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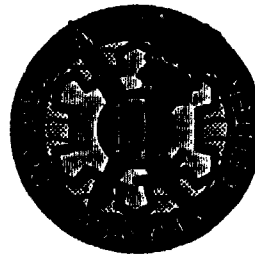**Study Directorate**
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Mobile Strike Force 2010

Technical Memorandum
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This paper describes the Mobile Strike Force (MSF) 2010 analysis. This analysis provided input to the TRADOC Commander and the Chief of Staff of the Army to support decisions regarding FORCE XXI development and to the Battle Laboratory Integration and Technology Directorate (BLITD), TRADOC, in support of their Louisiana Maneuver New Technology issue. The TRADOC Analysis Center (TRAC) conducted a workshop to assess the impact of future technological capabilities and organizational variations enabled by these new technologies. TRAC assembled a group of subject-matter experts from the new technologies' proponent schools and centers to role play the MSF 2010 staff. TRAC used the Computer Assisted Map Exercise (CAMEX) model to execute the Southwest Asia (SWA) Prairie Warrior 94 MSF scenario with the MSF force structure, systems, and threat updated to 2010. TRAC conducted after-action reviews after each staff planning session to collect qualitative observations from the workshop participants. There was a base case and six alternatives that were variations on the insertion of new technologies and changes in organizational structure and MSF employment based on those new technologies.

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DISCLAIMER

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Abstract

This paper describes the Mobile Strike Force (MSF) 2010 analysis. This analysis provided input to the TRADOC Commander and Chief of Staff of the Army to support decisions regarding FORCE XXI development and to the Battle Laboratory Integration and Technology Directorate, TRADOC, in support of their Louisiana Maneuver New Technology issue. TRAC.conducted a workshop to assess the impact of future technological capabilities and organizational variations enabled by these new technologies. TRAC assembled a group of subject matter experts from the new technologies' proponent schools and centers to role play the MSF 2010 staff. TRAC used the Computer Assisted Map Exercise (CAMEX) model to execute the South West Asia Prairie Warrior 94 MSF scenario with the MSF force structure, systems and threat updated to 2010. TRAC conducted after action reviews after each staff planning session to collect qualitative observations from the workshop participants. There was a base case and 6 alternatives that were variations on the insertion of new technologies, tactical employments, and changes in organizational structure and MSF employment based on those new technologies. New technology questionnaires were administered to the MSF 2010 Workshop to capture the participants unique perceptions of the capabilities and employment of future technologies.

MOBILE STRIKE FORCE 2010

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1.   **Purpose.** This paper contains the experimental observations and insights developed during the dual session Mobile Strike Force (MSF) 2010 Workshop held 16-26 May and 6-14 June 1994. The purpose of the workshop was to provide analytic insights for the development of Force XXI to the TRADOC Commander and Chief of Staff of the Army (CSA) by July 1994.

2.   **Participants.** The workshop was hosted by the TRADOC Analysis Center (TRAC). Participants included representatives from HQ TRADOC Battle Lab Integration and Technology Directorate (BLITD), US Army Command and General Staff College (CGSC) Studies of Advanced Military Science (SAMS), US Army Infantry Center, US Army Armor Center, US Army Artillery Center, US Army Aviation Center, US Army Intelligence Center, US Army Combined Arms Support Command, US Air Force Air Combat Command, and the TRADOC Combined Arms Center Threats Directorate. TRAC participants included representatives from TRAC's Study and Analysis Center (TRAC-SAC), Operational Analysis Center (TRAC-OAC), Scenario and Wargaming Center (TRAC-SWC), and TRAC-LEE.

3.   **Background.** TRAC conducted the MSF 2010 analysis for BLITD in support of their Louisiana Maneuver (LAM) New Technology issue. Originally, the study was to provide an analysis in September for an October 1994 Board of Director's (BOD) meeting. However, this schedule was preempted by the CSA's desire to begin making decisions on Force XXI in July 1994. In order to develop analytical insights by July 1994, TRAC conducted a workshop to assess the impact of future technological capabilities and organizational variations enabled by these new technologies. TRAC conducted the workshop in two sessions during May and June 1994. TRAC assembled a group of subject matter experts (SME) from the proponent schools and centers to role play staff sections of a MSF 2010. TRAC employed the Computer Assisted Map Exercise (CAMEX) model to execute a scenario and act as a discussion driver for the workshop participants. The South West Asia (SWA) scenario chosen was the MSF scenario used for the Prairie Warrior exercise held during May 1994 by the US Army Command and General Staff College (CGSC). Although the Prairie Warrior MSF scenario is 1998, it served to set the starting conditions for the workshop. The MSF 2010 force structure, systems and threat varied significantly from those of the MSF 1998 in Prairie Warrior. The workshop employed after action reviews (AARs) at the conclusion of each staff planning session as the means to collect qualitative observations from the workshop participants. At the conclusion of the MSF 2010 Workshop, all the MSF staff and CAMEX gamers fill out a new technology questionnaire designed to capture these SMEs opinions on the future technologies employed during the workshop.

4.   **Mobile Strike Force.** The MSF is an experimental vehicle to aid in designing future organizations; it is not an objective force. The MSF is a maneuver organization of 2010 whose systems include extended capabilities in digitization, lethality and mobility. Its mission is to strike deep into the enemy using shock, firepower and speed to quickly defeat the enemy. Figure 1 depicts the force organization for the MSF 2010. The MSF 2010 has two Mobile Strike Groups
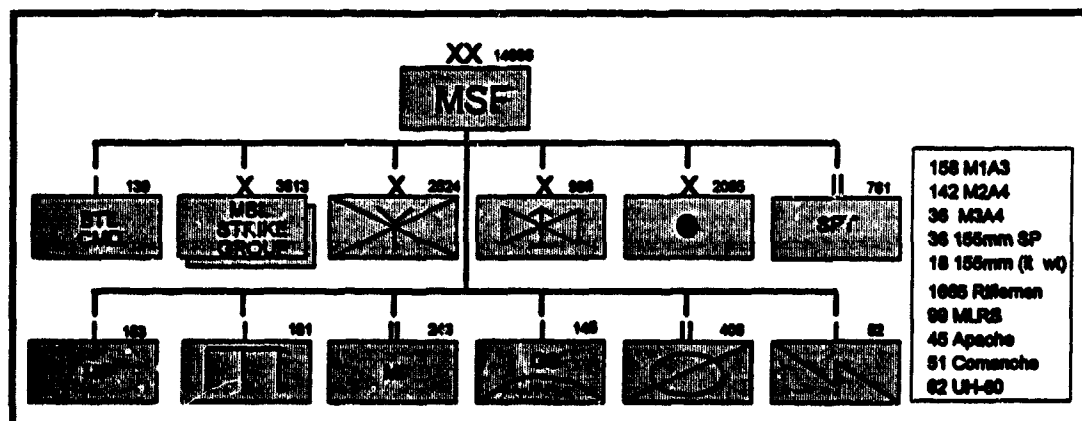
Figure 1. MSF 2010 organization chart.

(MSGs) each with two armored battalions and two mechanized infantry battalions. These battalions have about sixty percent of the tanks and infantry fighting vehicles of an Army of Excellence (AOE) battalion. The MSG has its own artillery with 9 Multiple Launcher Rocket Systems (MLRS) and 18 Advanced Field Artillery Systems (AFAS). The MSF has an Air Assault Group (AAG) with light infantry and lift helicopters to move quickly to an objective. There are three light infantry battalions in the AAG. The AAG also has 18 towed howitzers. The Attack Aviation Regiment is the air maneuver arm of the MSF. There are 45 Apaches and 27 Comanches in the regiment. The Mobile Artillery Group has 81 MLRS. The MSF is organized by brigade sized modular units all of which have their own logistics units plus there is one mobile support group for the other MSF units. Additionally, the MSGs and the AAG have their own direct support artillery and reconnaissance company or troop. The MSGs have their own engineer support and there is one engineer company to support the rest of the MSF. The logistics support is provided at the brigade level having been pulled out of the battalions and there is no division support command. The unit is to be self-sufficient for 3 to 5 days and does not provide hot meals to the troops. There is no band, a reduced MI battalion, a small signal company, and limited engineer support. The MSF has a significant deep fires capability with 99 MLRS and direct support artillery with 36 SP 155mm and 18 towed 155 mm.

5.   Assumptions / Limitations / Constraints.

   a. *Assumptions.*

      (1)   The MSF can move at a rate of 30-35 kilometers an hour including HEMMTTS, HMMWVs, M1A3s, M2A3s.

      (2)   The MSF would get two or more MLRS Battalions' support from corps.

      (3)   Sufficiently accurate data is available, or can be generated, to represent 2010 technological capabilities in all simulations used in this analysis.

(4)   Electronic sensors for BDA available at corps level to include JSTARS, Short and Close Range Unmanned Aerial Vehicle (UAV).

(5)   The target acquisition systems and improved sensor to shooter linkage were sufficient to achieve precision targeting.

b. *Limitations.*

(1)   **Because of the nature of the workshop no definitive conclusions can be drawn; rather this analysis is exploratory in nature and points to general trends.**

(2)   **Results reported herein entitled observations or based on the questionnaire should not be construed as definitive; these results point to areas that may require further investigation.**

(3)   **There was a lack of near real-time situational awareness in this exercise. While it was assumed that RTSA would be the norm for the day in 2010, it could not be played with the CAMEX model.**

(4)   **As represented in this exercise, the UAVs were able to provide near ground truth and were not vulnerable to enemy air defense systems.**

(5)   **The analysis considered one scenario in Southwest Asia (SWA).**

(6)   **No conclusions may be made from this exercise about the value of joint precision strikes against command and control, logistics and intelligence nodes or other high value targets because CAMEX does not explicitly represent the effects of such targeting.**

c. *Constraints.* MLRS Army Tactical Missile Systems (ATACMS) missions were constrained to 400 rounds of Block Ia, 200 rounds of Block II, and 100 rounds of Block IIa. These initial quantities of ATACMS were considered to be reasonable; in fact the quantities are very liberal (200 Block II ATACMS to one MSF battle is a significant part of the projected total Army buy).

6.   **Computer Assisted Map Exercise (CAMEX).** CAMEX was selected for the MSF 2010 analysis to accommodate time constraints and for its value as a qualitative analysis tool. Over the past three years CAMEX has evolved with each new use and user. It was originally developed as an alternative (to the dice and board game) exercise driver, but has also been used as a course of action analyzer, a staff trainer, and to assess scenario feasibility and analyze proper employment of units. Its propensity to serve as a discussion driver, highlighting observations and insights that can easily go unnoticed in other models, made CAMEX a natural choice to analyze new technologies and organizational structures with minimal bias to any particular weapon system or functional area.

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a. *How unique is CAMEX?* CAMEX is TRAC's division / corps level model that allows for human interaction while using deterministic processes. Developed in-house, the CAMEX model is based on modules from Vector-in-Commander (VIC). VIC is a low resolution, event-driven, deterministic model composed of sets of tactical decision rules (which describe the decision making process) and various model time delays (that would affect movement and fire support). As a corps and division-level force effectiveness model, VIC currently serves as the centerpiece of the Army's functional area modeling effort. CAMEX and VIC use common data files as well as common attrition and movement algorithms. Although CAMEX is man-in-the-loop, there are no purely random processes. CAMEX differs significantly from VIC, however, in both command and control and time delay processes.

b. *What are these differences and how do they affect analysis / model results?* CAMEX takes command and control input generated by staffs of Red and Blue players (subject matter experts (SME)) acting out the roles they would actually perform on a division or corps level staff. This input (e.g., tactical objectives, axes of advance, movements, obstacle emplacements, primary targets, munitions, UAV flight patterns, engagement decisions) is entered into the CAMEX model by gamers, military and civilian operations analysts trained to interpret the SME input as executable commands to the model. Time delays vary, from automated to manual to "off-line" play , depending on the nature of the event and scenario.

c. *Repeatability.* CAMEX has two levels of man-in-the-loop gamers; one are the SME Red and Blue staff players and the second is the CAMEX gamers. In addition to the gamers and players, CAMEX also requires controllers, objective senior officers and civilians to ensure all gamers and players stay inside their roles, give each force no unfair advantage, and play the scenario as opposed to the model. These interspersions of gamer, player, and controller involvement with the model and scenario, and the learning that is inevitable with each iteration, make exact repetition of results impossible, even given identical inputs. On the other hand, the qualitative nature of CAMEX makes it useful to support analysis of trends and observations. CAMEX results can narrow alternatives, allowing for better choices of what to analyze in the more labor- and time intensive VIC. Human interpretations of player / model actions and results become more important than the quantitative aspects of force-on-force results. Whereas absolute comparisons are seen as speculative in CAMEX, the observations and insights from the staff group's use of terrain, scenario, and forces against the man-in-the-loop OPFOR make for a fertile bed for further investigation.

7. **New Technology Questionnaires.** As a result of participation on the MSF 2010 Workshop, the MSF staff possessed some unique perceptions of potential future U.S. Army warfighting capabilities. Much of the Army's future warfighting effectiveness relies on continued investment in the right new and emerging technologies. Questionnaires were distributed to key staff, gaming and exercise control personnel from whom comments were solicited. In total, 11 questionnaires were returned for the conduct of the analysis and this represented 100 percent of the responses expected. the initial review of these questionnaires revealed that all of the respondents provided several of the requested ratings and comments, and thus, all the questionnaires provided usable data and information to support the analysis effort. The details of the administration of the questionnaire and the results obtained are at appendix i.

8. **Issues.** TRAC focused on fires, maneuver and combat service support (CSS) issues for the July deliverable. Observations and insights evolved in other areas and were collected and documented as well. CSS issues were addressed by TRAC-LEE and documented under separate cover. The specific issues and subissues addressed in this report are:

a. *Fires:* Are the MSF fire support assets sufficient to provide both close support and fires in depth?

b. *Maneuver:* Is the MSF capable of performing maneuver functions over the duration of operations?

(1) Subissue 1: How can the MSF improve the maneuver organizational structure to best utilize future technological capabilities to accomplish its mission?

(2) Subissue 2: What future technological capabilities best enable the maneuver force to accomplish its mission?

9. **Essential elements of analysis.**

a. Fires essential elements of analysis.

(1) EEA 1: Is there sufficient target acquisition systems (FA and non-FA) to exploit the MSF fires capabilities?

(2) EEA 2: Are there sufficient fire support delivery assets to support maneuver functions?

(3) EEA 3: Do the addition of future technological fire support capabilities and / or changes in the fire support force structure enable the MSF commander to mass more of his force / systems sooner and increase the intensity of the battle?

(4) EEA 4: Do the addition of future technological fire support capabilities and / or changes in the fire support force structure improve MSF's ability to kill the enemy at depth?

(5) EEA 5: Do the addition of future technological fire support capabilities and / or changes in the fire support force structure achieve increased survivability?

b. Maneuver essential elements of analysis.

(1) EEA 6: Do future maneuver technological capabilities improve the effectiveness of the force?

(2) EEA 7: Do future maneuver technological capabilities enable changes to the force structure?

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(3) EEA 8: Are maneuver organizational changes necessary to achieve the effectiveness required to ensure success of the MSF?

(4) EEA 9: How resilient is the maneuver force over the duration of the operation?

(5) EEA 10: What areas of improvement provide the best potential for increased combat effectiveness?

(6) EEA 11: Are reconnaissance assets sufficient to ensure the effectiveness of the force?

(7) EEA 12: What is the impact of the maneuver force on the MSF commander's ability to dominate the battle space?

10. **Alternatives.** Seven organizational and technological variations were investigated during the MSF 2010 Workshop as depicted in Table 1. Originally, five runs were anticipated to look first at the balance of the fires capability to conduct the deep battle and support the close fight and then at the combat capability of the maneuver forces of the MSF. As the workshop unfolded, requirements for additional runs surfaced. The seven runs conducted during the workshop are presented below. Additional information on the future systems used in this analysis may be found in appendix C.

Table 1. Alternative descriptions.

Alternative	Description
Base Case	See Page 2
1.	2 MLRS BN replaced by 2 AFASBN
2.	Future Maneuver Systems (FMBT, FIFV, FSV, & JAWS)
3.	Additional company per maneuver battalion.
4.	Increased ATK helicopter survivability.
5.	Triple ATACMS missiles.
6.	Redesign, 3 grnd & 3 air cav trps; add 2 more 155 cannons per battery

a. *Base Case*. This alternative used the MSF operational concept developed by SAMS in a scenario written by CGSC students for Prairie Warrior. The scenario launched the MSF in a deep deliberate attack against the three trail divisions of the Governor's Van Guard Corps in South West Asia.

b. *Alternative 1*. For this alternative two MLRS battalions were traded for two AFAS battalions from the base case to investigate MSF ability to provide deep and close fires.

c. *Alternative 2*. Future systems replaced advanced models of current systems to investigate the impact on the MSF's capability to conduct close combat operations. Would future technologies offset the 40 percent reduction in maneuver battalion's major combat systems? Future technologies included the Future main battle tank (FMBT), the future infantry fighting vehicle (FIFV), the future scout vehicle (FSV), and the Joint Advanced Weapon System (JAWS).

d. *Alternative 3*. In this alternative one company was added to the mobile strike units, increasing combat system totals from 35 to 46 in each battalion.

e. *Alternative 4*. This alternative investigated the impact of stealth technology on the survivability of attack helicopters. The contribution of future attack helicopters to the success of the MSF was examined. For this run, the Apaches were given the stealth characteristics of Comanches.

f. *Alternative 5*. Alternative 5 tripled the number of ATACMS rounds and kept the number of MLRS launchers constant. The Ferret missile was also added in this alternative. During the execution of the base case and alternative 1, it was observed that the deep battle was limited by the number of ATACMS rounds, not the number of MLRS launchers. Alternative 5 was created to investigate the impact of tripling the number of ATACMS rounds in an effort to examine the number of MLRS launchers as a constraint.

g. *Alternative 6*. This alternative challenged the workshop participants to design a 2010 MSF that used technological, organizational and doctrinal lessons learned from previous alternatives. The reconnaissance and security (R&S) force increased from 3 ground and 1 air troops (3X1) to 3 ground and 3 air troops (3X3). The air cavalry troop was taken from the AAG and put into the R&S force and a third air cavalry troop was added. The number of 155 mm SPs was increased to 48 by increasing the number of tubes in a battery from 6 to 8. The future systems of alternative 2 remained in the MSF. Mobile strike units retained a total of 35 combat systems.

11. **Scenario.**

a. *Opposing Forces.*

(1) The opposing forces (OPFOR) portrayed in the exercise were not intended to be, and are not, a representation of any real world threat force. Similarly, the OPFOR does not represent the intelligence community's projection of any specific threat force. The OPFOR organization and equipment package was designed to present a futuristic (2010), high technology force capable of providing the MSF a stressful fight across all of its battlefield operating systems.

(2) The OPFOR for this exercise was drawn from the TRADOC Common Teaching Scenario Southwest Asia. The principal force opposing the MSF were elements of the First Governor's Vanguard Corps (1GVC), the theater reserve. Figure 2 shows the
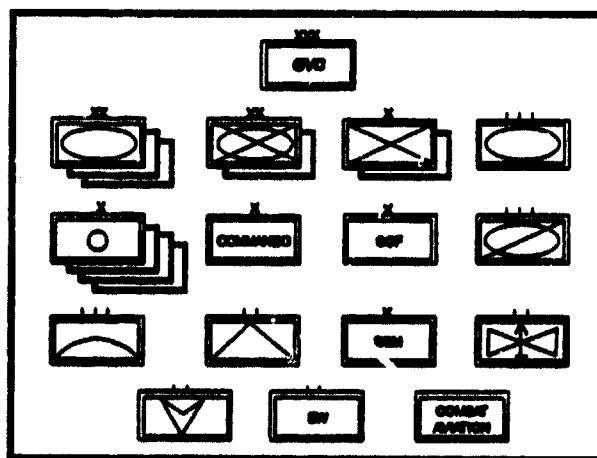
Figure 2. First Governor's Vanguard Corps

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composition of the 1GVC. In addition to the Army units, the 1GVC had a total of 184 sorties available each day. The sorties were apportioned among defensive counterair (DCA) 60%, close air support (CAS) 30% and air interdiction (AI) 10%.

(3) Figure 3 shows the disposition of the 1GVC at the beginning of the exercise. The 13th and 16th Mechanized Divisions (MD) and the 15th Tank Division (TD) have moved into blocking positions to stop expected blue penetrations. The remaining three divisions, the 11TD, 12TD and 14MD, are in assembly areas north of the Euphrates River. This exercise focused on the battle between the MSF and the 11TD, 12TD and 14MD, initially deployed north of the river. The 13MD, 15MD, and 16TD were not dynamically gamed in this exercise.
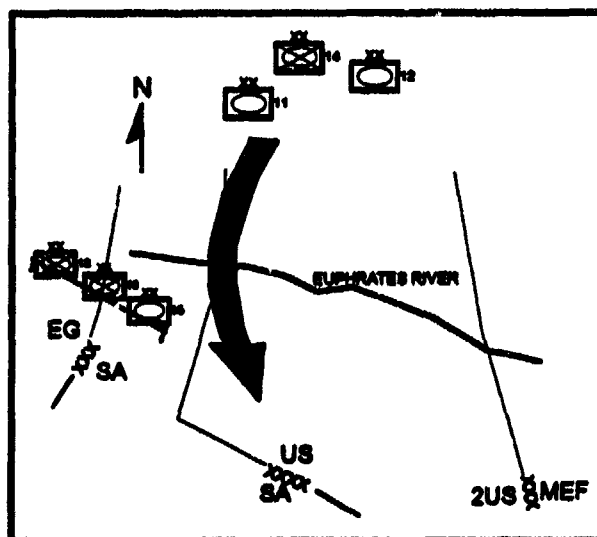
Figure 3. Opposing forces disposition.

(4) The concept of operations for the 1GVC is graphically portrayed in Figure 3. Three divisions, the 13MD, 15MD, and 16TD, are to occupy blocking positions in the southwest to thwart expected blue penetrations. The remaining divisions (11TD, 12TD and 14MD) and the Independent Tank Regiment (ITR), supported by three artillery brigades (two corps and one army level) are to conduct the 1GVC's main attack, splitting the boundary between the friendly coalition forces. This attack would be lead by the 11TD and 14MD with the 12TD and ITR following and prepared to exploit the success of either lead divisions.

b. *Battle Flow*. This section provides a brief synopsis of the six alternatives which were conducted during the MSF 2010 analysis. A more detailed description is available in appendix G. Paragraph c. below summarizes the results of the basecase and the alternatives.

(1) The mission of the MSF, shown in Figure 4, was to conduct an operational move through II Corps sector NLT 1500 XX May 2010, attack in zone to stop the 1GVC by defeating three divisions in engagement areas Red and Green. The MSF commander intended to use the deep strike assets of the MSF to attrit the 11TD, 12TD and 14MD and shape the
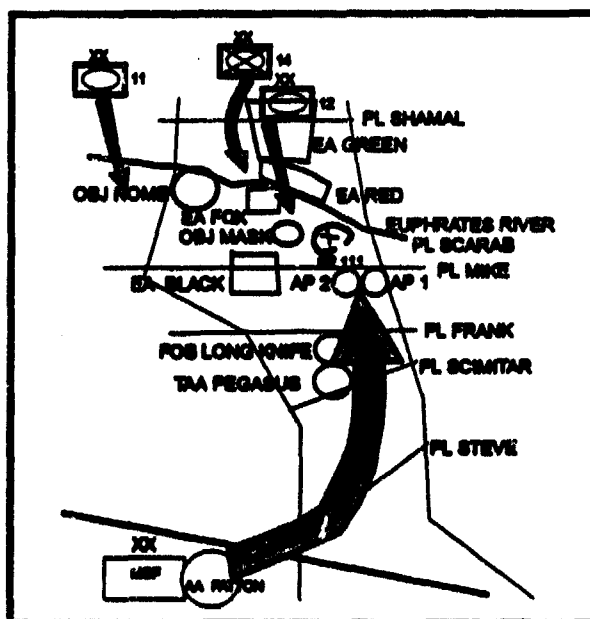
Figure 4. Battle flow base case.

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battle, find the flank division quickly, screen with the R&S Force, and strike with a Mobile Strike Group (MSG). He wanted to use the Air Assault Group (AAG) to block the trail division. Finally, he wished to fight the third division with the second MSG. Base case through alternative 4 were identical in their concept of operation, scheme of maneuver, and the general execution of the scenario.

(2)   Concept of the operation (base case). The Mobile Artillery Group (MAG) battalions were placed forward of the maneuver forces to begin the deep attack. As shown in Figure 4, the MSGs conducted an operational move from TAA Patton to attack positions (AP) 1 and 2. The R&S Force secured TAA Pegasus and then occupied a screen line along PL Mike. The AAG remained at Patton and was airlifted to arrive at Forward Operating Base (FOB) Long Knife as the first MSG crossed PL Frank.

(a)   The three trail divisions of the 1GVC were the 11TD in the west, the 12TD in the east and the 14MD trailing the 12TD in the north. The 2nd (US) Corps delayed the 11TD north on the river until 2400, and attrited them to 75% strength. The MSF hit the 12TD with ATACMS Block II, SEAD, and air interdiction as the 12TD moved through EA Green. Air interdiction targeted key bridge sites in front of the division and the MAG battalions fired a WAM minefield on the north side of the river in EA Red. As the lead elements of the 12TD reached the river, ATACMS Block II was fired, SEAD went in, CAS was used and the attack helicopter battalions were rotated into attack by fire positions south of the river. The 12TD was defeated and reduced to 48% strength.   The 12TD occupied a hasty defense.

(b)   Corps assets and its organic lift battalion airlifted the Air Assault Group from FOB Long Knife to a blocking position at BP 111. The 1GVC fired persistent chemical agents and FASCAM into the remainder of the MSF, which was still moving north to enter the close battle. The MSF commander halted the entire force for three hours to conduct decontamination. Although his combat forces could have continued to fight in overpressurized systems, his support forces would have had to remain in MOPP 4 for several hours, which would have degraded their capability. Artillery, SEAD, and air interdiction attrited the 14MD in EA Green. West of EA Red, a WAM minefield was laid and the attack helicopter battalions were committed simultaneously (surged), to ensure that no 14MD forces crossed the river. After decontamination, MSG's 1 and 2 continued to move to PL Glenn and were at 91% and 98% strength respectively. The 14MD was defeated and assumed a hasty defense south of the river and west of OBJ Mask, with an end strength of approximately 48%.

(c)   The 11TD abandoned its earlier mission to split the seam between 2nd (US) Corps and coalition forces. Based on OPFOR intelligence, the 11TD turned south and east to meet the division sized force which threatened to flank the 1GVC. The 11TD was configured with two regiments (12th Tank Regiment (TR) and 14th Mechanized Regiment (MR)) up and one back (11TR). The MSGs attempted to attrit the regiments of the 11TD deep by integrating the deep strike assets of MLRS with the precision of AFAS. They targeted mech. battalions, and the Regimental Artillery Groups. The Independent Tank Regiment (ITR) was approximately 20 kilometers north and east of 11TD trail regiment. The MSF separated the two lead regiments (12th and 14th) from the trail regiment (the 11th) by firing a WAM minefield. This created EA

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Black. The R&S air troop that had been providing an advanced guard for the two MSGs occupied an attack-by-fire position east of the WAM minefield and orchestrated the CAS, attack helicopters and artillery firing into EA Black. As the Joint Air Attack Team (JAAT) struck the lead regiments, the two MSGs maneuvered to the division's right flank. The 11TD fired a FASCAM minefield that delayed the two MSGs for a short time, allowing the ITR to join the trail mech regiment. The 11th TD met the two MSG's in a meeting engagement.

(d) At the conclusion of the battle shown in Figure 5, both the ITR and the mech regiment were reduced to a combat ineffective status. The 11TD began a withdrawal at 18% strength. MSG 1 and MSG 2 were reduced to 37% and 56% respectively. The MSF was at 58% strength. All attack helicopters were destroyed and most artillery ammunition was expended. The MSF occupied a hasty defense and waited for corps reconstitution. In the base case, as in alternatives one through four, the MSF was successful in defeating the three trail divisions of the 1GVC. It moved 200-300 kilometers, attrited the enemy with deep attacks, closed with and destroyed him. The MSF did not remain combat effective in the base case or in Alt 1 though Alt 4. Losses, particularly to direct fire systems were high in the close battle in each of these cases.
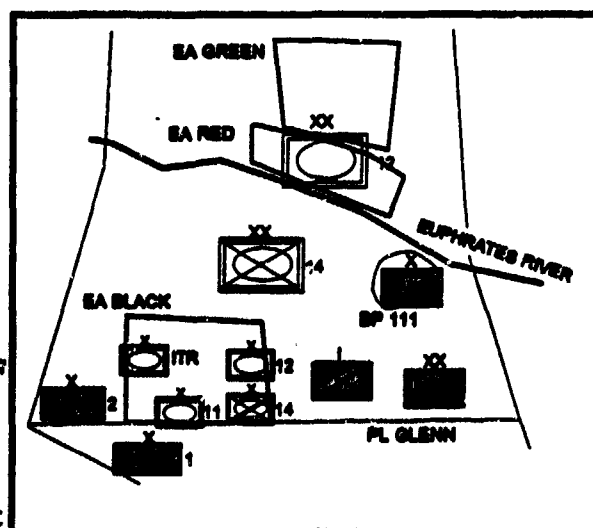
Figure 5. Close combat base case through alternative 4.

(3) Alternative 1 traded two MLRS battalions for two AFAS battalions, while other variables were kept constant. This alternative investigated the MSF's ability to provide deep and close fires. The concept of operation, scheme of maneuver and execution of the scenario were not changed, however, the modification to indirect fire force structure, did change the unit strengths slightly from the base case, as described in the following paragraph.

(4) Alternative 2 used future systems in place of advanced models of current systems, investigating the impact on the MSF's ability to conduct close combat operations. Future systems included the FMBT, FIFV, FSV, and JAWS. Other variables were kept constant, and the concept of operation, scheme of maneuver and execution of the scenario did not change. Results varied slightly from the base case. Lethality and survivability improvements to the personnel carrier and tank reduced losses to direct fire systems. Similarly, improved air defense capabilities reduced losses to attack aviation.

(5) Alternative 3 added one company to each MSF maneuver battalion, increasing combat systems from 35 to 46 (AOE 58 and 54). Other variables were kept constant, and the concept of operation, scheme of maneuver and execution of the scenario were unchanged from the base case.

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(6)   Alternative 4 examined the contribution of future attack helicopters to MSF success and featured the Comanche's stealth characteristics as an enhancement to the Apache. This alternative investigated stealth technology's impact on attack helicopter survivability. Other variables were kept constant, and the concept of operation, scheme of maneuver and execution of the scenario were unchanged from the base case.

(7)   Alternative 5 tripled the number of ATACMS rounds available while keeping the number of MLRS launchers constant. (Alternative 5 was created to investigate this impact since the base case and alternative 1 showed that the number of ATACMS rounds, not the number of MLRS launchers, limited the deep battle.) The Ferret missile was also added. This alternative differed from the base case battle flow previously described, in that the MSF was able to defeat all three divisions in the deep battle. In this alternative the significant difference was that there was no close fight and the MSF remained combat effective.

(a)   The defeat of all three divisions in the deep attack was made possible by two major changes. First, the MSF's number of allocated ATACMS was tripled. Second, a technique for effective application of these ATACMS fires was developed. When the last division (11TD) was unable to cross the river after the deep attack, the MSF had achieved the commander's intent. At the end of the battle shown in Figure 6, all three divisions occupied hasty defenses north of the river, with the 11TD at 58% strength, the 12TD at 55% strength, and the 14MD at 60%.
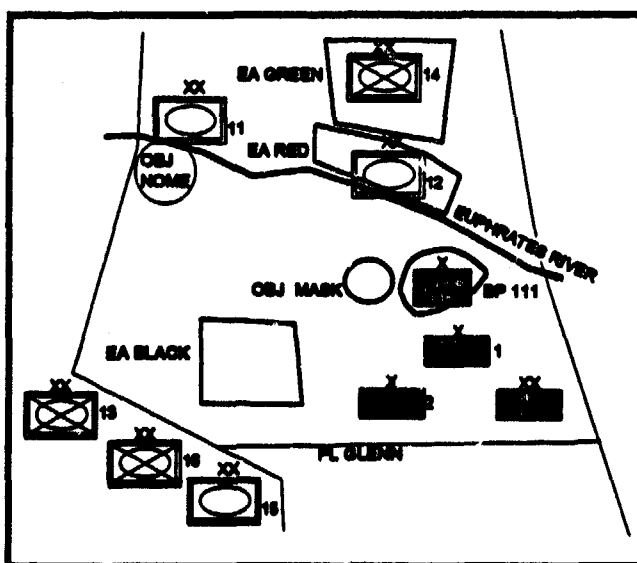
Figure 6. End of battle alternative 5

(b)   Since there was no close battle, the MSF was at 90% strength, with MSG 1 at 95% and MSG 2 at 95%. Thirty percent of the attack helicopters were destroyed and two thirds of the ATACMS rounds were expended. In this case the MSF defeated three OPFOR divisions and remained combat effective. The MSF accomplished its mission and was a success, but several questions remained. How would the MSF do if it were forced to fight through remnant forces before beginning their deep attack? What would occur if the best options from all five alternatives were combined? What would occur if the FEBA was crossed earlier and the MSF had to move over a hundred kilometers beyond it? Could the OPFOR be played more realistically? Is the Corps role in the deep battle sufficient, and when should battle handover occur? These questions were addressed in alternative six.

(8)   Alternative 6 was conducted to provide a more realistic analysis of MSF capabilities and shortfalls. For more in depth analysis and to make the simulation as realistic as possible, player insights were used to redevelop the scenario and force structure. Corps assets were called on to do more, and their efforts were more surgical than in past alternatives. The empty battlefield, which the MSF had moved through in past alternatives, was now occupied by remnants. MSF staff now planned a move through hostile areas in which security for support elements became an important consideration.

(a)   In this alternative corps and MSF roles were more clearly defined. II Corps was asked to attrit and delay the three trail OPFOR divisions north of the Euphrates. It specifically targeted OPFOR artillery brigades, reducing them to 75%. This was unique because although earlier alternatives had included a 15% attrition of the 1GVC trail divisions, it was non specific. The MSF specified its requirements for Corps attrition, in this alternative. The staff requested that corps attrit the 1GVC corps artillery, begin the deep attack on all three divisions and maintain pressure on the OPFOR as the MSF moved through the breach. The battle handover occurred during the move, after the MSF had conducted passage of lines. In this alternative, the MSF was required to fight through OPFOR remnants on their deep strike to defeat the three trail divisions of the 1GVC. This affected the entire force; support units were now required to move under an umbrella of maneuver coverage. MAG battalions, which had preceded MSGs in earlier alternatives to maintain a continuous deep attack while the force was still moving , now required maneuver element security.

(b)   The MSF began its deep attack with Ferret missiles and ATACMS fires, concentrating on the OPFOR corps artillery brigades. This effort successfully destroyed two corps artillery brigades. The Attack Aviation Regiment then launched a JAAT against the 12TD in EA Red. SEAD and FASCAM from the MSF struck the 12TD in EA red and the 11TD in EA Blue.

(c)   The 12TD crossed the Euphrates with one regiment. The two trail regiments were cut off by FASCAM. This permitted the MSF's attack helicopters to concentrate on the lead regiment while 48 AI sorties attacked the trail regiments in EA Red. The 12TD was reduced to 41% strength.

(d)   In the west, two lead regiments of the 11TD crossed the Euphrates before WAM cut off its trail regiment. Eighteen AI sorties attacked the trail regiment and attrited it to 69%. The MSF continued deep fires against the 11TD. Mean while the OPFOR launched two battalions of attack helicopters and 50 fixed wing sorties against the MSF. The air CAP and a counterattack by a Comanche air troop stifled the OPFOR air attack.

(e)   The MSF repeated its attack sequence in EA Red against the 14MD reducing it to 56%. The OPFOR then surged their aircraft, attack aviation, UAVs, and fixed wing against the MSF. A combination of air CAP, scout and attack helicopters and organic air defense reduced the OPFOR air threat by 76%. They were still able to commit 28 systems destroying all but 18 of the MSF's MLRS launchers. The MSF overall was attrited to approximately 81%. The MSF succeeded in defeating the 1GVC, reducing all three trail divisions below 60%. Figure 7 shows

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the end state of alternative six. The majority of its losses came from air strikes. These strikes were successful only when the OPFOR surged all their fixed wing and attack helicopter assets simultaneously. Because of the terrific losses in aircraft these attacks could not have been repeated. The MSF took very few losses from direct fire engagements with remnants.

(f)   Again, the MSF was successful in moving 300 kilometers deep into sector. It succeeded in providing security for the force, without significant direct fire losses. The MSF defeated the three trail divisions of the 1GVC without entering close battle. The MSF was lethal and survivable; in a realistic mission it moved great distances, conducted a deep attack, and retained the capability to execute continued operations.

Figure 7. End of battle alternative 6.

c. *Summary.* The MSF succeeded in defeating the OPFOR in base case and each of the alternatives. Its end strength percentages are shown in Table 2. The two most important observations from this data are: the MSGs were attrited in the close battle to an average of 63 percent, and the MAGs were attrited by air strikes to 46 percent.

Table 2. Major unit percent mass remaining .

	BASE	1	2	3	4	5	6
MSF TOTAL	88	88	74	73	74	88	81
MSG1	88	37	80	67	82	95	94
MSG2	82	67	79	73	76	95	94
AAG	99	97	100	100	100	89	100
MAG	71	83	91	88	91	71	46
OPFOR	58	55	58	68	67	71	83
1JMD	47	49	66	68	53	69	85
9TD	48	49	37	37	43	48	35
11TD	33	19	33	33	23	89	41
1TR	38	43	37	37	33	65	47

(1)   The OPFOR reduced the MSGs to an average of 63 percent strength in the base case through alternative 4. The modal percentage strength was 62, the median was 64 with a standard deviation of 12. This data indicates that the MSGs were attrited by over 36 percent in these five alternatives. This attrition was the result of close battle between the two MSGs and three OPFOR regiments. In alternatives 5 and 6, the OPFOR reduced the two MSGs to an average of 92 percent strength. The modal and median percentage strength were 95 with a standard deviation of 5. This data indicates that the MSGs were attrited by only 8 percent in these two alternatives. This dramatic change was the result of a successful deep attack which negated the need for a close battle.

(2)   The MAG was reduced in alternative 6 to 46 percent when the OPFOR surged fixed wing and attack aviation assets in a massed strike against the MSF. This figure is two standard deviations from the average MAG strength. The MAG was closest to the attack and

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took the most casualties, before the Air Cap defeated the OPFOR. This represented a change in OPFOR tactics.

12. **Analysis.** Each of the following paragraphs provides information regarding the study issues and their subordinate EEA. Results are clearly broken down by source. Again, please be aware of the limitations of some of them.

a. *Fires. Are the MSF fires support assets sufficient to provide both close support and fires in depth?* Detailed fires observations made by the MSF staff during the workshop can be found at appendix D. Note: The alternatives of most interest for this question are the base case, alternative one and five. Other alternatives were maneuver system variants.

    (1) *Sufficiency of target acquisition systems to support MSF fires capabilities.*

        (a) Gamer Observations. There was an assumption of sufficient target acquisition systems and improved sensor to shooter linkages to achieve precise targeting. However, there were soundings of caution on the reliance on these system. "Digital euphoria" was to be avoided as the points discussed below illustrate.

           1. There will still be complications with dissemination and analysis of the mass of information available. Ability to collect targeting information is much more advanced than ability to process and disseminate to firers. There will still be things outside the digital realm such as civilian refugees, EPWs, non-targetable sites (schools and hospitals for example) that will need to be considered.

           2. Another concern was that the speed of the MSF would leave behind some target acquisition assets. Ground based sensing assets may not be quick enough to keep up with a fast moving force. The MSF needs target acquisition on the move to go along with shoot on the move.

           3. Intelligence needs to be collected, analyzed and disseminated to all on the move with communications present to support it. Intelligence planning is essential to support targeting. Fixed wing missions, for example, cannot be tasked without proper coordination.

           4. As a sensor under direct control of the MSF and each MSG, the UAV was mentioned frequently. The players used UAV to reconnoiter locations for helicopter holding areas, to monitor likely routes of advance of enemy force, to gather BDA, to key ATACMS fires, to screen the MSF flank, even considered it to resupply the MSF with small electronic parts. This generated some concern that there may not be enough ground control stations to support the missions given the UAV. With greater reliance on UAV, the staff discussed what happens when the UAV suffers attrition. JSTARS and Comanche are possible backups but this requires consideration in the intelligence collection plan. The bottom line is that UAV technology is rapidly developing a host of capabilities with a resulting tendency to approach UAV as the universal cure-all. The Army needs to manage development closely to take full advantage UAV collection, transport and attack capabilities. Since UAVs were considered to be so important to

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the success of the deep battle, further experimentation is required to ensure availability sufficient numbers to perform the deep targeting and BDA missions.

5. The staff felt a need to dramatically increase the capability to conduct BDA to meet the needs of the MSF. Future requirements may dictate a model of DECIDE-detect-deliver-ASSESS which emphasizes the DECIDE and ASSESS functions instead of the current decide-DETECT-deliver model. As technology makes it easier to detect targets in the future, commanders will have to place more emphasis on which targets to expend their limited resources. In addition, the assessment function must be done better using new technology for information gathering and dissemination. Near real time target acquisition and BDA are critical to the tempo and lethality of the MSF, particularly when executing the deep battle. Useful BDA impacts battle planning (tempo) and the allocation of combat resources (lethal force that prevents overkill or underkill). Commanders in 2010 will need the ability to control target acquisition assets for accurate and timely targeting and BDA, even with asset and linkage improvements. National assets may not be responsive enough. While it was felt that a primary mission of UAV was BDA, UAVs can be used for confirmation of target and then for BDA on same target. The rapid pace of the MSF also generated concern about how to do BDA of our own assets (use of mobile maintenance teams, for example).

(b) CAMEX results. The exercise gamers had numerous intelligence and target collection assets at their disposal. JSTARS Ground Station Module (GSM), helicopters to include Comanche, counterfire radar, Short and Close Range UAV and scouts were organic to the MSF. JSTARS, Guardrail Common Sensor, Advanced Quickfix, Rivet Joint/TENCAP, ASARS and long range reconnaissance units (LRSU) provided information to the MSF from corps and higher. These assets were not varied across the alternatives; however, employment varied based on METT-T of the alternative being gamed. UAV, ASARS and JSTARS MTI were used to support artillery missions, air force attacks and attack helicopter missions. ASARS was used for deep attack missions. JSTARS MTI was employed as a cueing sensor for UAV. Throughout the battle, 50-60% of the UAV missions were tasked to locate high payoff targets for artillery and fixed wing aviation.

(c) Questionnaire. The fire support officer in the exercise commented that "UAV allowed us to employ our limited assets when and where they had the most impact on the enemy..." The Air Force liaison officer wrote that JSTARS provided "near real time" targeting for fixed wing fire support. The respondents were asked to rate which potential new technology most affected the lethality, survivability, and tempo of the MSF; the top three rated were the UAV, Comanche, and ATACMS Block II with BAT.

(2) *Sufficiency of fire support delivery assets to support maneuver operations.*

(a) Gamer Observations. Killing the enemy throughout the depth of the battlefield requires different, but complementary systems. The MLRS is effective at longer ranges, against large area targets, and can surge or mass firepower quickly. Cannons are more effective than MLRS, at closer ranges and against hard or point targets. Previous studies show that rockets and cannons are complementary systems, with cannons as the direct support weapon of choice. With

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cannons reinforcing the brigade fight, more threat losses occur in the close battle than with MLRS reinforcing. Cannons reinforcing the brigade fight (with MLRS both in the MSG and in general support) help complete the continuum between the division deep, division close, brigade extended close, and brigade close battles. With MLRS reinforcing the brigade fight, a paucity of close support fires for the brigade close fight appears to exist. Given that the ability to support the deep battle was constrained more by the number of rounds than the number of launchers (see paragraph (3) below), the MSF with 45 MLRS launchers (alternative 1) was preferred by the subject matter experts over the MSF with 99 MLRS launchers (base case). Further, the exercise group preferred most of all a test excursion (alternative 6) MSF with 72 MLRS launchers and 72 AFAS.

(b) **CAMEX results.**
Gaming results (Figure 8) show that cannons reinforcing the brigade fight (exercise alternative 1) provide more utility than rockets in the close battle. With cannons reinforcing the brigade fight, more threat losses occur in the close battle than with MLRS reinforcing (base case).
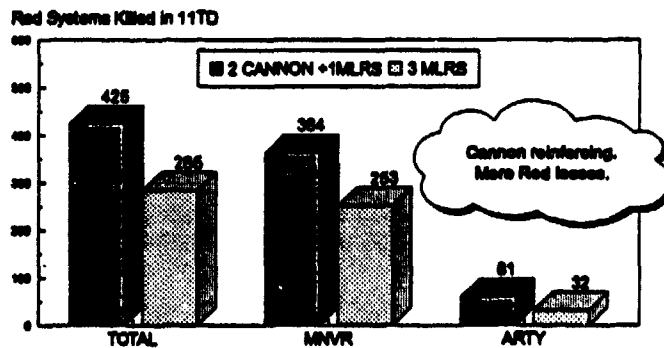
Figure 8. Cannons vs. MLRS in close battle.

(3) *Future fire support technological capabilities' and force structures' impact on massing the force and battle intensity.*

(a) Gamer Observations. The exercise participants felt much more successful with artillery in alternative 1 (45 MLRS/72 AFAS) than in the base case due to the increased intensity of the battle introduced by the cannon reinforcing the MSGs. As the exercise progressed, the group learned that massing of fires and setting priorities for targeting made the greatest impact in fire support effectiveness.

(b) **CAMEX results.**
Figure 9 compares the number of cannon and rocket missions fired for the base case (99 MLRS/18 AFAS) and alternative 1 (45 MLRS/72 AFAS) in the CAMEX gaming. The increase in close battle intensity can be seen in the increased missions of cannons in alternative 1. Massing of effects by use of extended range munitions allows the MSF to avoid an intense close battle as shown in the consistency of the number of
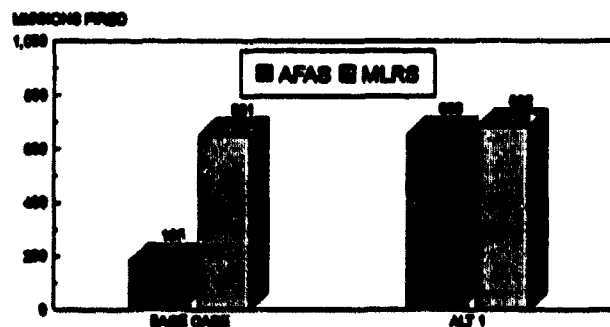
Figure 9. Missions fired.

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MLRS missions in each of these cases. At the same time, the ability to mass fires in support of the close battle with cannon artillery remains a force structure consideration.

(c)   Questionnaire. The respondents were asked to rate which potential new technology most affected the lethality, survivability, and tempo of the MSF. The systems rated were the UAV, Comanche, and ATACMS Block II with BAT.

(4)   *Future fire support technological capabilities' and force structures' impact on the deep battle.*

(a)   Gamer Observations.

1.   Of concern to the MSF staff was the role of corps in supporting the MSF. Specifically, what resources would be placed on MSF targets and areas of interest? For example, can the MSF assume JSTARS support from corps? Corps is relied upon to supply assets to assist in the MSF operation. With uncertainty between corps and MSF roles, the staff thought that they may be committing MSF assets too early.   Some felt it might be better to wait until the corps deals with some of the opposing force. A big question remained unresolved: With 300 km battle space for MSF, who has which part of the deep fight between the overlapping corps and division battlespace? This is further complicated on the nonlinear battlefield. While the MSF is the corps' main effort, it is not fighting the corps battle. Corps assets need to be available to fight the corps battle and to shape the deep fight for the MSF. The MSF fight must be tied to the corps battle, especially for long range artillery fires and aviation support.

2.   Extended range ATACMS allows the maneuver of fires over the breadth and depth of the battlefield. One of the biggest keys to the MSF's success in this operation was the MSF's 100 km standoff in deep fires. ATACMS allowed the friendly force to increase tempo by maneuvering fire and massing with maneuver assets (attack helicopters in particular) and fixed wing. An ATACMS (extended range) WAM provided a significant capability to separate and delay the enemy and shape the deep battlefield. This may also be an appropriate follow-on capability for GATOR.

3.   CAMEX results. Analysis revealed that the *quantity* of deep strike munitions available to the MSF (ATACMS Block I, I-P3I, II, II-P3I) may be limiting the capability of the MSF to mass and increase the intensity of the battle at key points in the battle.

4.   Figure 10 shows that the loss exchange ratio (LER) for the deep attrition phase improves by 22% when the quantity of deep strike munitions is held constant and the quantity of delivery
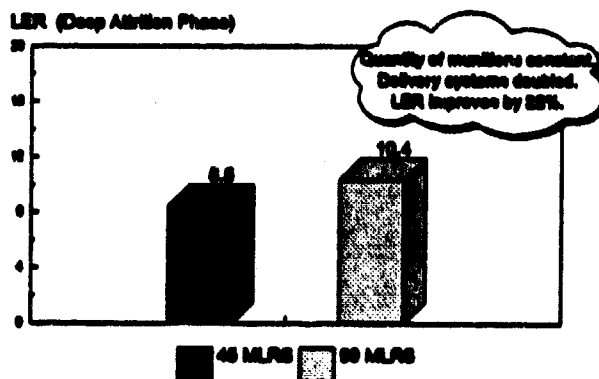
Figure 10. Increase quantity of delivery systems

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systems (launchers) is roughly doubled. Losses are total major system losses due to fixed wing, attack helicopters and artillery.

5. Figure 11 shows that the LER for the deep attrition phase improves by 93% when the quantity of deep strike munitions is tripled (three time as many Block II and Block II-P31 were available for firing) and the quantity of launchers is not increased. Thus, the deep fire support is constrained more by the quantity of deep strike munitions than the quantity of delivery systems.
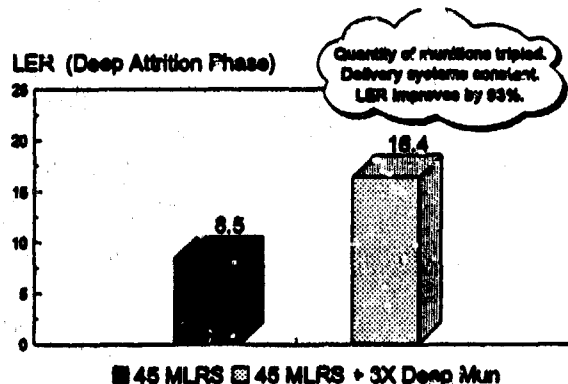
Figure 11. Increase quantity of munitions available.

(b) Questionnaire. The respondents were asked to rate which potential new technology most affected the lethality, survivability, and tempo of the MSF; the top three rated were the UAV, Comanche, and ATACMS Block II with BAT.

(5) *Future fire support technological capabilities' and force structures' impact on survivability.*

(a) Gamer observations. Survivability is dependent on several factors discussed above, particularly the impact of fires on the maneuver battle, the ability to win the deep battle and the intensity of the battle. Maneuver is best supported by a mix of cannon and rocket, with sufficient quantities of munitions to win the deep battle, decreasing the intensity of the MSF close fight.

(b) CAMEX results. Figure 12 shows percentage remaining of the MSF maneuver systems (tank, AFV, helicopter), artillery and total (maneuver and artillery) in the base case, alternative 1, and alternative 5. Avoiding the close battle is key to the protection of the MSF. Alternative 1, with cannon and rocket supporting the MSF, was least survivable of the fires cases due to its more intense close fight. The ability of MLRS to fire at extended ranges allows the MSF to conduct a less intense close battle and improves the survivability of the MSF in the base case. When
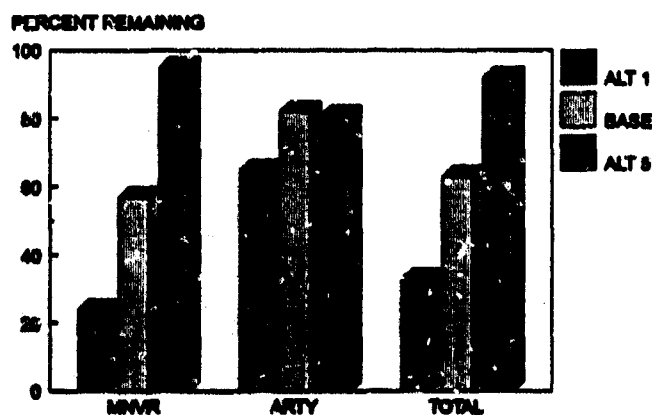
Figure 12. MSF survivability.

additional munitions for the deep battle were added to alternative 1 (alternative 5), the MSF was effective in killing the enemy at depth, disrupting their planning and execution, avoiding a close fight and significantly improving MSF survivability.

(c) Questionnaire. Killing the enemy in depth is the key to MSF survivability. ATACMS Block II is an extremely effective system for the deep battle; its lethality is confirmed by a poll of MSF Staff observations in Appendix I.

(6) *Other fire support impacts.*

(a) *Gamer observations*

1. The role and importance of an FSE for the MSF has increased. This is due the increased range and capabilities of the fires systems and munitions, as well as the additional responsibilities associated with fighting and winning the deep battle. It is going to be a much greater job to coordinate targeting information. MSF 2010 and other studies (Legal Mix VII, CR-UAV COEA) point to the need for closed loop acquisition systems, sensors linked directly to fire support systems, rather than filtered through intelligence and command channels. Additional staff capabilities may be required (i.e., AFATDS, DOCC, mini-ASOC, etc.).

2. Airspace has not expanded in the MSF scenario, but may have in the theater perspective. Airspace was seen as part of the battle space and airspace management is still an issue for which doctrinal development has lagged behind technology. A2C2 needs detailed study as we shoot more long range, high altitude missiles, add long loiter UAV, proliferate short and medium range UAV, extend range of attack helicopters and increase joint air support to land forces. Airspace coordination for ATACMS has not been streamlined accordingly (may take 40 minutes or longer), too long for a fire support system in which the sensor to shooter timelines are down to a few minutes. A2C2 is a key issue across all deep systems that needs to be addressed. For this exercise we assumed this process worked perfectly but at present it does not.

(b) *Questionnaire.* In the questionnaire, the participants were asked to describe any OPFOR actions that reduced Blue force lethality, survivability, and tempo. The respondents pointed out that the Blue force's air defense could be overwhelmed by the OPFOR's use of surging attack helicopters and fixed wing. Additionally, several respondents noted that OPFOR's chemical attacks had been employed effectively to dictate a change in tempo. Finally, two further questions solicited any perceived lack in MSF 2010 capabilities or additional insights. Several capabilities were lacking, including an organic decontamination capability, adequate ammunition hauling capacity, ADA coverage, sufficient air cavalry assets, and sufficient engineer assets.

b. *Maneuver. Is the MSF capable of performing maneuver functions over the duration of operations?* Detailed maneuver observations made by the MSF staff during the workshop can be found at appendix E.

(1) *Future Maneuver Technological Capabilities.* The most important future maneuver technological capabilities were the attack helicopter, the Comanche, FMBT and FIFV. Their

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ability to improve the effectiveness of the MSF were recorded in gamer insights, CAMEX results and the questionnaire.

(a)   Gamer Observations.

1.   Army aviation is the maneuver component of the deep battle and is a major contributor. Army aviation is an extremely effective system that rapidly projects combat power. Helicopters can assist in the synchronization of deep attack assets in a JAAT or as a forward observer or laser designator. Attack and scout helicopters work well in conjunction with wide area munitions (WAM) minefields. WAM worked well in this scenario, because its "smart" mines can cover larger areas. Rapidly emplaced by either helicopter, air or artillery, WAM can separate and delay forces. The Attack Aviation Regiment synchronized with WAM, CAS, and MLRS, defeated two divisions deep without requiring any close battle. Attack helicopters accounted for between 16% and 30% of the total kills during the deep battle.

2.   The Comanche was considered by the MSF gaming staff as one of the key future maneuver technological systems to the success of the MSF. The Comanche increased tempo and provided capabilities that no other system could provide. The Comanche's lengthy time on-station, stealthiness, and lethality combined to provided a means to perform a variety of missions including deep reconnaissance, target acquisition and BDA; security for attack helicopters during the deep battle, for the Air Assault Group when inserted, and for the MSGs during the close battles; air defense against OPFOR attack helicopters for forward deployed systems (e.g., MLRS) and for the MSGs during the close battles; and securing likely air avenues of approach.

(b)   CAMEX results.

1.   The addition of FMBT and FIFV capabilities increased the survivability of ground maneuver systems. The total number of kills by the FMBTs and FIFVs were approximately the same as the total number of kills by the M1A3s and M2A3s. The significant difference was the number of MSF direct fire systems lost. Figure 13 illustrates that there were 3.67 times as many M1A3s and M2A3s lost to OPFOR direct fire systems (i.e., tanks, AFVs, and attack helicopters) than there were FMBTs and FIFVs lost to these systems.

2.   Since the OPFOR in this scenario was technologically advanced, the OPFOR direct fire systems were about on par with the MSF direct fire systems. In fact the OPFOR had a direct fire missile that out ranged the M1A3 and M2A3. Accordingly, these MSF systems were devastated in the base case losing nearly 50% of all systems. They were rapidly killed by the OPFOR attack aviation, artillery and

MSF Armor Losses
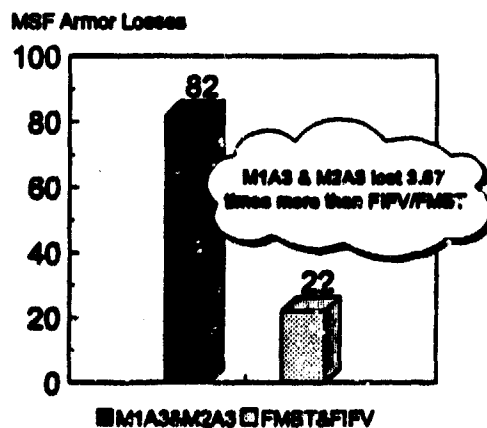
Figure 13. MSF direct fire losses.

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ground maneuver systems. Particularly effective was the OPFOR AFV with its antitank missile system that out ranged the M1A3. The range difference was significant enough that this system, without stabilization, and firing from a short halt was able to effectively reduce MSGs to a combat ineffective status.

3. The Comanche's role as an air defender was key to the destruction of OPFOR attack helicopters. The Comanche was more effective than other systems in using the advanced Stinger because its greater stealth decreased the OPFOR's standoff. The MSF increased resiliency with the destruction of OPFOR helicopters, losing (8%) fewer maneuver systems. They were better able to complete the close fight. The MSF staff poll observations in Appendix I corroborated that the Comanche was a major contributor to force survivability.

4. The MSF began all alternatives with 335 tanks and infantry fighting vehicles in its two MSGs. The tanks and IFVs survivability was increased with the introduction of the FMBT and FIFV in alternative two. In the base case, the MSGs lost 159 of these systems, and their residual strength was only 176. In alternative two, the MSGs lost 142 of these systems and their residual strength was 193. Although this marks only a five percent improvement in survivability it is more significant when you realize (as previously stated) that losses to direct fire systems in alternative two were reduced by 20% over the base case.

5. OPFOR systems competed for the Blue targets. As OPFOR helicopters and direct fire systems killed fewer MSF systems, OPFOR artillery took up the slack. Figure 14 illustrates the target competition among the principle OPFOR killers. In the base case, OPFOR attack helicopters and artillery killed 41 and 31 percent of the MSF kills, respectively. As the alternatives to counter the OPFOR attack helicopter were implemented in the future systems (i.e., FMBT, FIFV) alternative and the stealthy AH alternative, the MSF losses to OPFOR attack helicopters was significantly reduced. However, the MSF losses to OPFOR artillery increased so that the gains from countering the OPFOR attack helicopters provided more targets for OPFOR artillery. In all three cases the total MSF system kills by OPFOR direct fire systems was relatively constant.
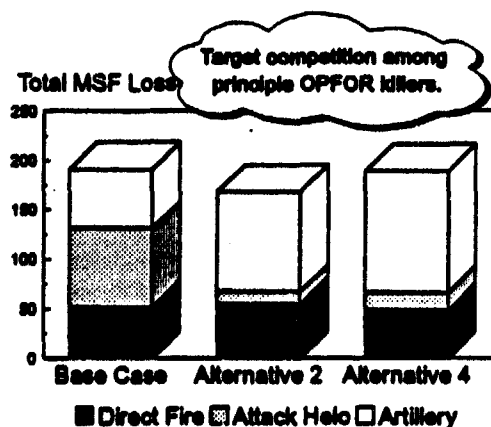
Figure 14. Total MSF losses by category of killer.

(c) Questionnaire. With regards to tempo, lethality and survivability, the Comanche was perceived as the one of the six most effective systems, as indicated by having a majority of the respondents rating this system as providing an "extreme positive effect".

(2) *Future Maneuver Technological capabilities impact on force structure.* Future maneuver technologies enable the MSF to achieve marginal success in close battle against a

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reduced OPFOR division, without changing the MSF's force structure. Attack aviation with other deep systems were potentially so effective, that no close battle was necessary in some alternatives.

(a) Gamer Observations. The MSF can achieve marginal success in close battle, without changing force structure, because of the contribution of key technological capabilities. These capabilities include the attack helicopter and the Comanche. Attack helicopters and Comanches give the maneuver commander more mobility, agility and lethality, while enabling him to project combat power farther (300 km) and faster. Their contribution enables the force to complete its mission. They are the only maneuver component of the deep battle and are major contributors. By increasing the depth at which the MSF kills, the intensity and scope of the close battle are reduced proportionally.

(b) CAMEX results. CAMEX results also showed that technological capabilities enhanced the survivability of the force without changing the maneuver organization. In alternative 2, the survivability of tanks and AFVs was enhanced by future systems as previously mentioned. In alternative 4, where attack helicopters were provided a stealth capability, the MSGs lost less systems overall, despite losing more maneuver systems to direct fire than in either the base case or alternative 2. These results would seem counterintuitive until you realize that losses of all MSF systems to OPFOR attack aviation dropped from 79 in the base case to 17 in alternative 4. Thus, the Comanche's technological capability did successfully counter the OPFOR attack aviation threat, enhance the MSF's overall survivability, and enable it to achieve marginal success.

(c) In alternative 3, the force structure was changed by adding a fourth company of FMBTs/FIFVs to each maneuver battalion. This change in force structure did not bring the expected improvements in lethality and survivability. It was not as successful as the addition of improved technological capabilities in alternative 2. Kills by the MSF increased from alternative 2 by 6%, but the losses also increased by 13%. These results are confusing. It appears that when the number of systems are increased, so are the losses. More study is required on this alternative in a higher resolution model.

(3) *Maneuver Resiliency*. The maneuver force possessed very little resilience. In close battle they continued to lose an unacceptable percentage. While future systems have helped, further analysis must be conducted to determine the resilience expected of the MSF.

(a) Gamer Observations.

1. Each alternative, especially those involving close battle, showed that the maneuver force possesses very little resilience. It has limited depth and casualties typically result in loss of a significant percentage of the force. This affords a commander no reserve. Piecemeal commitment will not succeed, nor can the MSGs become decisively engaged without severely high casualties. MSGs in close combat require further study to determine what technology or force structure enhancements can overcome this shortfall.

2. The value added by the ground maneuver force was more due to its presence in the enemy's flank and rear, than the ground maneuver force's ability to engage and defeat the enemy maneuver force in close combat. It is true that the Mobile Strike Groups did provide a guard for the deep attack forces, they easily fought through the scattered remnants of OPFOR forces, and they were marginally effective in direct fire attack against a reduced regiment (less than 60% strength). But the key contribution of the MSGs and the AAG was to provide a maneuver presence that had to be considered by the OPFOR. The MSGs rapid movement towards the enemy's rear area forced the OPFOR to react and counter, to move and adjust. They affected the OPFOR divisions' tempo and caused the OPFOR commander to alter his plan.

(b) CAMEX results.

1. The Mobile Strike Group's direct fire capability for lethality and survivability was marginally adequate to defeat the OPFOR's trail division after a successful brigade and division level deep fight which defeated the two OPFOR lead divisions. This deep fight was used consistently by the MSF in several alternatives. It emphasized the use of WAM minefields to shape the battle followed by attack aviation, artillery and air interdiction. As shown in Figure 15, the CAS, artillery and attack aviation, employed during the close battle, accounted for the majority of the total

OPFOR Close Battle Kills

Direct fire systems killed only 18% of close battle kills.

DF · AH · AI · ARTY

Figure 15. OPFOR losses by category killer.

kills (82%). Whereas, the MSG's direct fire systems, employed during the close battle, accounted for a minority of the total kills (18%), and the MSGs were essentially combat ineffective after the close battle, having lost over 30% of their systems.

2. The MSGs began with 335 tanks and IFVs. In the base case they retained 176 after the close battle. In alternative four (the last close battle) they retained 173 after close battle. These end strengths demonstrate that despite defeating the attack helicopters, and direct fire systems with future maneuver capabilities, the OPFOR's other systems continued to attrit the force. The end state was a maneuver force with only 52% of its combat systems remaining; a small force which rapidly became combat ineffective.

3. The addition of a maneuver company in alternative 3 produced no significant increase in resiliency. Alternative 3 added a fourth company to each maneuver battalion. These battalions were comprised of the FMBT and the FIFV. The MSGs lost 163 systems in alternative 3 compared to 142 in alternative 2. This 13% increase in losses appears counterintuitive. The MSF Staff recommended that this alternative receive further study on a higher resolution model.

(4) *Reconnaissance Assets.* The most important observation in terms of reconnaissance assets, was the organizational change of the R&S Force to a 3X3 organization. The MSF staff

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identified this shortfall when conducting their original planning, when they attempted to send 2 MSGs, the AAG, and an Attack Aviation Regiment on different axis. Providing security for these forces in their myriad mission was not possible with the original organization.

(a) Gamer Observations. An alternative run included a R&S Force consisting of three ground troops and three air troops (3X3). This organizational change provided the MSF commander the capability to move on three separate axis with an aviation R&S troop in the lead. The change to the MSF was to consolidate the air cavalry troop from the AAG into the R&S Force making it a 3X2 organization, then increasing the R&S Force by a third air cavalry troop, making it a 3X3 organization.

1. This force change was highly successful. The additional Comanche air recon troops enabled the MSF to provide security to attack aviation during the deep attack. Air recon troops were used to gain contact with and delay the lead division. An air troop was also used to provide immediate security during the emplacement of the air assault group. The change resulted in aviation R&S troops conducting effective recon and security (screen, cover, and guard) for the force.

2. Because these missions often took place simultaneously, it was the force change which made air troop support possible. Three air recon troops attrited more OPFOR aircraft and armored vehicles, enhancing the survivability of maneuver forces. Real time information on enemy force disposition enabled MSG commanders to see the battlefield and better maneuver their forces to engage the enemy. CAS and attack helicopter operations were enhanced as the air cavalry troop had "eyes on target" and could effectively direct fires on the enemy.

(b) Questionnaire. One of eight themes which consistently arose in terms of lacking capabilities was insufficient air cavalry assets. This was reported in terms of the inability to provide adequate air defense and security for the force.

(5) Other Maneuver Issues. There were some other maneuver issues which were particularly evident during the planning phase of the exercise. The effects of deep battle targeting against command and control assets, and lines of supply or communication were not available from CAMEX. The AAG was not an effective force in a SWA scenario. Finally, the requirement for a ten kilometer air-to-air missile (ATAM) was clearly demonstrated during the exercise.

(a) Gamer Observations

1. The number of friendly losses or number of OPFOR kills may have been different had the simulation included the effects of deep battle attacks on morale, command and control (C2) and resupply. C2 nodes, lines of supply and shock effect are common objectives of the deep attack. Without morale, command and control and the hope of resupply, men and systems do not fight at 100% of their capability. In the simulation, success of the deep battle could be measured only in the total number of systems destroyed. Deep attacks still assisted the close fight, but those systems remaining were 100% capable and ready to fight when they entered the close battle.

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2. Air Assault Group. In other operations and on other terrain, the Air Assault Group may be capable of adding an offensive capability to the MSF. When properly employed, the AAG is a maneuver asset that can quickly be placed in a key position to force the OPFOR to react. The AAG may be quite effective seizing airfields, crossing sites, command and control facilities, or as a choke point on a key movement route. The AAG's contribution in this scenario was, however, limited by the OPFOR's capability for unrestricted movement and the lack of dense terrain. In all alternatives the OPFOR avoided the AAG and occupied a hasty defense. This seemed to be related more to the remaining strength of these OPFOR units than their desire to avoid contact with the AAG. On occasions where OPFOR divisions crossed the river they bypassed the AAG's position. Since the AAG was incapable of pursuing them, it was attrition that caused the OPFOR divisions to assume a hasty defense.

3. The AAG has many limitations in a SWA scenario. Its lack of mobility once on the ground, limits its agility and ability to react to the OPFOR. It lacks survivability, with no organic engineer assets and towed howitzers (no armor protection). Its heavy weapons company has a maximum direct fire range of 2500 meters. All mounted OPFOR systems have more than double that capability. Addition of the TOW 2 or TACAWS / JAWS will be required for greater lethality and survivability. The AAG required outside assets to emplace, such as a corps lift battalion (UH-60), attack aviation, and MLRS support. These requirements made the AAG a distraction to the primary mission, whether it was the deep fight, close fight, or support of MSG movement.

(b) CAMEX results.

1. No numbers are available on kills by the AAG. However since the AAG only came in contact with small dismounted forces we can assume that they had no vehicle kills.

2. A requirement for an air-to-air missile with a 10 kilometer range to increase survivability of Blue attack helicopters against OPFOR attack helicopters was demonstrated during the CAMEX gaming of various alternatives. Figure 16 depicts kills by Blue helicopters of OPFOR helicopters with both the ATAM and a 10 km ATAM. Blue forces destroyed 20% more OPFOR helicopters with this system. Figure 17 depicts Blue helicopter losses with ATAM and a 10 km ATAM. We achieved a 71% reduction in losses of friendly aircraft to OPFOR aircraft when we fitted Blue attack helicopters with an air-to-air missile with a range of 10 kilometers.

c. *Other*. In addition to observations and insights on fires and maneuver, a number were made in other areas as well, including air defense, decontamination, mobility / countermobility, intelligence, and information operations. Detailed observations in these areas made by the MSF staff during the workshop can be found at appendix F.
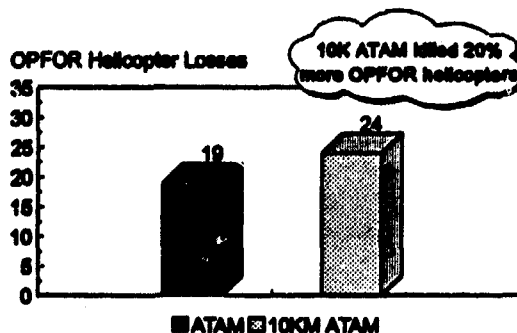
Figure 16. MSF helicopter kills

(1) *Air Defense*.

(a) Gamer Observations.

1. The AD package for the MSF needs to be closely considered. OPFOR air systems enjoy a standoff against U.S. armor, air, and AD systems. A capability must be developed that can out range OPFOR missiles. The OPFOR attack helicopters had a standoff over the Blue air defense missiles, the MSF's primary self defense AD system.

2. A joint combined arms approach to AD was employed to counter the OPFOR attack helicopters. After the air CAP took its share of the attacking fixed wing and rotary wing aircraft, EFOG-Ms were employed in an AD role along with the air defense missiles against the remaining enemy helicopters. Additionally, suspected air avenues of approach were mined with WAM which are effective against helicopters. Finally, the air cavalry troops performed security missions to identify, engage, and protect MSF attack assets. This joint combined arms approach reduced, but did not eliminate the MSF's vulnerability to OPFOR air.

3. The most effective counter to the OPFOR attack helicopters was the employment of a 10 km air-to-air missiles that out ranged the OPFOR missile. This technology significantly reduced the MSF's vulnerability to OPFOR air.

(b) CAMEX results. Even though OPFOR air suffered 80 to 90 percent losses to the US Air Force combat air patrols (CAP), enemy aircraft managed to get through nearly every time. These "leakers" were responsible for significant MSF losses. In fact, OPFOR fixed wing and attack helicopters were the greatest killers of MLRS (one of the MSF's major deep fire assets). In addition, MSF attack helicopter battalions in the deep attack were vulnerable to OPFOR attack helicopter missiles.

(c) Questionnaire. One of the primary killers of the MSF was OPFOR air, especially attack helicopters. In spite of MSF local air superiority, the OPFOR was able to mass and surge fixed and rotary wing assets to get aircraft through to their MSF targets. The potential for the OPFOR to surge air assets, successfully overwhelming friendly air defense, is confirmed by the MSF staff's polling in Appendix I.

(2) *Decontamination*.

(a) Gamer Observations.
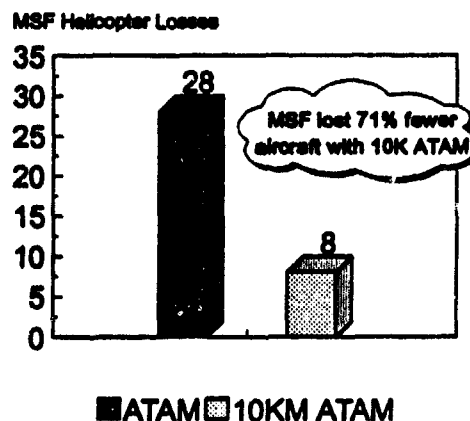
Figure 17. MSF helicopter losses.

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MSF lost 71% fewer aircraft with 10K ATAM

■ ATAM ▢ 10KM ATAM

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1. Chemical attacks were effectively employed by the OPFOR against the MSF. Although the MSF was not configured with any decontamination capability, such a capability was assumed available for the purposes of this exercise. Nonetheless, a three hour delay was incurred by the MSF each time it was hit by a chemical attack. In order to maintain its tempo, the MSF needs to be able to DECON on the move. This may require a dry DECON capability or the MSF DECON units must have their own capability to haul bulk water.

2. There is a disparity between overpressure systems and those which require their crews to MOPP. The overpressure systems can maintain their combat effectiveness without significant degradations. MOPP, however, immediately degrades crew performance and system effectiveness, and after a relatively short period of time, systems not overpressured will have to decontaminate and come out of MOPP before the onset of heat exhaustion. Meanwhile, overpressure systems can go right on fighting. This could lead to piecemeal commitment of the MSF.

(b)   Questionnaire. Not having a decontamination capability in the MSF proved a deficiency, especially when it is being employed against a OPFOR known to possess chemical agents and has a willingness to use them. This deficiency was one of eight highlighted by the MSF staff polls as noted in Appendix I.

(3)   *Mobility / Countermobility.*

(a)   Gamer Observations.

1. FASCAM and WAM minefields were instrumental in the shaping the battlefield for deep attack. WAM mines, which can be used in both close and deep fights, were particularly useful to shape deep engagement areas, separate forces, and cover air avenues of approach.

2. Air and artillery delivered FASCAM and WAM mines were employed to shape the deep attack engagement areas and close battle. Artillery emplacement is more responsive, has less risk associated, but is limited in the volume of mines and size of the minefield. Fixed wing GATOR mines and rotary wing VOLCANO mines, on the other hand, can emplace a greater volume of mines but should be employed when the risk to the OPFOR is minimal. Effective use of mines requires them to be covered by CAS, attack helicopters and UAVs and also requires a high degree of situational awareness.

3. An ATACMS (extended range) WAM provided a significant capability to separate and delay the enemy and shape the deep battlefield. May also be an appropriate follow-on capability for GATOR and VOLCANO.

(4)   *Intelligence.* Gamer's Observations:

(a)   Near real time situational awareness was key to the success of the MSF, and the MSF asset that was instrumental in achieving near real time situational awareness was the UAV. In order for MI units to produce near real time situational awareness, intelligence collection,

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analysis and reporting needs to be done on the move, especially for a force that moves at the tempo and speed of the MSF.

(b) Near real time situational awareness is actually the product of the entire intelligence system, not just the UAV. It requires cross queuing from corps and EAC systems (JSTARS, AWACS, TENCAP, etc.) through ASAS to effectively employ the UAV. The MSF is reliant on corps for situation development, but the MSF must rely on its own organic UAVs for targeting and BDA. Having UAVs in sufficient numbers at brigade and division levels was a key factor in the full simultaneous employment of all assets of the MSF to achieve improved agility and massing of effects.

(c) UAVs were one of the major contributors to the success of the MSF in the deep battle (as much as three fourths of the intelligence UAVs were used for deep targeting and BDA). The number of UAVs needed to support the MSF ranged from 6 to 15 during this operation. Additional missions point to a need for more UAVs. Survivability also dictates the number of UAVs required, as does their capability to carry multiple packages. The MSF will need a counter UAV capability - a means to identify and defeat enemy UAVs. Since UAVs were so important to the success of the MSF, further experimentation is required to ensure there are sufficient numbers to perform the deep and close targeting and BDA, as well as intelligence missions.

(5) *Information operations.*

(a) Gamer Observations. The ability to perform Army airspace command and control (A2C2) was critical to the success of all deep battle systems (i.e., AI, CAS, ATACMS, attack and scout helicopters, and UAV) in this MSF operation. For this exercise we assumed this process worked perfectly. In reality it does not. Lots of work is yet to be done in this area.

(b) Questionnaire.

1. A2C2 coordination and deconfliction is more complicated due to the increased tempo of the MSF. In the future, sensor to shooter times are expected to decrease to around a few minutes. A2C2 must keep pace for the timely engagement of high payoff targets. C2 staffs may need to be expanded to accomplish A2C2 (e.g., mini-ASOC / BCE may be required in the MSF).

2. Responsibilities of each echelon (MSG, MSF, corps, theater) for portions of the battle space must be thought out and clearly defined. Otherwise, there will be confusion over where one echelon's battle space and responsibilities end and the next begin. This may lead to overlapping responsibilities and unnecessary redundancy in staffs.

d. *Organization.* During the workshop, the MSF staff role players were asked to examine the organizational structure of the MSF and suggest any changes that they thought would improve the MSF's lethality or survivability. They provided several points of input. Primarily they looked at ways to improve command and control of the deep attack. They considered employment of the Air Assault Group, air defense for the force, and engineer support. None of

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the changes drastically reshaped the organization and some have been previously mentioned in this document.

(1)   In the realm of deep battle, the players suggested several improvements to the coordination and synchronization of deep strike assets. The intelligence staff requires target production personnel. These personnel would plan proactive counter battery fire through analyzing the current ASAS data base. Additional planning staff are needed to handle the sheer number of missions that the MAG and direct support battalions are capable of firing. Battle command company and MAG are still important for artillery control functions. There is a need for FSE support personnel in the battle command company to plan deep fires with appropriate automation and links. There is no way for the current limited staff to do fires planning for the 99 MLRS and the 54 howitzers. This number also reflects the requirement for increased deep fire effects given the reduced maneuver force.

(2)   The Air Assault Group requires an engineer company for counter mobility and survivability particularly in a desert environment. Air assault companies posses no organic armor or survivability assets and without the cover and concealment provided in woodland terrain, they are particularly endangered without key survivability assets. The air assault battalion needs an antitank company (LOSAT or TOW) to provide them the capability to engage OPFOR systems which now posses an unacceptable standoff.

(3)   The MSF will require additional aviation assets. This is true for several reasons. The lethality and agility of the attack helicopter promises increased success in most engagements against mechanized forces. The aviation battalion of AAG cannot conduct an airlift of more than one battalion at a time. To air mobile all battalions with their organic artillery, corps lift is required. The Recon and Security Force requires three air recon companies to provide security for the maneuver forces especially when they are attacking on separate axis. There is a need for more than three EH-60s in the aviation brigade to provide a twenty-four hour capability.

(4)   Combat support elements of the MSF required a few additional improvements. The MSF requires a transportation battalion to move all required support assets. The MSF MI BN (-) requires one additional MI company team for each MSG, and the AAG. The engineer armored vehicle laying bridge company must be replaced by the heavy assault bridge company to maintain force mobility. Engineer assets were insufficient as noted by MSF staff polls in Appendix I. Air defense for the MAG is critical, an organic air defense system may be necessary to protect it from catastrophic loss.

13.   Summary of observations by issue and EEA. This section takes the observations and insights made by the MSF staff during the CAMEX gaming and relates them to the fires and maneuver issues, subissues and essential elements of analysis developed for this analysis.

    a. *Fires: Are the MSF fire support assets sufficient to provide both close support and fires in depth?*

(1)   *EEA 1: Is there sufficient target acquisition systems (field artillery and non-field artillery) to exploit the MSF fires capabilities?* Planned acquisition systems available to the MSF 2010 force were sufficient to provide targets for the MSF fires capabilities. However, control of available targeting assets is an important consideration. To leverage future fire support technologies and dominate the battlespace with effective lethality, survivability and tempo the commander needs the ability to focus targeting and BDA assets. MSF 2010 and other studies (legal Mix VII, CR-UAV COEA) point to the need for closed loop acquisition systems, sensors netted directly to fire support systems, rather that filtered through intelligence and command channels.

(2)   *EEA 2: Are there sufficient fire support delivery assets to support maneuver functions?* Previous studies have indicated that rockets and cannons are complementary systems, with cannon the direct support weapon of choice. The MSF 2010 analysis also showed that a cannon / rocket mix, reinforcing the brigade fight, increases flexibility for the extended and close brigade fight. While massing fires sooner was achieved in the MSF 2010 exercise, there was still a need to plan and execute a close fight. The MSF 2010 alternative with a pure MLRS structure limited the effectiveness of the force in the close battle. Further experimentation with restructured FA organizations is warranted. The preferred alternative of the subject matter experts in the MSF 2010 exercise was a MAG with two battalions of 27 MLRS, one battalion of 24 AFAS and MSG artillery with one battalion of 24 AFAS and 9 MLRS for each of two MSGs.

(3)   *EEA 3: Do the addition of future technological fire support capabilities and / or changes in the fire support force structure enable the MSF commander to mass more of his force / systems sooner and increase the intensity of the battle?* The MSF 2010 exercise considered different mixes of fire support delivery assets and all were sufficient, with varying degrees of effectiveness, to support the close battle (see EEA 2). However, analysis of the MSF 2010 has shown that deep fire support is constrained more by the quantity of munitions than the quantity of delivery systems. Adding launchers without adding munitions to fire from them does not benefit the force as much as adding munitions alone. Additional long range munitions allow the force to achieve disruption and destruction of the threat at range.

(4)   *EEA 4: Do the addition of future technological fire support capabilities and / or changes in the fire support force structure improve MSF's ability to kill the enemy at depth?* Even with added munitions and launchers to improve the MSF 2010's ability to kill the enemy at depth, corps assets were still relied upon to shape the deep fight for the MSF. In the MSF 2010 exercise, the MSF requested corps delay one of three enemy divisions for nine hours. Corps accomplished the mission with ATACMS and TACAIR. While the MSF was the corps' main effort, it was not fighting the entire corps battle. Corps assets needed to be available to fight the corps battle as well as to shape the deep fight for the MSF. The MSF fight was tied to the corps battle, especially for long range artillery fires and aviation support.

(5)   *EEA 5: Do the addition of future technological fire support capabilities and / or changes in the fire support force structure achieve increased survivability?* To win quickly with minimum casualties, threat artillery must be countered. Employing fixed wing or attack helicopters to counter threat artillery is not as effective as artillery delivered smart munitions,

diverts them from other fire support missions, and puts them at risk. The MSF 2010 analysis touched on the future artillery capabilities and force structure to perform the counter-fire mission, but further research into the issue is needed.

(6) *Summary.* Planned acquisition systems available to the MSF 2010 force were sufficient to provide targets for the MSF fires capabilities if commanders at all echelons were able to control target acquisition assets for timely targeting information and BDA. Adding extended range launchers without adding deep strike munitions does not benefit the MSF as much as adding munitions alone. Sufficient fire support assets are available to the MSF when its operations are integrated into the corps fight. A mix of cannon and rocket, reinforcing the brigade fight, would provide flexibility for the extended and close MSF fight.

b. *Maneuver: Is the MSF capable of performing maneuver functions over the duration of operations?*

(1) *EEA 6: Do future maneuver technological capabilities improve the effectiveness of the force?* Yes, each analysis alternative showed that technological capabilities improve the effectiveness of the force. Comanche provided the force with a weapon system demonstrating greater standoff from its opponents and better security during movement. The 10 km air-to-air missile increased the survivability of all systems against attack aviation. The FMBT and the FIFV with 2nd Gen. FLIR were able to engage earlier and possessed greater survivability. The AAG's heavy weapons company currently has a maximum direct fire range of 2500 meters. Addition of the TOW 2 or TACAWS / JAWS will be required to offset mounted OPFOR systems with more than double our current capability.

(2) *EEA 7: Do future maneuver technological capabilities enable changes to the force structure?*

(a) Attack helicopters and Comanche give the maneuver commander more mobility, agility and lethality, while enabling him to project combat power farther (300 km) and faster. They are the only maneuver component of the deep battle and are major contributors. By increasing the depth at which the MSF kills, the intensity and scope of the close battle are reduced proportionally.

(b) The MSF concept changed the force structure of a standard maneuver battalion from 54 / 58 (infantry fighting vehicles / tanks) to 35 / 35. The FMBT and FIFV were more survivable and improved the commander's ability to fight with reduced battalions. The total number of kills by the FMBTs and FIFVs were approximately the same as the total number of kills by the M1A3s and M2A3s. The significant difference was the number of MSF direct fire systems lost. There were 3.67 times more M1A3s and M2A3s lost to OPFOR direct fire systems (i.e., tanks, AFVs, and attack helicopters) than there were FMBTs and FIFVs lost to these systems.

(3) *EEA 8: Are maneuver organizational changes necessary to achieve the effectiveness required to ensure the MSF's success?*

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(a)   The R&S Force will need to become a three ground troop by three air troop organization to achieve the effectiveness required to ensure the MSF's success. This organizational change provided the MSF commander the capability to move on three separate axes with an aviation R&S troop in the lead. The additional Comanche air recon troops enabled the MSF to provide security to attack aviation and to gain contact with and delay lead divisions. They also provided immediate security during the emplacement of the AAG.

(b)   The AAG should be removed from the MSF in a SWA scenario. Other, more effective, forces could be less costly and more productive than the AAG (e.g., an additional attack aviation regiment). The AAG's contribution in this scenario was limited by the OPFOR's capability for unrestricted movement and the lack of dense terrain. The AAG lacked mobility; once on the ground, it had limited agility and ability to react to the OPFOR. It lacked survivability, with towed howitzers without armor protection and no organic engineer assets. The AAG required emplacement assistance from outside assets including the corps lift battalion, attack aviation, and MLRS firing units. This deficiency was recognized by the MSF staff during mission analysis as noted in Appendix I. These requirements made the AAG a distraction to the primary mission, whether it was the deep fight, close fight, or support of MSG movement.

(4)   *EEA 9: How resilient is the maneuver force over the duration of the operation?* Each alternative, especially those involving close battle, showed that the maneuver force possesses very little resilience. It has limited depth and casualties typically result in loss of a significant percentage of the force. This affords a commander no reserve. Piecemeal commitment will not succeed, nor can the MSGs become decisively engaged without severely high casualties. MSGs in close combat require further study to determine what technology or force structure enhancements can overcome this shortfall.

(5)   *EEA 10: What areas of improvement provide the best potential for increased combat effectiveness?* The FMBT, FIFV, attack helicopter, Comanche, and 10 km air-to-air missile all provide excellent potential for generating increased combat effectiveness. Of these systems, the two most important are the Comanche and the attack helicopter because they extend the maneuver commander's battlespace. Their stealth, speed and lethality exemplify the "mobile strike" concept of the MSF.

(6)   *EEA 11: Are reconnaissance assets sufficient to ensure effectiveness of the force?* To ensure effectiveness of the force the following reconnaissance assets must be employed: the Comanche, UAVs, and 2nd Gen. FLIR. The primary reconnaissance asset was the UAV. The MSF relied on UAVs for targeting and BDA. They were key factors in the full simultaneous employment of all MSF assets. UAVs were programmed to find forces by type and location. Killer UAVs (Ferret) were used to find enemy high payoff targets for ATACMS. These systems would loiter, determine BDA, and strike again as necessary. Another key technological development used in maneuver reconnaissance vehicles was the 2nd Gen. FLIR. Mounted on nearly all future systems, its superior range and clarity surpasses threat capabilities and provides the maneuver commander with real time intelligence.

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(7) **EEA 12: What is the impact of the maneuver force on the MSF commander's ability to dominate the battlespace?** Attack aviation, with its increased depth and agility, enabled the maneuver commander to enter the deep attack and influence the deep battle as never before. The MSF was able to attrit, delay and defeat OPFOR divisions by concentrating squadrons of the Attack Aviation Regiment against them. These squadrons, when synchronized with WAM minefields, ATACMs and CAS, defeated OPFOR divisions. Attack aviation enabled the maneuver commander to increase deep battle tempo with direct fire weapons.

(8) **Subissue 1: How can the MSF improve the maneuver organizational structure to best utilize future technological capabilities to accomplish its mission?** The MSF's organizational structure can be improved by changing the R&S Force to a three by three organization and by improving the survivability of the ground maneuver force. The MSF staff agreed that the base case force structure provided insufficient air cavalry assets as noted in Appendix I. The MSF organization was changed several times during the wargaming and several variants were successful. Two air troops were added to the R&S force, which provided better security for the MSF. In a separate alternative a maneuver company was added to each of the mobile strike units. The results were inconclusive, however, and warrant further study with a higher resolution model.

(9) **Subissue 2: What future technological capabilities best enable the maneuver force to accomplish its mission?** The technological capabilities which best enabled the MSF to accomplish its missions included the Comanche, the FMBT, the FIFV, the 10 km air-to-air missile and the TOW 2 or TACAWS / JAWS. The Comanche's greater stealth provided a weapon system with greater standoff and better security. The 10 km air-to-air missile destroyed OPFOR helicopters before they could engage friendly forces and increased the survivability of all systems against attack aviation. The FMBT and the FIFV with 2nd Gen. FLIR were able to engage earlier, overcoming the threat's AT missile standoff advantage.

(10) **Summary:** The MSF was capable of performing maneuver functions, moving over 300 kilometers, and defeating three divisions in deep battle. Improvements are possible in the areas of organization and technology. The MSF's organizational structure can be improved by changing the R&S Force to a three by three organization and by improving the survivability of the ground maneuver force. Technological improvements which best enabled the MSF to accomplish its mission included the Comanche, the FMBT, the FIFV, the 10 km air-to-air missile and the TOW 2 or TACAWS / JAWS. Attack aviation, with its increased depth and agility, enabled the maneuver commander to enter the deep attack and influence the deep battle as never before. Comanche, UAV and 2nd Gen. FLIR were key reconnaissance assets in the full, simultaneous employment of the MSF. Finally, the MSG's maneuver battalions possess little resilience as they consist of only sixty percent of the systems in a current mechanized or armor battalion.

14. **Findings** - This section presents findings based on the key observations captured during the MSF 2010 Workshop, the CAMEX, and the questionnaire and groups them into three categories: Fires, Maneuver, and Other. Based on the observations, the CAMEX results, and the questionnaire, the U.S. Army of the 21st century should consider the following as recommendations to ensure a strong and effective force.

a. *Fires.*

(1). Ensure sufficient assets for targeting and BDA are provided to the force. Targeting and BDA provide the commander with the critical ability to focus and assess the effectiveness of fires. The UAV was the key system relied on to provide this capability.

(2) A rocket / cannon mix reinforcing the brigade fight, increases flexibility for the extended and close fight brigade fight. ATACMS Blk II was critical for winning the deep battle.

(3) Ensure that the quantities of deep strike munitions needed for the combat success of a MSF type force are available.

b. *Maneuver.*

(1) Provide an air maneuver capability similar to the RAH-66 Comanche. Its capabilities for extended range, overpressurization, and stealth were critical to the overall success of the MSF.

(2) Increase the range for the air-to-air missile to 10 kilometers. The increased survivability of the blue helicopters demonstrated requirement for a 10 kilometer range for an air-to-air missile to overcome the OPFOR air-to-air capability.

(3) The MSF requires Reconnaissance and Surveillance Force consisting of 3 air troops and 3 ground troops. This provides the MSF with security forces for all three maneuver elements and enables them to conduct independent movement on a fluid battlefield.

c. *Other.*

(1) The MSF needs a A2C2 cell to synchronize the deep fires within a crowded airspace which includes UAV, AFAS, ATACMS Block II, WAM, attack and scout helicopters, and TACAIR.. The deep attacks which took place in this operation probably could not have been synchronized by a heavy division's staff which is larger than the MSF staff.

(2) The MSF was hit by chemical munitions in this scenario, and, even given a DECON capability, a three hour delay was incurred after each chemical strike. The MSF needs to be able to DECON on the move. DECON units must develop a dry capability or be able to haul their own water especially in a SWA scenario. Add a DECON company to the MSF and develop a capability to DECON on the move.

APPENDIX A

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APPENDIX B

GLOSSARY

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Appendix B

Mobile Strike Force 2010

Glossary/Definitions

AAG	Air Assault Group
AAR	After Action Review
AFAS	Advanced Field Artillery System
AFATDS	Advanced Field Artillery Tactical System,
AFV	Armored Fighting Vehicle
AOE	Army of Excellence
ATAM	Air To Air Missile
AWACS	Airborne Warning and Control System
AWD	Advanced Warfighting Demonstration
AWE	Advanced Warfighting Experiment
BCBL	Battle Command Battle Lab
BCE	Battle Command Elective
BCTP	Battle Command Training Program
BDA	Battle Damage Assessment
BLITD	Battle Lab Integration and Technology Directorate
CAC-CD	Combined Arms Command Combat Development
CAMEX	Computer Assisted Map Exercise
CAP	Combat Air Patrol
CAS	Close Air Support
CBS	Corps Battle Simulation
CD	Combat Developments
CGSC	Command and General Staff College
COA	Courses of Action
CSA	Chief of Staff of the Army
DDD	Data Development Directorate, TRAC-OAC
DOCC	Deep Operations Coordination Center
DS	Direct Support
EEA	Essential Elements of Analysis
EPW	Enemy Prisoners of War
FASCAM	Family of Scatterable Mines
FDD	Force Design Directorate, Combined Arms Command Combat Development

FER	Fractional Exchange Ratio
1GVC	First Governor's Vanguard Corps
FLOT	Forward Line of Troops
FMBT	Future Main Battle Tank
FSV	Future Scout Vehicle
GS	General Support
HEMETS	Heavy Enhanced Mobility Multipurpose Truck
HMMWVS	High Mobility Multipurpose Wheeled Vehicle
HPT/HVT	High Payoff/Value Targets
ITR	Independent Tank Regiment
JAWS	Joint Advanced Weapons System
JSTARS	Joint Surveillance Target Attack Radar Systems
JTF/CINC	Joint Task Force/Commander-in-Chief
LAM	Louisiana Maneuver
LAM, BOD	LAM Board Of Directors
LER	Loss Exchange Ratio
MAG	Mobile Artillery Group
MLRS	Multiple Launch Rocket System
MOE	Measures of Effectiveness
MOP	Measures of Performance
MOPP	Mission Oriented Protective Posture
MSF	Mobile Strike Force
MSG	Mobile Strike Group
MTMC	Military Traffic Management Command
OBJ	Objective
OPFOR	Opposition Forces
OPORD	Operations Order
PAD	Production Analysis Directorate , TRAC-OAC
PW	Prairie Warrior
R&S Force	Recon and Security Force
SAMS	School for Advanced Military Studies, CGSC.
SEAD	Suppression of Enemy Air Defense
SER	System Exchange Ratio
SME	Subject Matter Experts
SWA	Southwest Asia

TACAWS	The Army's Combined Arms Weapon System
TOW	Tracked Optically by Wire
TRAC	TRADOC Analysis Center
TRAC-OAC	TRAC Operations Analysis Center
TRAC-SWC	TRAC Scenario and Wargaming Center
TRAC-WSMR	TRAC White Sands Missile Range
TRADOC	Training and Doctrine Command
UAV	Unmanned Aerial Vehicle
VIC	Vector-in-Commander
WAM	Wide Area Munitions

APPENDIX C

MSF 2010 SYSTEM DESCRIPTIONS

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Appendix C
Mobile Strike Force 2010
System Descriptions

INDEX

C. AIR DEFENSE SYSTEMS

MSF 2010 SYSTEM DESCRIPTIONS

A. MANEUVER SYSTEMS.

1. **M1A3/M2A3/M3A3.** Armored forces use mobility, firepower and shock effect to intimidate and destroy the enemy. The main battle tank is the centerpiece in gauging lethality and survivability of forces on the integrated battlefield. The addition of the Inter-Vehicle Information System (IVIS), second generation Thermal Imaging Sight and Battlefield Combat Identification System (BCIS) capability to key maneuver elements will increase the engagement range and lethality of the ground maneuver force. Friendly and enemy location and situation awareness information can be rapidly passed within the combined arms team to aid in increased target attack rates and improved distribution of targets. BCIS and automated situation awareness will minimize fratricide and improve system and unit survivability. With known enemy locations displayed on each vehicle commander's screen, each shooter can quickly engage a specific target with minimum chance of redundant engagements of the same target. The second generation thermal sight will provide substantial standoff engagement advantage over enemy systems with older generation or no thermal vision capability, helping retain friendly domination of the night battlefield. These capabilities provide significant combat multipliers for the MSF, especially at night or in adverse weather or obscured conditions. Incorporation of an active protection system for missile countermeasures will provide significant improvement in force protection and survivability. The incorporation of the Improved Target Acquisition System (ITAS) will also provide the M2/M3 with growth capability and extended range engagement capability.

2. **Future Main Battle Tank (FMBT).** The FMBT is a conceptual replacement for the M1 Abrams MBT. Missions will include support of intelligence collection, close combat operations and destruction and attrition of enemy systems. In the offense, FMBT will be capable of spearheading the attack, taking and holding key terrain, exploiting the enemy's weakness and pursuing retreating forces. In the defense, the FMBT provides direct close-in and long-range kinetic energy firepower, the ability to reposition to threatened areas and to counterattack. In both offense and defense, FMBT supports security and reconnaissance operations. The FMBT capabilities include advanced modular armor, improved main gun (potentially an electromagnetic cannon), autoloader, reduced volume powerpack (reduced weight and fuel usage of at least 30%), electric drive, electronic countermeasures and active protection system, advanced, long-range fire control and target engagement capability and reduced vehicle signatures. The development goal is to provide increased capability at a significantly reduced weight (50-60 tons) and crew size.

3. **Future Infantry Fighting Vehicle (FIFV).** The FIFV is a conceptual follow-on to the M2/M3 Bradley. It will have a capability to transport at least 12 soldiers (including a crew of two to three persons). It will be able to engage a wide variety of targets and possess mobility and protection levels sufficient for it to operate in conjunction with the FMBT. Firepower will include a long-range missile (TOW follow-on/JAWS) and a medium caliber cannon or directed energy system to provide close-in protection, overwatch and suppression capability in support of dismounted troops. Target acquisition sensors and fire control systems provide wide field-of-view for engagement. Modular ceramic armor and advanced electronic countermeasures and active protection systems will maximize survivability while reducing weight.

4. **Future Scout Vehicle (FSV).** The FSV will provide the ground maneuver commander with an improved time-space ratio that allows him to organize, tailor and rapidly maneuver his forces to focus combat power. FSV will have sustained cross-country and mobility differential over both enemy and friendly main body forces. This will include the capability to swim (without preparation), be employed using low velocity air drop (LVAD) or be transported by the CH-47D helicopter (internal and external transport desired). It will rely primarily on signature control or suppression and cover and concealment for survivability, but will accept modular armor packages and electronic countermeasures for specific configurations. Weapon options are also modular and can be tailored to suit unit mission. Options range from directed energy to medium caliber cannon and may include hunter-killer capabilities incorporating dedicated indirect fire systems within the supported force. FSV is expected to weigh around eight tons. .

5. **Comanche.** Designed to replace the Army's scout and reconnaissance helicopters, the Comanche (RAH-66) features increased speed, lethality and improved mission equipment. Its design supports force agility (through a reduction in size and logistics requirements) and significantly increases Army aviation capabilities and survivability for day or night tactical operations in adverse weather, all types of terrain, and battlefield environments. Mission equipment includes night vision system, helmet-mounted display, electro-optical target acquisition and designation system, aided target recognition, integrated displays and Longbow capability.

6. **Longbow.** The Longbow system is a millimeter wave radar air/ground targeting system designed to increase the survivability, lethality and versatility of the combined arms team. Combat aviation assets will fully integrate into the maneuver battle by providing the ground commander a versatile, rapidly employable, long-range aerial weapon system capable of massed, rapid, fire-and-forget Hellfire engagements against a wide range of fixed and moving targets. Its digitized target acquisition system provides automated detection, location, classification, prioritization, and target handover. The Longbow system incorporates millimeter wave, countermeasures survivability, adverse weather capability (effective in rain, snow, fog, smoke, and battlefield obscurants), and an advanced technology warhead system capable of defeating dual reactive armor configurations.

7. **Ferret.** Ferret is an extended engagement range, precision strike missile compatible with launch from attack or armed reconnaissance helicopters and ground platforms. Ferret is an autonomous weapon with man-in-the-loop (MITL) guidance option. It is expected to weigh 145 pounds and have an engagement range from five to 280 kilometers. It will have lethality capability against many types of targets including air defense units, surface-to-surface missile launchers, rotary-wing aircraft, and communications and command posts. Ferret will normally be employed in a lock-on-after-launch (LOAL) mode.

8. **Joint Advanced Weapons System (JAWS).** JAWS is an advanced version of the TOW follow-on missile with capabilities for both air and ground roles. It is envisioned to have a maximum range of at least seven kilometers for armor threats and seven to ten kilometers for helicopter threats. It will be compatible with any platform that fires either the TOW or Hellfire missile. It will be capable of either lock-on-before-launch (LOBL) or LOAL fire-and-forget engagements and include software selectable flight trajectory options depending on the target type, engagement geometry and operational conditions.

9. **Enhanced Fiber Optic Guided Missile (EFOG-M).** EFOG-M will provide ground maneuver brigade commanders with an ability to engage high payoff targets with surgical precision out to a range of 15 kilometers. EFOG-M is a highly versatile, multipurpose, multi-mission engagement capability. It will expand the commander's freedom of action, ability to focus combat power and disrupt, attrit and decisively defeat main battle tanks, armor vehicles and rotary-wing aircraft before they are able to engage friendly forces. EFOG-M will have six or more ready to fire missiles and can have up to two missiles launched in less than 30 seconds. This non-line-of-sight engagement capability MITL option provides precision, high confidence kills across the tactical area of operation. It also provides real-time intelligence and battle damage assessment information back to the launch platform as it flies to the target area. Target acquisition and identification information is provided to the EFOG-M command and control (C2) element through the Fire Support Element (FSE) located at the brigade TOC. The EFOG-M battery interfaces with digital C2 subsystem. The decision to utilize EFOG-M fires for any target, regardless of the source of the targeting information, will normally be made by the FSO.

10. **Javelin.** Javelin is a man-portable, anti-tank weapon that replaces the Dragon in the infantry and combat engineer battalions and scout platoons and troops. It includes an integrated day/night optic/thermal sight providing target engagement capability in adverse weather and countermeasures environments and a fire-and-forget, top-attack missile with a range of two kilometers. Javelin also provides increased range, lethality against conventional and reactive armor, and survivability of dismounted forces.

11. **Improved Javelin.** Improved Javelin will include a more lethal warhead, a higher resolution focal plane array seeker and missile weight reduction to allow a modest increase in engagement range. A lethality improvement will also be achieved with improved aimpoint control by the seeker and guidance processor.

12. **TOW Follow-on (Advanced Missile System-Heavy)(AMS-H).** A TOW Follow-on missile is planned to be compatible with the approved AMS-H requirement for a fire-and-forget TOW replacement with greater range than TOW and with increased lethality and survivability. This missile will be compatible with all platforms that now fire the TOW missile. As a passive, fire-and-forget missile, increased engagement rates will be possible along with reduced crew/platform exposure times. Growth options allow technology insertion into the missile to meet additional mission requirements including long-range, anti-helicopter and self-defense capability against "attacking" fixed wing threats. Will become the JAWS.

13. **Enhanced Land Warrior Ensemble.** Enhanced Land Warrior is a highly integrated, modular fighting ensemble for the dismounted soldier with payoffs in lethality, survivability, C2, mobility and sustainability. The system provides the individual soldier enhanced capability to detect and identify targets, rapidly engage threats with an aided, point and shoot fire control, an advanced C2 capability including voice, digital and graphic communications. Survivability is enhanced by improved ballistic, NBC, DEW, flame and incendiary protection.

B. FIRE SUPPORT SYSTEMS

1. **Advanced Field Artillery System (AFAS).** Concentrated, coordinated field artillery strikes are key to supporting the force as it attempts to dominate the maneuver battle. AFAS and its companion Future Armored Resupply Vehicle (FARV), currently in the concept development stage, will incorporate advanced technologies such as liquid propellant and a multi-option fuse to increase accuracy, rate of fire, survivability, mobility and ammunition handling speed as well as to decrease crew size. This next generation indirect fire cannon will take the place of the M109A6 Paladin self-propelled howitzer in Force Package I units.

2. **Army Tactical Missile System (ATACMS) Block I.** ATACMS Block I is a conventional, long-range, surface-to-surface, inertially guided, semi-ballistic missile with an antipersonnel, anti-materiel (APAM) warhead. It can engage high-priority targets at ranges beyond the capability of cannons and rockets. ATACMS missiles will be deployed within the ammunition loads of corps Multiple Launch Rocket System (MLRS) battalions, and fired from MLRS M270 launchers modified to fire both missiles and rockets. The single stage, solid propellant ATACMS missile is a pod or container compatible with the MLRS. It is 23 inches in diameter, 156.6 inches long and delivers 950 APAM grenades to ranges in excess of 150 kilometers.

3. **ATACMS P3I/APAM (Improved ATACMS).** The improved ATACMS missile is a modification to the current Block I missile that provides the capability to attack targets at ranges exceeding 300 kilometers. The payload will be reduced to 275 APAM bomblets which more than doubles the current range using the existing motor. Current missile guidance is inertial utilizing a ring laser gyro and is totally autonomous after launch. The improved missile will incorporate a global positioning system (GPS) receiver as well to update missile position in flight and increase accuracy at greater ranges.

4. **ATACMS Block II/Brilliant Anti-Armor Submunition (BAT).** ATACMS Block II is the integration effort between the Block I missile and the BAT. The propulsion, guidance, and control sections for the Block II missile will remain the same as the Block I ATACMS. Guidance algorithms, however, will be altered to support the BAT submunitions. The ATACMS warhead will be modified to carry and dispense 13 BAT submunitions at ranges greater than 150 kilometers. BAT is an unpowered, gliding, terminally guided, antiarmor submunition designed to autonomously locate, attack and kill moving armored combat vehicles including tanks and fighting vehicles. It utilizes dual seekers (acoustic and infrared) and a tandem shaped warhead. The BAT submunition is 36 inches long, 5.5 inches in diameter and weighs approximately 44 pounds.

5. **Improved Bat (IBAT) (formerly BAT P3I).** Seeker and warhead enhancements will provide improved performance in reduced visibility, the ability to attack stationary (cold) targets as effectively as moving (hot) targets and enhanced capability against surface-to-surface missile launchers for attack operations. Six IBAT submunitions will initially be integrated into the ATACMS P3I missile providing the capability to attack high value, short dwell time targets at ranges exceeding 300 kilometers. Once developed, IBAT may also be phased into ATACMS Block II production replacing the basic BAT submunition, allowing more submunitions per missile but with reduced range of engagement.

6. **Multiple Launch Rocket System (MLRS).** MLRS is an indirect fire, free-flight rocket system designed to deliver large volumes of fire in a short time against critical, time sensitive targets. It provides an all-weather capability to attack threat indirect fire systems, air defense

systems, and light materiel/personnel targets out to a range of 32 kilometers. The system features disposable rocket launch pod/containers (two per launcher load) which are factory loaded with six rockets each and serve as shipping and storage containers as well as launching tubes. All emplacement, firing and displacement tasks at the launcher are performed from within the launcher cab by the three-man crew. The free-flight, single stage, solid propellant rocket is nine inches in diameter, 155 inches long, and contains 644 Dual Purpose Improved Conventional Munitions (DPICM) submunitions.

7. **Extended Range (ER)-MLRS.** ER-MLRS is a free-flight, single stage, solid propellant rocket capable of delivering a variety of conventional munitions to significantly greater ranges than the current M77 DPICM rocket. The baseline ER-MLRS warhead will contain DPICM submunitions. Range of the rocket will be increased 50 percent over the current M77 rocket to approximately 45 kilometers. The additional range is accomplished by decreasing the number of submunitions (511 versus 644) and increasing the length of the rocket motor (about 10 inches). Integration of ER-MLRS will incorporate accuracy and submunition reliability enhancements as well.

8. **Longfog.** Longfog will expand the application of fiber optic guidance capability to engagements up to 100 kilometers. It will allow long-range precision kill capability with MITL guidance option. It can provide real-time intelligence back to the platform during fly-out. It is expected to be lethal against an array of target types including heavy armor, helicopters, fixed C2 vans or support facilities.

9. **Wide Area Munitions (WAM).** WAM consists of three variants: a basic hand emplaced (HE WAM), Volcano (V WAM) helicopter delivered, and a deep attack (DA WAM) version. The WAM has a standoff detection and engagement capability common to all variants. It attacks targets from the top at a distance of up to 100 meters and will provide a mobility kill (Mk) to a predesignated target array. Deep attack WAM is a capability to deliver or employ a WAM minefield by the MLRS or ATACMS at extended ranges. Pre-planned product improvements will allow the mine to communicate with its employing unit for remote on/off, recyclable self-destruct and intelligence gathering.

C. AIR DEFENSE SYSTEMS

1. **Avenger.** Avenger is a lightweight, highly mobile and transportable surface-to-air missile system mounted on a High Mobility Multipurpose Wheeled Vehicle (HMMWV). It is operated by two crew members and provides air defense capability against fixed wing aircraft and helicopters operating at low altitude. Avenger has eight ready to fire Stingers and has a shoot on the move capability. Its Forward Looking Infrared (FLIR) sensor provides target detection, tracking and engagement in day or night conditions. Conversion to MANPADS capability is quick and easy.

2. **Advanced Stinger (Block II).** Advanced Stinger (Block II) provides an upgraded focal plane array seeker with imaging capability to lock on to IR suppressed targets operating in terrain clutter. Engagement capability against helicopters at night or in heavy terrain clutter backgrounds will be substantially improved. A tailored missile trajectory will also be utilized to increase

lethality and probability of maintaining seeker track to intercept. Modest capability against UAVs and cruise missiles is anticipated.

3. **Bradley Stinger Fighting Vehicle (BSFV).** The BSFV will provide air defense coverage against fixed-wing aircraft, helicopters, UAVs, and tactical cruise missiles. Each BSFV will have racks for six Stingers and three TOW/JAWS missiles. Two additional TOWs can be loaded in the TOW launcher and two of the Stingers can be mounted in a ready to fire configuration with grip stocks attached. BSFV will be provided targeting information from ground and airborne sensors through the FAADS C2I net.

4. **EFOG-M (AD).** EFOG-M (AD) provides air defense units the capability to engage helicopters at extended ranges even when they are operating in terrain clutter. This non-line-of-sight engagement option provides standoff kill capability to protect the maneuver force out to ranges approaching 15 kilometers. EFOG-M in the air defense role will be linked into the FAAD-C2I for targeting alert and fire distribution data.

APPENDIX D

FIRES OBSERVATIONS

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Appendix D

Mobile Strike Force 2010

Key Fires Observations

D-1. The following observations resulted from after action reviews conducted at the completion of each game turn. They describe key observations which the players extracted from planning, game turn results, and general discussion. The essential elements of analysis for the study were used as discussion drivers for these after action reviews; however the topics were not limited to them. The key inputs assessed under fires were mobility, target acquisition, lethality, depth, survivability and tempo. Also considered were the effects of ground maneuver, aviation and intelligence support in defeating the OPFOR and sustaining the force. These observations, while only preliminary, will offer direction in assessing which technologies and force organizations the Army should investigate in further analyses.

D-2. Base Case.

a. US force is still limited in the ability to slow the enemy at depth. Deep fires for attrition are not as much a concern as slowing and canalizing at depth, based on the inability to lay down sufficient mines and other fires to produce the desired effects.

b. UAV was used to reconnoiter locations for helicopter holding areas, to monitor likely routes of advance of enemy force, to provide BDA, and to monitor bridges to key ATACMS fires. Long endurance UAV can be used for confirmation of target and then for BDA on same target. With such a wide array of missions, the UAV operator, in a sense, can be seen to be fighting the battle. What happens when UAV goes down? JSTARS and Comanche can be used, but this will impact missions that they already cover.

c. What role does corps play in supporting the MSF? What corps resources would be placed on MSF target areas of interest (for example, JSTARS)? Corps is relied upon to supply assets to assist in the MSF plan. The MSF is not fighting the corps battle, primarily because the MSF is the corps' main effort; hence, corps assets will be available when needed. The MSF really belongs to the JTF commander. In this exercise, MSF assets may be committed too early. In reality, the MSF commander might wait until the corps deals with some of the OPFOR. CSS uses corps assets whenever possible to save supplies that are organic to the MSF. The MSG commander has his own deep fight and should be asking for MSF support if needed. The MSF fight must be tied into the corps battle, especially for the deep fires. This is particularly true for fixed wing support. In the exercise, the MSF coordinated CAS and AI for the MSGs.

d. Intelligence must support targeting. Planning is essential. "Digital Euphoria" must be avoided; there will still be considerations outside the digital realm such as civilian refugees, EPWs, non-targetable sites such as schools and hospitals. US commanders cannot assume 100%

D-3

knowledge; there will still be complications with dissemination, analysis of the mass of information available. The MSF commander assumed an 80% solution. Even so, the group felt that intelligence needs to be analyzed and disseminated to all on the move. Communications needs to be there for that to happen. The MSF 2010 needs target acquisition on the move to go along with shoot on the move. Ground based sensing assets are not quick enough to keep up with fast moving force.

e. Decontamination. Given the experience of OPFOR chemical strikes in the MSF 2010 gaming, how long would it take for corps to support MSF decontamination operations? There is no organic decontamination company in the MSF but maybe there should be, given the number of chemical strikes experienced in the game scenario.

f. The MSF 2010 plan is event, not time, driven. The MSF is force oriented. The MSF fights battles 24-48 hours out with much greater range than current year divisions. Battle Space is 300-500 km in three dimensions and defined as the area to be touched and effected, not merely observed. Tempo of the battle is based on the attempt of the force to proceed to objectives unopposed. Movement speed should be 30 km day or night as terrain permits. Assume improved sensor to shooter linkage to achieve precise targeting. Thus, target specific units, not necessarily areas such as EA Red.

g. Airspace has not expanded here, but may in the theater perspective. Airspace management is still an issue for which doctrine needs development. Airspace management may be the long pole in the tent. Coordination for this may take up to 40 minutes when the sensor to shooter link takes seconds.

h. How to do BDA? National assets may not be responsive enough. The MSF may not need to look at target but get information from his subsequent actions. In any case, must dramatically increase capability to conduct BDA. The assessment function must be done better using new technology for information gathering and dissemination. Also should think about how to do this for our own assets, possibly with mobile maintenance teams.

i. The group discussed the future of the fire support coordination line (FSCL). With better identification-friend-or-foe (IFF), the MSF can put the FSCL close to the force along terrain features. The need for a FSCL may go away, but coordination will still take place digitally without difficult to modify control measures. For SEAD, the Army responsibility goes out to the range of IDF. If Army does not have the assets, it must request missions from USAF to do it. There is no physical space divider determining whether an AF mission is CAS or AI. These missions can be done anywhere needed regardless of whatever coordination measures are imposed. The bottom line may be that the ability to collect is much more advanced than ability to process and disseminate. The MSF in 2010 still cannot assume complete situational awareness especially in combined and even joint operations. Within the Army there will be differences in capability between units so the procedural controls such as the FSCL still will have a place.

j. As the exercise played out in the base case, there was a problem with air defense coverage, particularly for protection of friendly helicopters. Avengers need to be task organized to best protect the MSF. Should not fall into complacency about "perfect" intelligence for air or ground assets. The MSF commander would probably place MLRS forward of division only if they took divisional ADA assets. The group felt that planners need to think more about ADA assets manage them.

k. Can the MSG defeat a division? What can it use? The group felt that the MSF probably cannot take on more than one OPFOR division at a time. The MSF needs to hit high payoff targets such as theater ballistic missiles. The MSF should also be attacking enemy C2 assets and show the benefit of targeting OPFOR information systems. This would probably require a theater effort to locate and engage them. High payoff priority targets for the MSF are: C2, maneuver, fires. Use artillery on latter two; UAV with EW/jammer payload to disrupt C2 nodes. The targeting process was not properly represented in the exercise. In reality there would be a HPT/HVT list that would determine targeting priorities.

D-3. Alternative 1. Artillery systems.

a. The exercise participants felt much more successful with artillery in this alternative than in the base case. More missiles were expended since the launchers could support it. They were able able to mass artillery fires, use more ATACMS and change priority of targeting to hit those assets and units that were effective threats to the friendly force. The MSF brought MSG MLRS launchers up to participate in the deep battle. If there were more MLRS, the players felt they could have dealt with the OPFOR 12th and 14th divisions at the same time, rather than sequentially. Also, more attention was paid to intelligence to be more specific about targeting, not simply firing in a goose egg.

b. The MSF delayed OPFOR 9 hours. Bridges were targeted again as in the base case and also the west to counter OPFOR 14th division. Air Assault Group was committed this alternative. There remained concern about fire support for the AAG and linkup (R&S DIV CAV squadron) within two hours of the air assault being on the ground.

D-4. Alternative 2. Future systems.

a. Sensors give bigger envelope of awareness but with improvements in range for future maneuver systems, eyes on target allow better fires, both direct and indirect.

b. In this alternative the deep battle was the focus; not much close range munitions being used. In such a situation, may need to review the basic load mix of long and close munitions to support increase in deep fires.

c. Is the AAG needed for the MSF in SWA? Their role in the MSF remained unclear.

D-5

D-5. Alternative 3. Additional company to each battalion increased resiliency. In this alternative, the group could not draw any conclusions from the close battle.

D-6. Alternative 4. Comanches replace Apaches. Comanches seen as more survivable and stealthy. Kills of OPFOR Hokum helicopters increased with improvements in the friendly air-to-air capability, with a resulting loss of effectiveness against the blue force. Tempo of the battle increased as Comanche able to remain on station longer.

D-7. Alternative 5. More artillery munitions plus Ferret.

a. In this alternative, the MSF extended EA Green to the north since more long range munitions were available. Timing of the artillery fires changed and were more effective in the disruption of the OPFOR force.

b. Ferret targets are C2, Hokums and Scuds. Use of abort criteria for helicopters (disengage after attrition to 70%) increased their survivability.

c. Air interdiction (AI) is used to delay, disrupt and divert the forward movement of the OPFOR force. In this alternative, fixed wing lethality down; targets were stolen by artillery smart munitions. The group felt that there needs to be a review of targeting for fixed wing sorties to utilize them to maximum advantage for the MSF.

d. Deep fight has slowed the tempo of the OPFOR. Tempo set by the friendly force; disrupted OPFOR timelines. The group discussed the idea of the MSF's ability to destroy maneuver systems deep, not only the traditional HPT of C2, ADA, artillery, CSS. When the effectiveness of artillery fires is increased by not having to carefully choose when and where to mass fires AND not conserving ammunition so able to engage two divisions in succession THEN the deep battle drives the outcome and the close battle may never happen.

e. Cannon and rocket mix depends on mission. The MSF needs a balanced force, maybe a four battalion MAG with two MLRS and two AFAS battalions. Experience has shown that composite artillery battalions don't work very well due to logistics resupply and ammo problems.

f. To achieve effectiveness with deep fires, need to be precise in targeting and target acquisition. This is particularly true since units were on the move. Timeliness is key. JSTARS would be needed for ATACMS and fixed wing and UAV cross cueing at deep ranges in this fight. Filters between sensor and shooter should be minimized to speed information transfer.

D-8. Alternative 6. Tailored MSF force based on previous alternatives.

a. The alternative 6 scenario took 7 1/2 hours to execute. The players believed that it would likely take longer to fire all the fire missions executed in this scenario, even with perfect A2C2.

b. Attack on the move by artillery slowed the rate of fire but increased tempo. However, tempo of the fight does not consider human factors and follow on missions. Firing laterally as well as straight on in depth a capability of long range fires.

c. In this alternative, the MSF focus was on OPFOR forces south of the river. Corps was relied upon to deal with forces north of the river. Splitting the battle space with corps allowed focus of effort. In this way, the MSF is choosing where it can best engage the OPFOR.

d. MSF success was due in part to the OPFOR force's deficiency in target acquisition assets. No friendly UAV have been lost, but were felt to be critical to deep targeting accuracy. LRSU (non-organic, HUMINT, needs no fire zone around them), Guardrail (non-organic asset, enemy must be emitting) could be backups to UAV.

APPENDIX E

KEY MANEUVER OBSERVATIONS

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Appendix E

Mobile Strike Force 2010
Key Maneuver Observations

Numerous observations were derived from after action reviews conducted at the completion of each game turn. The players extracted these describe key observations which the players extracted from planning, game turn results, and general discussion. The key inputs assessed under maneuver included force sizes, number of companies in a battalion, and degree of modernization of future combat systems. Also considered were the effects of artillery, aviation, intelligence and fixed wing support in defeating the OPFOR and sustaining the force. These observations, while only preliminary, will offer direction in assessing which technologies and force organizations the Army should invest in for the future, use in further experiments, or discard.

E-1. Aviation is a lethal combat maneuver system, which adds depth to the MSF fight (300 kilometers).

    a. Attack Aviation is a lethal asset in the MSF deep and close battles. It destroyed more targets than any other maneuver system. This was due in part, to the system's greater mobility, and also relates to its effective range and air-to-ground standoff capability.

    b. In the deep attack, MSF attack helicopter battalions were vulnerable to OPFOR attack helicopters due to standoff advantage. OPFOR attack helicopters were destroyed by aviation recon troops performing security to identify, engage, and protect attack assets.

    c. The Comanches is an excellent multi-mission platform.

        (1) It performs well in recon and surveillance, security and air defense missions.

        (2) Its low burn rate, coupled with additional fuel tanks, provides five hours of sustained flight time per aircraft.

        (3) It encounters little to no degradation when struck with chemical agents, attributable to the overpressurization system.

E-2. MSF ground maneuver battalions require increased survivability.

    a. The MSF ground forces were not fully assessed and require further experimentation.

        (1) In instances when close battle occurred, MSF ground maneuver forces demonstrated the capability to defeat an enemy regiment, but with extremely high casualty rates.

(2) Two MSGs succeeded in defeating two regiments with exceedingly high casualties (30-40% friendly losses). This occurred after a division and brigade level deep fight which succeeded in attriting the OPFOR regiments below sixty percent strength. The MSG lacks requisite lethality and survivability to attack and defeat an enemy regiment (with regimental artillery group) without sustaining significant losses in combat power.

(3) Increases in MSG maneuver systems' technological capabilities served to place them only on par with opposition forces; when outnumbered they suffered rapid attrition.

b. If the deep battle is extremely successful and the battlefield is shaped properly, then MSF should be able to defeat three divisions at extended range with limited close combat. Although the emphasis early in the operation is on the deep battle, the MSF must continue to focus on and plan for the close battle as well.

c. All MSF assets were used to defeat the enemy. The MSF ground maneuver force was used for more than the close battle. (In fact, in some situations there were no close battles.) In operational terms, maneuver forces add value three ways:

(1) Maneuver forces can perform security missions to get the MSF deep assets into a position from which they can defeat the enemy.

(2) Mobile Strike Groups were effectively employed fighting remnants, conducting hasty breaches and in close battle with enemy regiments whose combat strengths were below 60%.

(3) The MSF was successful in affecting the enemy's tempo by forcing the enemy to consider the presence of MSF ground forces at his flank and rear. This had a disruptive effect on the enemy's battle planning and execution.

d. The improved range of FMBT and FIFV offset the OPFOR AFV standoff and resulted in a significant improvement in survivability.

e. Technology cannot fully offset the human factors aspect of a three to four day continuous operation.

f. Based on this exercise, any findings on MSF "seize and hold" and " close and destroy" capabilities are inconclusive. Need a higher resolution model to capture additional MSG ground maneuver insights.

g. Unable to capture the organizational degradation suffered by OPFOR units when they were reduced by 40-50%. Command and control would have to suffer along with morale, cohesiveness, synchronization, etc.

h. The MSF staff began to focus on destruction of maneuver elements in the deep fight as opposed to the high payoff deep targets (C2, ADA, radar), because effects from target

E-4

destruction were not measurable. One significant exception was the use of the Ferret which was particularly effective in destruction of Scuds, targeting OPFOR attack helicopter forward operating bases, and destroying command and control centers. Whenever intelligence could find an appropriate target, Ferret could destroy it. The Ferret was effective because it could be programmed for a particular target within a particular zone. It was prioritized, so that if its first target was unavailable it could destroy another. It was also quite effective as an automated forward observer which relayed targets (like Scuds) to the artillery in a timely manner. Additionally the Ferret had a limited ability to hover above the target area which may enable the firer to provide initial BDA of other firing systems.

E-3. Recon and security operations require extensive assets in the MSF mission.

a. Changing the MSF CAV organization to a three ground troop and three air troop organization provided a significant improvement. The MSF no longer had to use attack battalions for security missions.

(1) Provided security to attack battalions increasing survivability and effectiveness.

(2) Enabled the MSF to attack on three axes simultaneously.

b. All three air recon troops were fully employed throughout the operation.

c. The R&S troop at MSG level requires a beefed up capability to perform security missions.

d. R&S air troop can provide a strong guard force for the MSGs against a division sized force.

e. The UAV is an inexpensive asset which can perform recon .

E-4. The Air Assault Group provides limited offensive capability to the MSF in a SWA scenario.

a. The AAG is a great asset. but difficult to use in this scenario. When placed on the ground it lacks the mobility and agility to react to a mounted force. Its weapon systems are unable to impact the OPFOR at extended distances. Its artillery lacks the range and survivability necessary for success against a modern OPFOR. It requires:

(1) A weapons company equipped with TACAWS/JAWS or the improved TOW to offset the threat's extended range advantage.

(2) An engineer company to provide the AAG some defense against a mounted force, with survivability positions, craters, obstacle belts etc.

b. The AAG serves as a distracter to the MSF in terms of placement, logistics, fires, air and aviation assets. Its possible missions require a focus which is not compatible with the offensive mission of the MSF. The AAG did not actively contribute to the MSF's principle mission, defeat of the three divisions. The AAG is not capable of reacting quickly to changes in enemy situation. The OPFOR, when they did come south of the river, bypassed the AAG, and in that sense the AAG was able to shape the battle. The AAG was not able to pursue the OPFOR division and was unable to delay or block it in any way.

(1)   The AAG will probably be more effective in OOTW or scenarios like NEA, where restrictive terrain limits the effectiveness, mobility, and range of mounted systems.

(2)   The MSF as a modular organization may benefit from removing the AAG and including a second Attack Aviation Regiment in a SWA scenario. Support requirements and costs may be offset when you remove the AAG's air lift requirements and Aviation Unit Maintenance section.

E-5. Capability of MSF for mobility and countermobility operations is critical to the success of the force.

a. AAG cannot survive on desert floor without survivability positions, particularly when fighting a heavy division.

b. FASCAM mine fields were emplaced by the OPFOR to delay and attrit the MSF. They were successful in impeding the combat support elements, who have no organic breaching capability. The MSGs because of the great distances required for movement, and the additional need for flank security could not leave these elements back. The MSF was delayed several times for periods up to three hours.

(1)   Combat support forces like the MAG require organic breaching assets.

(2)   MSGs can conduct hasty breeches to extricate themselves, but other MSF elements do not have organic breaching assets e.g. MAG, support battalions, MLRS etc.

(3)   A protective umbrella of maneuver forces is required in deep operations, to protect the MSF's combat support elements.

E-6. MSF controlled tempo:

a. Keys to success were the ability to fully employ all MSF assets simultaneously, improved agility and massing effects.

(1)   Deep fires stripped away the enemy's long shooters and had a greater effect on the tempo of the battle than the MSF's speed.

(2)   WAM, AI and ATACMS slowed and separated the 2d echelon divisions, which allowed the MSF to concentrate on one division at a time.

b.   The MSF experienced significant loss of speed and effectiveness when it received a chemical attack.   Overpressure systems exist in the MSG maneuver battalions, but not in the combat support units.   This resulted in degradation of the entire force.   AH64D pilots, MAG battalions, air defenders, MLRS, truck drivers, medics, etc., all operated in MOPP4.   The resulting degradation in effectiveness caused the MSF commander to halt his force and decontaminate.

c.   A2C2 is a critical maneuver concern for the MSF.   Since the deep battle includes maneuver forces, attack aviation now enters engagement areas with extended range AFAS, MLRS, UAVs and WAM.   The MSF has timely and accurate intelligence which greatly enhances lethality, given that an organization exists which can orchestrate the synchronization of all these systems.   However, the potential for fratricide and the requirement for sophisticated, rapid fire command and control are staggering.

APPENDIX F

KEY "OTHER" OBSERVATIONS

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Appendix F

Mobile Strike Force 2010

Key "Other" Observations

1. **Introduction.** Fire support and maneuver were the 2010 MSF analysis focal points. The study did, however, produce some "other" observations. These observations were taken from the players and seemed important enough to include as an appendix to this report. The study did benefit from the inclusion of Military Intelligence, Air Force and Logistical personnel. Unfortunately, no Air Defense, Engineer, or Chemical personnel were available for direct input during the study.

2. **Battle Space.** The concept of battle space needs continued study. Battle space is determined as the area which a commander cannot only see, but can affect with his organic weapons systems. MSF battle space certainly has grown as weapons with increased range and lethality are included. Some discussion centered on whether a division sized unit equipped with corps assets should have a corps or division sized battle space. Is the combination of the two redundant? In this study corps and the MSF worked together, and a great deal of discussion centered on who was responsible for which portion of the deep battle, especially when an MSF must move 200 to 300 kilometers before striking the enemy.

3. **Intelligence.** Near real-time situational awareness was key to successful MSF employment. This heightened awareness may change the way the Army does planning. There is a need to be more flexible. Technology allows the force to respond to the enemy quicker. MSF may require a more capable but smaller staff. This staff should be capable of synchronizing the deep attack at depths beyond the "normal" division deep fight. It will orchestrate an attack consisting of UAV's, EFOG-M, Comanches, AH-64Ds, ATACMS, WAM, etc. These assets will strike nearly simultaneously, and their potential for fratricide is extremely high. The job of coordinating targeting information will become a much greater challenge. In the decide-detect-deliver engagement paradigm, the emphasis is changing from detect to decide. The MSF relies on corps and above for deep intelligence collection and for situation development.

    a. With all the intelligence assets available to the MSF, the potential exists for information overload. Intelligence collection, analysis and reporting needs to be done on the move. It is critical that a system such as ASAS be provided to the MSF staff. This will ensure that critical information gets to the shooters in time. It will also ensure that a plethora of information will not drag commanders into indecision.

    b. The Air Assault Group needs an MI company team.

    c. UAVs were key to the success of the deep battle. As much as three fourths of the INTEL UAVs were used for deep targeting and BDA. As represented in this exercise, the UAVs provided near ground truth and were invulnerable to enemy air defense systems. Since UAVs

were so important to the success of the deep battle, further experimentation is required to ensure that there are sufficient numbers to perform the deep targeting and BDA missions.

d. The number of UAVs needed by the MSF requires further study (6-15 needed to support the MSF). Survivability dictates numbers required. Additional missions probably also equates to a need for more UAVs. The MSF commander will need to retain sufficient assets to look deep and develop the deep situation, or to look close and develop the close situation. He will need a counter UAV capability - a means to identify and defeat enemy UAVs. The availability of multiple packages on UAVs will enable fewer UAVs to perform all requisite missions. With the capabilities provided by ATACMS and UAV, consideration needs to be given to whether manned or unmanned systems should be sent deep. The 2010 MSF can decide when it may be worthwhile to put manned systems at risk.

e. Electronic attack was not used. A digitized force will be very vulnerable to electronic attack in the future

4. **Engineer.**

a. An engineer company is needed in the AAG for countermobility and survivability. The Air Assault Group has no armored vehicles. Its troops have only body armor. They require a capability to rapidly construct covered positions and delay mechanized forces. Without this capability they will be overwhelmed by the mass and speed of mechanized forces, particularly in a SWA scenario.

b. The MSF did not move as fast as we expected In fact, they took approximately fifteen hours to move the 250 kilometers to the close battle, averaging 16 kilometers per hour. It is essential that the MSGs move at the speed of their slowest vehicle because the MSGs must provide cover for all their support elements, as the force strikes deep beyond the FLOT.

c. FASCAM and WAM minefields were instrumental in shaping the battlefield for deep attrit and deep attack. Air and artillery delivered FASCAM and WAM mines were employed to shape the deep attack engagement areas and close battle. Artillery emplacement is more responsive and has less associated risk. Fixed-wing GATOR mines and rotary-wing VOLCANO mines can be emplaced in greater volume and may be employed when the threat is minimal. Effective use of mines requires them to be covered by CAS, AH, or UAVs and also requires a high degree of situational awareness.

5. **Air Defense.** The air defense package for the MSF requires further study. OPFOR fixed wing and attack helicopters were the greatest killers of MLRS (one of our major deep fire assets). OPFOR fixed wing aircraft were countered in two ways. First, the Patriot missile was used when its range was sufficient to cover the battle space of the MSF. Second, an air CAP was used when the MSF moved beyond the corps FLOT. Given that the USAF has maintained air superiority in this region for some time, fixed wing air OPFOR is seen as an asset which can only be surged at key periods. A possible time for this surge may be the commitment of the corps commander's reserve (the MSF). When committed in such a way, the OPFOR suffered high losses both from

the air CAP and from air defense missiles. Those that did penetrate, however, were able to kill a great deal of MSF systems. OPFOR attack helicopters were more prevalent on the battlefield due to their standoff against the air-to-air missile (without extended range).

6.   Air Force.

    a. There is a consistent misperception throughout the Army on the timelines of an ATO. Theater air sortie apportionment is made approximately seventy two hours before the mission. Munitions loads can be changed in as little as three to four hours before the mission. Target coordinates can be changed in as little as three hours before the mission and can be updated during the mission by ALO. Target types may also be changed, but a degradation in effectiveness may be incurred if the munition loaded on the aircraft is not the optimal munition for the target.

    b. Battle Damage Assessment: We require BDA to tell us where we should redirect the deep attack assets? How do we do deep BDA for air interdiction missions? BDA is probably best conducted after a strike, but not immediately after. Smoke and dust inhibit BDA and take time to clear. However, in some situations (against targets in the defense), it is difficult to tell a dead tank from a live tank, unless you see the crew leave.

7.   CHEMICAL.   Imbalances in chemical protection (over pressurized vehicles versus Mission Oriented Protective Posture suits (MOPP)) may cause the commander to commit his forces with degraded lethality. OPFOR chemical attacks were effective against MSG and the Mobile Artillery Groups, and at times succeeded in delaying the MSF for over two hours. The MSF staff recommended pauses to conduct decontamination so that units like the MAG and the Attack Aviation Regiment would not have to fight in MOPP 4. The decision was made to decontaminate the force. If the close fight would have been unavoidable at this time, the MSF would have been at risk. These key elements would have experienced a degradation in lethality and survivability. A decontamination capability should be added to the MSF, especially when OPFOR is known to employ chemical munitions. These decontamination units must have their own capability to haul bulk water.

APPENDIX G

BATTLE FLOW
BASE CASE THRU ALTERNATIVE 5

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Appendix G
Mobile Strike Force 2010

Battle Flow 1

Base Case through Alternative 5

G-1. The 2d US Corps OPLAN 98-3 (Prairie Dog) established the 52d Mobile Strike Force (MSF) as the corps main effort at Phase Line (PL) Glenn. Its mission: The 52d MSF conducts an operational move through 2d Corps sector, NLT _1500 May 1994, attacks in zone to defeat the offensive capability of the 1st Governor's Vanguard Corps (1GVC) in engagement areas (EA) Red, Green, and Mask; on order moves to objective (OBJ) Nome to conduct consolidation and reorganization.

G-2. The commander's intent: Use deep strike assets of the MSF to attrit trail divisions and shape the battle. Priority targets for deep battle include air defense artillery (ADA) radars, enemy artillery, and command and control (C2) systems. Find the flank division quickly, screen with the Reconnaissance and Security (R&S) Force, and strike with a Mobile Strike Group (MSG). Use the Air Assault Group (AAG) to block the trail division, and ensure MSG ground forces can reinforce the AAG within two hours. I want them to go in with two air assault battalions and one artillery battalion simultaneously so they will be ready to fight. Request corps lift assets (CH-47) to accomplish this mission, as the AAG does not have assets required for one mass lift. Fight the third division with the second MSG. Each MSG ought to be able to defeat a division. Fight the Attack Aviation Regiment (AAR) as a maneuver element. I want to fight the enemy divisions south and west of the Wadi Al Batin. Success equals defeat of three divisions and causing the GVC to stop before they engage the Egyptian and Saudi Arabian Corps.

G-3. Scheme of maneuver: In game turn one, starting at 1500 hours, the MSF began to advance, as depicted in Figure G-1. The Mobile Artillery Group (MAG) was moved into a position that would facilitate initiation of the deep battle. The MSGs conducted an operational move through 2d Corps sector, from tactical assembly area (TAA) Patton through a refuel-on-the-move (ROM) site to attack positions 1 and 2 along PL Mike. The R&S Force moved forward early to secure TAA Pegasus and then occupied a screen line along PL Mike. The AAG remained at Patton and was airlifted to arrive at forward operating base (FOB) Long Knife at the same time as the first MSG crossed PL Frank. Avenger platoons were task organized to the MAG Battalions, Military Intelligence (MI) Battalion, MSF Battle Command Group, MSF Support Battalion and moved with them to provide coverage for the force.
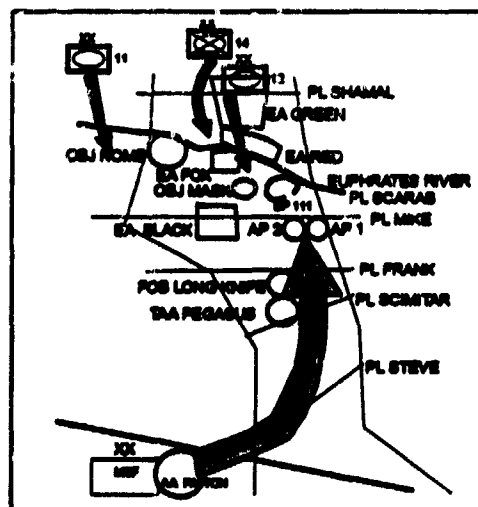
Figure G-1. Initial positions and axes of advance

G-4. The three trail divisions of the GVC were the 11th Tank Division (TD) in the west, the 12TD in the east and the 14th Mech Division (MD) trailing the 12TD in the

north, shown in Figure G-1. The MSF chief of staff requested that 2nd Corps commander dedicate assets to delay the 11TD north of the river (8 to 9 hours) until 2400 hours. This would enable the MSF to initially concentrate assets on the 12TD. The corps commander agreed and succeeded not only in delaying the 11TD, but in attriting it to approximately 75%. The MSF hit the 12TD with Army Tactical Missile System (ATACMS) Block II, suppression of enemy air defense (SEAD), and air interdiction (AI) as the 12TD moved through engagement area (EA) Green. To shape the deep attack, AI targeted key bridge sites in front of the division, and MAG battalions delivered a Wide Area Munition (WAM) minefield north of the river in EA Red. As the lead elements of the 12TD reached the river, ATACMs Block II was fired, SEAD and close air support (CAS) were used, and the attack helicopter battalions were rotated into attack-by-fire positions south of the river. The dropped bridges combined with the minefields stopped the 12TD while artillery, CAS and attack helicopters assaulted its main body. These efforts were successful in defeating the 12TD, reducing it to approximately 48%. One MSF attack helicopter battalion was attrited by enemy attack helicopters and BMPs to approximately 26%. There was no other significant attrition within the MSF during game turn one, which lasted for eight hours, thirty-one minutes, ending at 23:31 hours.

G-5. The AAG was moved to battle position (BP) 111 to establish a blocking position at 0100 hours with support from attack helicopters and organic 155s. An R&S air troop and later the R&S Force provided a covering force for the AAG. The MSF used AI to delay and disrupt enemy forces capable of engaging the AAG during their air assault. The GVC fired persistent chemical agents and family of scatterable mines (FASCAM) into the remainder of the MSF still moving north to enter the close battle. With the 12TD at about 48% and occupying a hasty defense, the MSF could now focus on the 14MD in EA Green. The cycle conducted with the 12TD was repeated artillery, SEAD, and AI attrited the main body. The 14MD was struck again west of EA Red (a WAM minefield was laid in), and the attack helicopters were committed. This time the attack helicopter battalions were committed simultaneously (surged) in an attempt to ensure that no 14MD forces crossed the river. Red ADA and attack helicopters attrited the MSF's attack helicopter assets to about 23%, destroying all of the Attack Aviation Regiment's

AH-64Ds. MSGs 1 and 2 moved to PL Glenn, as shown in figure G-2, and were at approximately 91% and 98% strength respectively. The 14MD was defeated and assumed a hasty defense south of the river and west of OBJ Mask, with an end strength of approximately 48%. Game turn two lasted five hours, twenty nine minutes, ending at 0500 hours.

G-6. Game turn 3 began the last phase of the battle. The 11TD was moving south and east from the river crossing. The 11th abandoned its earlier mission to split the seam between 2nd US Corps and the Saudi Arabian Corps because two of the three divisions given that mission were now combat ineffective. The 11th knew that a division-sized force was moving north and west toward it. It attempted to link up with the rear elements
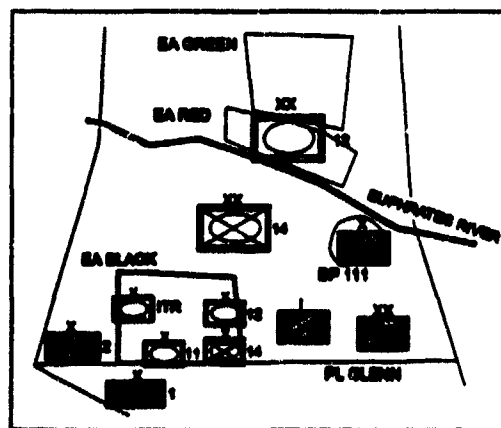
Figure G-2   After the close battle, enemy forces are combat ineffective and the MSF waits for 2d Corps.

of the three lead divisions of the GVC and to tie in a defense along with the Independent Tank Regiment (ITR). The brigade-level deep fight began by incorporating the deep strike assets of the Multiple Launch Rocket System (MLRS) with the precision of the Advanced Field Artillery System (AFAS), the MSGs attempted to attrit the regiments of the 11TD deep. They specifically targeted the mechanized battalions of the tank regiments since their BMP-3 long-range direct fire systems would be most lethal in close battle. Enemy artillery was also targeted. The 11TD was at this time configured with two regiments up and one back. It had not yet linked up with the lead divisons of the GVC, but the ITR was approximately 20 kilometers north and east of its trail brigade. The lead two regiments were separated from the trail regiment by firing in an L-shaped WAM minefield, creating EA Black. The R&S air troop, which had been providing an advance guard for the two MSGs, occupied an attack-by-fire position east of the first WAM minefield and orchestrated the CAS, attack helicopters and artillery firing into EA Black. As the joint air attack (JAAT) struck the lead regiments, the two MSGs attempted to maneuver to the division's right flank, as in Figure G-2. The 11TD fired a FASCAM minefield, delaying the two MSGs for a short time, and allowing the ITR to join the trail regiment. Now the MSGs faced two regiments, one of which was an ITR. The four units collided in a meeting engagement. Both the ITR and the tank regiment were reduced to a combat ineffective status. MSGs 1 and 2 were reduced to approximately 37% and 56% strength respectively. All attack helicopters were destroyed and most artillery ammunition was expended. The AAG remained at BP111 to prevent the 12TD and the 14MD from entering the fight, but was never engaged. SEAD followed by CAS and AI hit the 14MD in EA Fox. (The MAG had few missiles left after targeting the regimental artillery groups of the 11TD in game turns two and three.)

G-7. At the conclusion of the battle for the base case through alternative 4, the 11TD began a withdrawal at about 18% strength. The MSF was at approximately 58% strength. All attack helicopters were destroyed and most artillery ammunition was expended. Enemy follow-on forces could encircle the MSF if it continued to Nome, potentially cutting it off from much needed supplies. The MSF stayed in place, occupied a hasty defense, and waited for 2d Corps.

G-8. Alternative 5 tripled the number of ATACMS rounds available while keeping the number of MLRS launchers constant. (Alternative 5 was created to investigate this impact since the base case and alternative 1 showed that the number of ATACMS rounds, not the number of MLRS launchers, limited the deep battle.) The Ferret missile was also added. This alternative differed from the base case battle flow previously described, in that the MSF was able to defeat all three divisions in the deep battle, and there was no close fight.
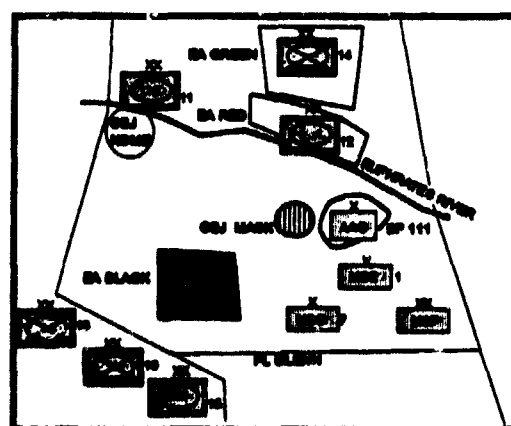
Figure G-3. End of Alternative 5.

a. The defeat of all three divisions in the deep attack was made possible by two major changes. First, the MSF's number of allocated ATACMS was tripled. Second, a technique for effective application of these ATACMS fires was developed. When the last division (11TD) was unable to

cross the river after the deep attack, the MSF had achieved the commander's intent. At the end of the battle shown in figure 3-3, all three divisions occupied hasty defenses north of the river, with the 11TD at 58% strength, the 12TD at 55% strength, and the 14MD at 60%.

b. In alternative 5, there was no close battle, therefore MSF was at 90% strength, with MSG 1 at 95% and MSG 2 at 95%. Thirty percent of the attack helicopters were destroyed and two thirds of the ATACMS rounds were expended. In this case the MSF defeated three OPFOR divisions and remained combat effective. The MSF accomplished its mission and was a success.

APPENDIX H

BATTLE FLOW 2

ALTERNATIVE 6, "THE REDESIGN"

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Appendix H
Mobile Strike Force 2010

Battle Flow 2

Alternative 6, " The Rede .:gn"

H-1. As the Post-Prairie Warrior Mobile Strike Force (MSF) workshop progressed from base case through alternative five, the staff increasingly felt the operational scenario inhibited their ability to employ the MSF according to its operational concept. The conventional mission dictated by the Prairie Warrior scenario had been modified [for the MSF 2010 effort] to force the MSF to fight three enemy divisions (1 Mech Division (MD) and 2 Tank Divisions (TD)). However, in the base case through alternative five the staff was still not using the MSF as a mobile, operationally decisive force.   Firing deep but not maneuvering deep, the MSF could not reasonably expect to accomplish its mission without becoming decisively engaged. With that decisive engagement, the Mobile Strike Groups (MSG) lacked the combat power necessary to defeat even a single enemy division without tremendous sacrifice to their own combat effectiveness.

H-2. This alternative used the same theater concept for the MSF to punch through the remnants of a division at the line of contact and penetrate deep to influence the Governor's Vanguard Corps (1GVC) commander to halt his attack against the coalition forces. The staff's tactical employment revisions called for the MSF to accomplish the mission by moving deep while attriting and, if possible, defeating the three trail divisions of the 1GVC. The position of the MSF on the enemy's flank and the defeat of his second echelon divisions would cause the 1GVC commander to halt his attack. This scenario, requiring the MSF to move deep, provide its own security and simultaneously attack deep with fires, provided ample opportunity to analyze different facets of fighting the MSF. Situational awareness, along with the MSF's mobility and deep fires, allowed for defeat of the 1GVC second echelon without direct fire contact with any major ground maneuver force.

H-3. During game turn one the MSF moved from its positions in assembly area (AA) Cherokee at 1500 hours and passed through the 2d US Corps penetration along phase line (PL) Steve. Remnants of an enemy corps continued to defend in isolated company (+) strength pockets throughout the MSF zone. The MSF moved in a wedge formation, with the Reconnaissance & Security (R&S) Force serving as a forward security element, and succeeded in destroying three of these remnant units with minimal casualties and no significant delay to forward movement. As shown in Figure H-1, the Air Assault Group (AAG) conducted an air assault into Objective Python, securing that location for a forward staging area to support anticipated deep attacks by the Attack Aviation Regiment (AAR). 2d US Corps retained control of the deep battle during this stage of the operation and succeeded in delaying / isolating the three second echelon divisions of the 1GVC north of the Euphrates River, attriting their supporting artillery brigades to 75%. In accordance with the theater concept / scenario, the main effort shifted to the MSF's fight against the three trail divisions while the 2d US Corps focused on halting the opposing forces (OPFOR) advance in the coalition forces sector.

H-4. During game turn two, the MSF began its deep attack by launching 12 Ferret missiles, achieving highly satisfactory results against several key targets. MSF Army Tactical Missile System (ATACMS) fires initially targeted two corps artillery brigades, focusing on Smerch and Astros launchers. Joint Surveillance Target Attack Radar System (JSTARS) acquisitions facilitated precision targeting and battlefield damage assessment (BDA) with organic unmanned aerial vehicle (UAV) assets. The effort successfully destroyed the OPFOR long range artillery support. The Mobile Artillery Group (MAG) also provided family of scatterable mines (FASCAM) and suppression of enemy air defense (SEAD) fires to support a joint air attack (JAAT) against the 12TD in engagement area (EA) Red and air

Figure H-1. End of battle,

interdiction (AI) against the 11TD in EA Blue. In the east the lead regiment of the 12TD was allowed to cross the river unopposed, isolating it for simultaneous attack by the MSF's three attack helicopter battalions. An MLRS-delivered Wide Area Munition (WAM) minefield on the northern bank of the river prevented the remaining two regiments from crossing the river and allowed 48 AI sorties (F-16WW, B-52, F-15E, F-111) to attack the stacked-up armor formations in EA Red. The combined effects of this attack reduced the 12TD to approximately 41% strength. In the west, the two lead regiments of the 11TD were allowed to cross the river before an MLRS-delivered WAM minefield was fired in front of the trail regiment just north of the established crossing sites. Eighteen AI sorties (F-16WW, F-111, F-15E) attacked this regiment, reducing it to approximately 69% strength. The 1GVC launched two battalions of attack helicopters (separated by thirty minutes) against the MSF main body and 50 SU-27 (Flanker) sorties against the perceived location of the MAGs. Based on JSTARS early warning, the Air Force combat air patrol (CAP) destroyed 25% of the OPFOR attack helicopters and 90% of the SU-27 sorties during ingress. The MSF counterattacked with an air troop from the R&S Force. The Comanches destroyed an additional six enemy attack helicopters before they could engage the MSF main body. As a result, MSF losses due to the remaining enemy helicopters were light. The remainder of the 2d US Corps, the 25 ID (M) and the 1st French Division were meeting with similar success against the three lead divisions of the 1GVC in the south. Attacking initially into the flank of the 16MD, the 2d US Corps' success prompted the 1GVC commander to shift the 15TD into a blocking position along the corps boundary, while the 16MD and the 13TD attempted to break contact and withdraw back toward Samwah. By the end of the game turn, the 16MD was reduced to 74% strength and in full retreat; while the 15TD was decisively engaged and at 80% strength. JTF-dedicated AI had successfully destroyed all but three of the Scud launchers in zone; they used those remaining Scud launchers to conduct a persistent chemical strike against the AAG in objective (OBJ) Python. The FARPs located to the southeast were not affected. The R&S Squadron responded immediately by launching six Ferret missiles, destroying the remaining Scuds.

H-5. Game turn three continued ATACMS deep fires against the 11TD in the West. It also directed a JAAT against the 14MD as it moved to reinforce the severely attrited 12TD, shown in

H-4

Figure H-1. (The 12TD was attempting to move into hasty defensive positions just south of the river in the east.) The MSF again used organic UAV assets to direct these attacks and perform BDA to generate restrike feedback. Targeting against the 11TD focused on the two lead regiments south of the river and their supporting long range artillery assets. Engaged with Block II and IIA, these elements were reduced to approximately 60% strength. The 14MD unexpectedly attempted to cross at the same site where the 12TD had been destroyed earlier. The MSF elected to repeat a variation of their attack sequence into EA Red as the 14MD approached the crossing site. MLRS-delivered FASCAM reseeded the WAM minefield along the northern bank to stop the lead regiments. The MAG also provided extensive SEAD fires against the maneuver units and air defense artillery (ADA) positions left to protect the bridge sites. Thirty-five AI sorties (F-16WW, B-52, F-111, F-15E) attacked the 14MD in two flights separated by 30 minutes. Sixteen sorties hit the two lead regiments at the river as the MSF's remaining attack helicopter troops arrived on station to assume the attack. These two regiments suffered approximately 50% casualties and failed to cross the river. In the process, the attack helicopter companies sustained significant losses due mainly to SA-18 and BMP missiles. Only a third of the MSF's initial attack helicopter strength remained following this engagement. As a result of the damage inflicted against the lead regiments, the remaining 17 AI sorties diverted to the trail regiment of the 14MD. The 14MD was reduced to approximately 56% strength and proceeded to establish hasty defensive positions in place.

H-6. In game turn four, the MSF established a blocking position against the possible withdrawal route of 15TD remnants and continued to attack the advancing 11TD and 3ITR with ATACMS fires. They also assumed the mission (from the 2d US Corps) of attriting the trail regiment of the 13TD. The 1GVC continued to push the 11TD and the 3ITR southeast toward a blocking position designed to protect the flank of the retreating 16MD and 13TD. By the end of the game turn, the 13TD's trail regiment, the 11TD, and the 3ITR were reduced to less than 37%, 41% and 47% strength respectively. In an attempt to degrade the MSF long-range capability, the 1GVC massed a combined fixed wing, "killer UAV", and helicopter attack against the MAG. Sixty SU-27 (Flanker) sorties, 18 UAVs, and 40 attack helicopters attacked in three successive waves. Air Force CAP reduced the attackers to six SU-27 and 30 attack helicopters. Based on JSTARS' early warning of the impending attack, the MSF responded with a helicopter security force using their remaining attack helicopter assets. The security force, along with organic ADA coverage from the Avenger platoons, further reduced the number of attacking aircraft to six SU-27, six UAVs, and 16 attack helicopters. These remaining aircraft succeeded in destroying all but 18 of the MSF's MLRS launchers before they were forced to break off their attack. The MSF overall was attrited to approximately 81%, a substantially better finish than previous alternatives.

APPENDIX I

MOBILE STRIKE FORCE 2010

NEW TECHNOLOGIES QUESTIONNAIRE

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I-1.   Purpose. The purpose of this appendix is to state TRAC's findings from the Mobile Strike Force (MSF) New Technologies Questionnaire, which was administered with regard to the MSF 2010 gaming exercise.

I-2.   Procedure.

   a.   The Prairie Warrior (PW) MSF New Technologies Questionnaire, which was being administered during the Command and General Staff College's (CGSC's) PW/MSF exercise, was modified into a 2010 Force version. Subsequently, this questionnaire was administered to the appropriate gaming personnel. A blank copy of this version of the questionnaire has been included as Annex I-I to this appendix.

   b.   In total, 11 questionnaires were returned for the conduct of the analysis and this represented 100-percent of the responses expected.

   c.   Since such a small number of responses were gathered, the analysis proceeded manually. Data, which were gathered by categorical rating scales, were summarized as frequency counts. The verbal, free response data these elements were recorded verbatim (except on occasional when abbreviations were transformed to their verbal equivalents, some wording was added where it had obviously been left out, etc. in attempts to enhance readability.)

I-3.   Results. Following the procedures outlined above, the data as a whole were examined and the following results obtained.

   a.   Administrative data. With regard to the administrative data, two elements were assessed: functional responsibility during the gaming and branch affiliation. The following list depicts the data received in this regard for the 11 individuals completing their questionnaires.

Functional Responsibiltiy	Branch Affilitation
• Div FSCOORD	Field Artillery
• G-3	Infantry
• Asst G-3	Armor
• G-2	Military Intelligence
• G-2	Military Intelligence
• Aviation Officer	Aviation
• Dep FSCOORD	Field Artillery

• Air Liaison Officer	US Air Force (USAF)
• CAMEX Game Controller	Armor
• CAMEX Gamer	Infantry
• CAMEX Gamer	Military Police

As unusual as it might seem, no data were collected from either the MSF-2010 commander or the MSF-2010 chief of staff. These individuals were so heavily involved with the main CGSC PW/MSF exercise that they were unable to devote their time and attention to the MSF-2010 effort and, as such, it was determined not to solicit their comments.

    b. Effects of New Technologies on Lethality, Survivability, and Tempo. In Part 1 of the questionnaire, the respondents were asked to provide ratings on the degree of change brought about on three primary MSF MOEs/criteria (i.e., lethality, survivability, and tempo) by the potential new technologies, which were intended to be in the MSF. The frequency data is at Annex I-II, where the number of observations for each rating category having at least one observation has been incorporated into the questionnaire format.

        (1) With regard to lethality, the UAV, Wide Area Mine, ATACMS Blk II w/BAT, Comanche, ATACMS Blk I and Ferret were perceived as most effective, as indicated by having a majority of the respondents rating these systems as providing an "extreme positive effect".

        (2) With regard to survivability, the UAV, Wide Area Mine, Comanche, ATACMS Blk II w/BAT, ATACMS Blk I and TACAWS/JAWS were perceived as most effective, as indicated by having a majority of the respondents rating these systems as providing an "extreme positive effect".

        (3) With regard to tempo, the UAV, Comanche, and ATACMS Blk II w/BAT were perceived as most effective, as indicated by having a majority of the respondents rating these systems as providing an "extreme positive effect".

    c. New Technologies Influence on Planning and Conduct of Operations. The second section of the questionnaire attempted to ascertain the influence of the new technology systems on the planning and conduct of operations. Here the responses were composed from both rating scales and free responses. Annex I-III documents the responses received on a question-by-question basis for Part 2. Because of the specific nature of these questions, no general findings were apparent and it is necessary to consult the Annex directly to grasp the respondents' thoughts.

    d. New Technology Interactive Effects. The third section of the questionnaire attempted to assess the interactive effects of the new technology systems on the MSF when added to a currently equipped force as well as a force equipped with multiple, interrelated new technology systems. Annex I-IV provides the results obtained from this portion of the questionnaire. While considering the new technology systems as supplements to a currently equipped force, the top rated systems were the UAV, ATACMS Blk II w/BAT, Comanche, Wide Area Mine, and ASAS. Subsequently, during the identification of suites of new technology systems, 12 suites were

identified from the 9 respondents, who completed this item. In the respondents' formation of suites, the UAV, Comanche, ATACMS Blk II w/BAT, Wide Area Mine, Ferret, ASAS and ATACMS Blk I were most frequently occurring systems with 6-to-9 suite memberships each. No other system had more than 4 suite memberships.

e. Enemy Reactions. In the fourth part of the questionnaire, the MSF participants were asked to indicate and describe any OPFOR counter reactions that could reduce Blue force lethality, survivability, and tempo. In regard to lethality and survivability, the respondent's comments seemed to point out that the Blue force's air defense could be overwhelmed by the threat's use of surging attack helicopters and fixed wing against Blue's deep attack assets. As for tempo, several respondents noted that the enemy's use of chemical attacks had been employed effectively to reduce or eliminate any advantage Blue possessed. The complete set of respondent comments is at Annex I-V.

f. Lacking Capabilities and Additional insights. Following the first four parts of the questionnaire, two further questions solicited any perceived MSF-2010 lacking capabilities or additional insights that the respondents wished to make. The comments resulting from this solicitation càn be found in Annex I-VI.

(1) Eight themes seemed to arise in terms of lacking capabilities, which called attention to:

- deficient organic decontamination capability,

- inadequate ammunition hauling capacity,

- insufficient air assets and control mechanisms to carry out deep missions,

- gaps in ADA coverage,

- inadequate numbers of CH-47Ds,

- insufficient air cavalry assets,

- insufficient engineer assets, and

- inadequate numbers of UAVs.

(2) Although no overall trends seemed to arise in the questionnaire section devoted to additional insights, several worthwhile comments were received. These can be reviewed individually in the second part of Annex I-VI.

I-4. Conclusions. Overall, it appears this questionnaire exercise was valuable for the insights it provided regarding the projected capabilities of a MSF set approximately 15 years into the future. As indicated from the comments received it appears there are still several areas for improvement in the MSF organizational and employment concept.

I-5. Recommendation. The knowledge derived from this questionnaire exercise should be retained and incorporated into further efforts to improve the design of the MSF.

ANNEX I-I

TO APPENDIX I

NEW TECHNOLOGIES QUESTIONNAIRE

- 2010 VERSION-

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Mobile Strike Force New Technologies Questionnaire
- 2010 Force -

Overview. As a result of your participation as a commander or key staff officer in the Mobile Strike Force (MSF) - 2010 exercise just completed, you now possess some unique perceptions of potential future US Army warfighting capabilities. To a large extent much of our future warfighting effectiveness relies on our continued investment in the right new and emerging technologies. As such, we would like your honest opinions in assessing some of these new and emerging technologies so that your perceptions can be considered in the structuring of future Army-wide investment decisions. Specifically, your data will be merged with the data of others participating in the MSF - 2010 exercise and, thereafter, analyzed in support of the Louisiana Maneuvers New Technologies issue by the Battle Lab Integration and Technology Directorate of TRADOC. Ultimately, via TRADOC's role as Architect of the Future Army, new technology recommendations will be formulated and forwarded to HQDA.

PART 1

Several new and emerging technologies were represented during the Mobile Strike Force exercise that you just participated in. Hereafter, you will be asked to provide an assessment of each system's battlefield effect on lethality, survivability, and operational tempo in this section. Please provide your assessments as a comparison with currently equipped forces. If you did not observe the effectiveness and performance of a system, please indicate as such, and, move on to the next system.

1. In terms of contributing to Blue Force <u>lethality</u>, how would you rate the following new technology systems/suite of munitions?

	Not Observed	Extreme Negative Effect	Moderate Negative Effect	Slight Negative Effect	No Effect	Slight Positive Effect	Moderate Positive Effect	Extreme Positive Effect
a. Longbow	—	—	—	—	—	—	—	—
b. LOSAT	—	—	—	—	—	—	—	—
c. Comanche	—	—	—	—	—	—	—	—
d. AFAS	—	—	—	—	—	—	—	—
e. 120 Mortar	—	—	—	—	—	—	—	—
f. SADARM	—	—	—	—	—	—	—	—
g. EFOG-M	—	—	—	—	—	—	—	—
h. EFOG-AD	—	—	—	—	—	—	—	—

	Not Observed	Extreme Negative Effect	Moderate Negative Effect	Slight Negative Effect	No Effect	Slight Positive Effect	Moderate Positive Effect	Extreme Positive Effect
i. Stinger Blk II	___	___	___	___	___	___	___	___
j. UAV	___	___	___	___	___	___	___	___
k. Wide Area Mine	___	___	___	___	___	___	___	___
l. TACAWS/JAWS	___	___	___	___	___	___	___	___
m. Battle Cmd Veh	___	___	___	___	___	___	___	___
n. Combat ID	___	___	___	___	___	___	___	___
o. SPEC 2	___	___	___	___	___	___	___	___
p. ASAS	___	___	___	___	___	___	___	___
q. Total Asset Vis	___	___	___	___	___	___	___	___
r. Enhance Land Warrior Ensemble	___	___	___	___	___	___	___	___
s. 2nd Gen FLIR	___	___	___	___	___	___	___	___
t. Extended Range MLRS	___	___	___	___	___	___	___	___
u. ATACMS Blk I	___	___	___	___	___	___	___	___
v. ATACMS P3I w/APAM	___	___	___	___	___	___	___	___
w. ATACMS Blk II w/BAT	___	___	___	___	___	___	___	___
x. ATACMS P3I w/BAT P3I	___	___	___	___	___	___	___	___
y. M1A3	___	___	___	___	___	___	___	___
z. Future Main Battle Tank	___	___	___	___	___	___	___	___

	Not Observed	Extreme Negative Effect	Moderate Negative Effect	Slight Negative Effect	No Effect	Slight Positive Effect	Moderate Positive Effect	Extreme Positive Effect
aa. M2A3	___	___	___	___	___	___	___	___
bb. Future Infantry Fighting Veh.	___	___	___	___	___	___	___	___
cc. LRAS3	___	___	___	___	___	___	___	___
dd. Future Scout Vehicle	___	___	___	___	___	___	___	___
ee. LONGFOG	___	___	___	___	___	___	___	___
ff. LOCAAS	___	___	___	___	___	___	___	___
gg RFAM	___	___	___	___	___	___	___	___
hh. Ferret	___	___	___	___	___	___	___	___
ii. Javelin	___	___	___	___	___	___	___	___
kk. Improved Javelin	___	___	___	___	___	___	___	___
ll. ARMADILLO	___	___	___	___	___	___	___	___

2. In terms of contributing to Blue Force **survivability**, how would you rate the following new technology systems/suite of munitions?

	Not Observed	Extreme Negative Effect	Moderate Negative Effect	Slight Negative Effect	No Effect	Slight Positive Effect	Moderate Positive Effect	Extreme Positive Effect
a. Longbow	___	___	___	___	___	___	___	___
b. LOSAT	___	___	___	___	___	___	___	___
c. Comanche	___	___	___	___	___	___	___	___
d. AFAS	___	___	___	___	___	___	___	___
e. 120 Mortar	___	___	___	___	___	___	___	___
f. SADARM	___	___	___	___	___	___	___	___

	Not Observed	Extreme Negative Effect	Moderate Negative Effect	Slight Negative Effect	No Effect	Slight Positive Effect	Moderate Positive Effect	Extreme Positive Effect
g. EFOG-M	—	—	—	—	—	—	—	—
h. EFOG-AD	—	—	—	—	—	—	—	—
i. Stinger Blk II	—	—	—	—	—	—	—	—
j. UAV	—	—	—	—	—	—	—	—
k. Wide Area Mine	—	—	—	—	—	—	—	—
l. TACAWS/JAWS	—	—	—	—	—	—	—	—
m. Battle Cmd Veh	—	—	—	—	—	—	—	—
n. Combat ID	—	—	—	—	—	—	—	—
o. SPEC 2	—	—	—	—	—	—	—	—
p. ASAS	—	—	—	—	—	—	—	—
q. Total Asset Vis	—	—	—	—	—	—	—	—
r. Enhance Land Warrior Ensemble	—	—	—	—	—	—	—	—
s. 2nd Gen FLIR	—	—	—	—	—	—	—	—
t. Extended Range MLRS	—	—	—	—	—	—	—	—
u. ATACMS Blk I	—	—	—	—	—	—	—	—
v ATACMS P3I w/APAM	—	—	—	—	—	—	—	—
w. ATACMS Blk II w/BAT	—	—	—	—	—	—	—	—
x. ATACMS P3I w/BAT P3I	—	—	—	—	—	—	—	—
y. M1A3	—	—	—	—	—	—	—	—

	Not Observed	Extreme Negative Effect	Moderate Negative Effect	Slight Negative Effect	No Effect	Slight Positive Effect	Moderate Positive Effect	Extreme Positive Effect
z. Future Main Battle Tank	___	___	___	___	___	___	___	___
aa. M2A3	___	___	___	___	___	___	___	___
bb. Future Infantry Fighting Veh.	___	___	___	___	___	___	___	___
cc. LRAS3	___	___	___	___	___	___	___	___
dd. Future Scout Vehicle	___	___	___	___	___	___	___	___
ee. LONGFOG	___	___	___	___	___	___	___	___
ff. LOCAAS	___	___	___	___	___	___	___	___
gg RFAM	___	___	___	___	___	___	___	___
hh. Ferret	___	___	___	___	___	___	___	___
ii. Javelin	___	___	___	___	___	___	___	___
kk. Improved Javelin	___	___	___	___	___	___	___	___
ll. ARMADILLO	___	___	___	___	___	___	___	___

3. In terms of contributing to Blue Force <u>op tempo</u>, how would you rate the following new technology systems/suite of munitions?

	Not Observed	Extreme Negative Effect	Moderate Negative Effect	Slight Negative Effect	No Effect	Slight Positive Effect	Moderate Positive Effect	Extreme Positive Effect
a. Longbow	___	___	___	___	___	___	___	___
b. LOSAT	___	___	___	___	___	___	___	___
c. Comanche	___	___	___	___	___	___	___	___
d. AFAS	___	___	___	___	___	___	___	___

	Not Observed	Extreme Negative Effect	Moderate Negative Effect	Slight Negative Effect	No Effect	Slight Positive Effect	Moderate Positive Effect	Extreme Positive Effect
e. 120 Mortar	___	___	___	___	___	___	___	___
f. SADARM	___	___	___	___	___	___	___	___
g. EFOG-M	___	___	___	___	___	___	___	___
h. EFOG-AD	___	___	___	___	___	___	___	___
i. Stinger Blk II	___	___	___	___	___	___	___	___
j. UAV	___	___	___	___	___	___	___	___
k. Wide Area Mine	___	___	___	___	___	___	___	___
l. TACAWS/JAWS	___	___	___	___	___	___	___	___
m. Battle Cmd Veh	___	___	___	___	___	___	___	___
n. Combat ID	___	___	___	___	___	___	___	___
o. SPEC 2	___	___	___	___	___	___	___	___
p. ASAS	___	___	___	___	___	___	___	___
q. Total Asset Vis	___	___	___	___	___	___	___	___
r. Enhance Land Warrior Ensemble	___	___	___	___	___	___	___	___
s. 2nd Gen FLIR	___	___	___	___	___	___	___	___
t. Extended Range MLRS	___	___	___	___	___	___	___	___
u. ATACMS Blk I	___	___	___	___	___	___	___	___
v ATACMS P3I w/APAM	___	___	___	___	___	___	___	___
w. ATACMS Blk II w/BAT	___	___	___	___	___	___	___	___

	Not Observed	Extreme Negative Effect	Moderate Negative Effect	Slight Negative Effect	No Effect	Slight Positive Effect	Moderate Positive Effect	Extreme Positive Effect
x.. ATACMS P3I w/BAT P3I	—	—	—	—	—	—	—	—
y. M1A3	—	—	—	—	—	—	—	—
z. Future Main Battle Tank	—	—	—	—	—	—	—	—
aa. M2A3	—	—	—	—	—	—	—	—
bb. Future Infantry Fighting Veh.	—	—	—	—	—	—	—	—
cc. LRAS3	—	—	—	—	—	—	—	—
dd. Future Scout Vehicle	—	—	—	—	—	—	—	—
ee. LONGFOG	—	—	—	—	—	—	—	—
ff. LOCAAS	—	—	—	—	—	—	—	—
gg RFAM	—	—	—	—	—	—	—	—
hh. Ferret	—	—	—	—	—	—	—	—
ii. Javelin	—	—	—	—	—	—	—	—
kk. Improved Javelin	—	—	—	—	—	—	—	—
ll. ARMADILLO	—	—	—	—	—	—	—	—

PART 2

In this second part of the questionnaire, the intent is to try to ascertain the influence of the new technology systems on the planning and conduct of operations. All insights and examples that you can provide will assist in this analysis.

4 a. When contrasted with currently equipped forces, did the presence of any of the New Technology Systems have an impact on the correlation of forces factors in your planning?

_____ Yes   _____ No

b. If you answered yes to item 4.a. above, please indicate below those new technology systems that required significant adjustments to the correlation of forces factors in your planning.

___ Longbow	___ Combat ID	___ Future Main Battle Tank
___ LOSAT	___ SPEC 2	___ M2A3
___ Comanche	___ ASAS	___ Future Infantry Fighting
___ AFAS	___ Total Asset Vis	Vehicle
___ 120 Mortar	___ Enhance Land Warrior	___ LRAS3
___ SADARM	Ensemble	___ Future Scout Vehicle
___ EFOG-M	___ 2nd Gen FLIR	___ LONGFOG
___ EFOG-AD	___ Extended Range MLRS	___ LOCAAS
___ Stinger Blk II	___ ATACMS Blk I	___ RFAM
___ UAV	___ ATACMS P3I w/APAM	___ Ferret
___ Wide Area Mine	___ ATACMS Blk II w/BAT	___ Javelin
___ TACAWS/JAWS	___ ATACMS P3I w/BAT P3I	___ Improved Javelin
___ Battle Cmd Vehicle	___ M1A3	___ ARMADILLO

c. If you marked any of the new technology systems above, please describe the major planning adjustments required regarding the correlation of forces factors.

5 a. When contrasted with currently equipped forces, did the presence of any of the New Technology Systems have an impact on the Task Organization for operations?

_____ Yes   _____ No

b. If you answered yes to item 5.a. above, please indicate below those new technology systems that required significant modifications in the Task Organization for operations.

___ Longbow	___ Combat ID	___ Future Main Battle Tank
___ LOSAT	___ SPEC 2	___ M2A3
___ Comanche	___ ASAS	___ Future Infantry Fighting
___ AFAS	___ Total Asset Vis	Vehicle
___ 120 Mortar	___ Enhance Land Warrior	___ LRAS3
___ SADARM	Ensemble	___ Future Scout Vehicle
___ EFOG-M	___ 2nd Gen FLIR	___ LONGFOG
___ EFOG-AD	___ Extended Range MLRS	___ LOCAAS
___ Stinger Blk II	___ ATACMS Blk I	___ RFAM
___ UAV	___ ATACMS P3I w/APAM	___ Ferret
___ Wide Area Mine	___ ATACMS Blk II w/BAT	___ Javelin
___ TACAWS/JAWS	___ ATACMS P3I w/BAT P3I	___ Improved Javelin
___ Battle Cmd Vehicle	___ M1A3	___ ARMADILLO

c. If you marked any of the new technology systems above, please describe by example one or two of the larger modifications required.

6 a. When contrasted with currently equipped forces, did the presence of any of the New Technology Systems change the operational art, tactics, techniques, or procedures that were employed (or needed to be employed)?

_____ Yes   _____ No

b. If you answered yes to item 6.a. above, please indicate below those new technology systems below that required significant changes in operational art or tactics, techniques or procedures.

___ Longbow	___ Combat ID	___ Future Main Battle Tank
___ LOSAT	___ SPEC 2	___ M2A3
___ Comanche	___ ASAS	___ Future Infantry Fighting
___ AFAS	___ Total Asset Vis	Vehicle
___ 120 Mortar	___ Enhance Land Warrior	___ LRAS3
___ SADARM	Ensemble	___ Future Scout Vehicle
___ EFOG-M	___ 2nd Gen FLIR	___ LONGFOG
___ EFOG-AD	___ Extended Range MLRS	___ LOCAAS
___ Stinger Blk II	___ ATACMS Blk I	___ RFAM
___ UAV	___ ATACMS P3I w/APAM	___ Ferret
___ Wide Area Mine	___ ATACMS Blk II w/BAT	___ Javelin
___ TACAWS/JAWS	___ ATACMS P3I w/BAT P3I	___ Improved Javelin
___ Battle Cmd Vehicle	___ M1A3	___ ARMADILLO

c. If you marked any of the new technology systems above, please provide examples of one or two of the larger changes needed.

7 a. When contrasted with currently equipped forces, did the presence of any of the New Technology Systems have an impact on the allocation of resources within the Task Organization?

_____ Yes   _____ No

b. If you answered yes to item 7.a. above, please indicate those new technology systems below that necessitated significant changes in the allocation of resources..

___ Longbow	___ Combat ID	___ Future Main Battle Tank
___ LOSAT	___ SPEC 2	___ M2A3
___ Comanche	___ ASAS	___ Future Infantry Fighting
___ AFAS	___ Total Asset Vis	Vehicle
___ 120 Mortar	___ Enhance Land Warrior	___ LRAS3
___ SADARM	Ensemble	___ Future Scout Vehicle
___ EFOG-M	___ 2nd Gen FLIR	___ LONGFOG
___ EFOG-AD	___ Extended Range MLRS	___ LOCAAS
___ Stinger Blk II	___ ATACMS Blk I	___ RFAM
___ UAV	___ ATACMS P3I w/APAM	___ Ferret
___ Wide Area Mine	___ ATACMS Blk II w/BAT	___ Javelin
___ TACAWS/JAWS	___ ATACMS P3I w/BAT P3I	___ Improved Javelin
___ Battle Cmd Vehicle	___ M1A3	___ ARMADILLO

c. If you marked any of the new technology systems above, please provide examples of one or two of the larger changes necessitated.

8. a. To what extent did the addition of the 2nd generation FLIR effect your METT-T assessments in the Staff Estimate/Commander's Decision Process?

Not Observed	Extreme Negative Effect	Moderate Negative Effect	Slight Negative Effect	No Effect	Slight Positive Effect	Moderate Positive Effect	Extreme Positive Effect
___	___	___	___	___	___	___	___

b. If your response above in 8.a. indicated either a moderate or extreme effect resulting from the 2nd generation FLIR, please describe how new factors affected the assessment process.

9. a. In the employment of AFAS Battalions, what command relationship did you determine as most appropriate?

_____ Assigned
_____ Attached
_____ Organic
_____ Op Con

b. In the employment of AFAS Battalions, what tactical mission did you determine as most appropriate?

_____ Direct Support (DS)
_____ General Support (GS)
_____ General Support Reinforcing (GSR)
_____ Reinforcing (R)

10. a. In the employment of the 120 MM Mortar, what command relationship did you determine as most appropriate?

_____ Assigned
_____ Attached
_____ Organic
_____ Op Con

b. In the employment of the 120 MM Mortar, what tactical mission did you determine as most appropriate?

_____ Direct Support (DS)
_____ General Support (GS)
_____ General Support Reinforcing (GSR)
_____ Reinforcing (R)

11. a. For EFOG-M, what command relationship did you determine as most appropriate?

_____ Assigned
_____ Attached
_____ Organic
_____ Op Con

b. For EFOG-M, what tactical mission did you determine as most appropriate?

_____ Direct Support (DS)
_____ General Support (GS)
_____ General Support Reinforcing (GSR)
_____ Reinforcing (R)

12. a. What was your intended use for EFOG-M in this exercise?

    b. What events actually triggered the use of EFOG-M in this exercise?

    c. Overall, could EFOG-M be used as intended?
                        _____ Never
                        _____ Rarely
                        _____ Occasionally
                        _____ Usually
                        _____ Always

    d. If your response was "never","rarely", or "occasionally" above, why couldn't EFOG-M be used as intended?

13. a. What was your intended use for SADARM in this exercise?

b. What events actually triggered the use of SADARM in this exercise?

c. Overall, could SADARM be used as intended?
_____ Never
_____ Rarely
_____ Occasionally
_____ Usually
_____ Always

d. If your response was "never","rarely", or "occasionally" above, why couldn't SADARM be used as intended?

14. a. What was your intended use for the Wide Area Mine system in this exercise?

b. What events actually triggered the use of Wide Area Mine System in this exercise?

c. Overall, could the Wide Area Mine System be used as intended?
_____ Never
_____ Rarely
_____ Occasionally
_____ Usually
_____ Always

d. If your response was "never","rarely", or "occasionally" above, why couldn't the Wide Area Mine system be used as intended?

15. a. What was your intended use for the Extended Range MLRS in this exercise?

b. What effect did the Extended Range MLRS exhibit on shaping the battle space?

c. What events actually triggered the use of Extended Range MLRS in this exercise?

d. Overall, could the Extended Range MLRS be used as intended?
_____ Never
_____ Rarely
_____ Occasionally
_____ Usually
_____ Always

e. If your response was "never","rarely", or "occasionally" above, why couldn't the Extended Range MLRS be used as intended?

16. a. What was your intended use for the ATACMS P3I w/APAM in this exercise?

b. What effect did the ATACMS P3I w/APAM exhibit on shaping the battle space?

c. What events actually triggered the use of ATACMS P3I w/APAM in this exercise?

d. Overall, could the ATACMS P3I w/APAM be used as intended?
_____ Never
_____ Rarely
_____ Occasionally
_____ Usually
_____ Always

e. If your response was "never","rarely", or "occasionally" above, why couldn't the ATACMS w/APAM be used as intended?

17. a. What was your intended use for the ATACMS P3I w/BAT P3I in this exercise?

b. What effect did the ATACMS P3I w/BAT P3I exhibit on shaping the battle space?

c. What events actually triggered the use of ATACMS P3I w/BAT P3I in this exercise?

d. Overall, could the ATACMS P3I w/BAT P3I be used as intended?
   _____ Never
   _____ Rarely
   _____ Occasionally
   _____ Usually
   _____ Always

e. If your response was "never","rarely", or "occasionally" above, why couldn't the ATACMS w/BAT P3I be used as intended?

18. a. What combat tasks were you able to assign to the Comanche that could not have been assigned to an Apache equipped force? Why?

b. What changes in FARP support tactics were made, if any, in the employment of the Comanche?

19. What combat tasks were you able to assign to a Land Warrior equipped dismounted infantry force that you could not assign to a current dismounted infantry force? Why?

20. a. How would you characterize the effects of the Total Asset Visibility system on rearming, refueling, and resupplying times?

_____ No Effect
_____ Slight Reduction
_____ Moderate Reduction
_____ Big Reduction

b. How would you characterize the effect of the Total Asset Visibility system on reconstitution times?

_____ No Effect
_____ Slight Reduction
_____ Moderate Reduction
_____ Big Reduction

21. What combat tasks were you able to assign to a Javelin equipped dismounted infantry force that you could not assign to a current dismounted infantry force? Why?

PART 3

Synergetic Effects. Not only must the New Technology Systems be considered individually, but they must be considered from a complete force perspective too. From such a perspective, we are looking for the synergetic effects of the New Technology Systems with the currently equipped force as well as a force equipped with multiple, interrelated New Technology Systems. This section of the questionnaire solicits your assessments of the potential synergetic effects in both contexts.

22. What five new technology systems would appear to have the greatest synergetic effect if added as a single system to the current force? Please rank your three choices as 1, 2, 3, 4, and 5 with 1 representing the most preferred.

____ Longbow	____ Combat ID	____ Future Main Battle Tank
____ LOSAT	____ SPEC 2	____ M2A3
____ Comanche	____ ASAS	____ Future Infantry Fighting
____ AFAS	____ Total Asset Vis	Vehicle
____ 120 Mortar	____ Enhance Land Warrior	____ LRAS3
____ SADARM	Ensemble	____ Future Scout Vehicle
____ EFOG-M	____ 2nd Gen FLIR	____ LONGFOG
____ EFOG-AD	____ Extended Range MLRS	____ LOCAAS
____ Stinger Blk II	____ ATACMS Blk I	____ RFAM
____ UAV	____ ATACMS P3I w/APAM	____ Ferret
____ Wide Area Mine	____ ATACMS Blk II w/BAT	____ Javelin
____ TACAWS/JAWS	____ ATACMS P3I w/BAT P3I	____ Improved Javelin
____ Battle Cmd Vehicle	____ M1A3	____ ARMADILLO

23. Considering the synergistic effects that you observed among the new technology systems, circle and draw a line among those that should make up a suite of systems.

Example.
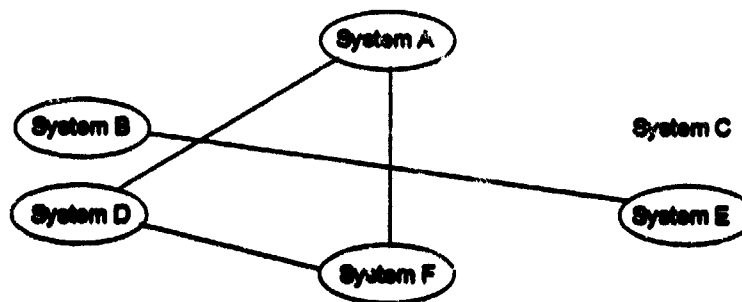
New Technology Systems (Circle & connects suites of systems).

Longbow

LOSAT

Comanche

AFAS

120 Mortar

SADARM

EFOG-M

EFOG-AD

Stinger Blk II

UAV

Wide Area Mine

TACAWS/JAWS

Battle Cmd Vehicle

Combat ID

SPEC 2

ASAS

Total Asset Vis

Enhanced Land
Warrior Ensemble

2nd Gen FLIR

Extended Range MLRS

ATACHMS Blk I

ATACMS P3I w/APAM

ATACMS Blk II w/BAT

ATACMS P3I w/BAT P3I

M1A3

Future Main
Battle Tank

M2A3

Future Infantry
Fighting Vehicle

ILRAS3

Future Scout Veh

LONGFOG

LOCAAS

RFAM

Ferret

Javelin

Improved Javelin

ARMADILLO

PART 4

OPFOR Counter Reactions. Of course, any OPFOR counter reactions that could reduce the Blue force lethality, survivability or op tempo are important considerations. This portion of the questionnaire solicits any such observations.

24. a. Did you observe any extraordinary actions taken by the OPFOR that appeared to reduce or eliminate any advantage in the lethality provided to the friendly forces by the New Technology Systems?

_____ Yes   _____ No

  b. If you replied yes above, please describe the circumstances.

25. a. Did you observe any extraordinary actions taken by the OPFOR that appeared to reduce or eliminate any advantage in the survivability provided to the friendly forces by the New Technology Systems?

_____ Yes   _____ No

  b. If you replied yes above, please describe the circumstances.

26. a. Did you observe any extraordinary actions taken by the OPFOR that appeared to reduce or eliminate any advantage in the op tempo provided to the friendly forces by the New Technology Systems?

_____ Yes   _____ No

  b. If you replied yes above, please describe the circumstances.

27. What capabilities were lacking in the Mobile Strike Force that should be added?

28. Are there any additional insights that you feel merit consideration regarding the New Technology Systems from the Mobile Strike Force exercise? (Please tie any additional insights provided to the specific portions of the battle that formed the basis for the insight.)

Administrative Questions

29. Name: _____

30. Functional Responsibility: _____

31. Branch: _____

ANNEX I-II

TO APPENDIX I

EFFECTS OF NEW TECHNOLOGIES ON

LETHALITY, SURVIVABILITY AND TEMPO

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FREQUENCIES OBTAINED

1. In terms of contributing to Blue Force <u>lethality</u>, how would you rate the following new technology systems/suite of munitions?

	Not Observed	Extreme Negative Effect	Moderate Negative Effect	Slight Negative Effect	No Effect	Slight Positive Effect	Moderate Positive Effect	Extreme Positive Effect
a. Longbow	6	—	—	—	—	—	2	3
b. LOSAT	7	—	—	—	1	1	2	—
c. Comanche	2	—	—	—	—	—	2	7
d. AFAS	3	—	—	—	—	—	5	3
e. 120 Mortar	9	—	—	—	2	—	—	—
f. SADARM	5	—	—	—	—	2	2	2
g. EFOG-M	7	—	—	—	1	3	—	—
h. EFOG-AD	7	—	—	—	1	3	—	—
i. Stinger Blk II	7	—	—	—	1	—	3	—
j. UAV	1	—	—	—	—	—	—	10
k. Wide Area Mine	1	—	—	—	—	1	—	9
l. TACAWS/JAWS	3	—	—	—	—	—	4	4
m. Battle Cmd Veh	10	—	—	—	1	—	—	—
n. Combat ID	10	—	—	—	1	—	—	—
o. SPEC 2	11	—	—	—	—	—	—	—
p. ASAS	7	—	—	—	—	—	—	4
q. Total Asset Vis	11	—	—	—	—	—	—	—
r. Enhance Land Warrior Ensemble	11	—	—	—	—	—	—	—

s. 2nd Gen FLIR	5	—	—	—	—	—	3	3
t. Extended Range MLRS	4	—	—	—	—	—	2	5
u. ATACMS Blk I	3	—	—	—	—	—	2	6
v. ATACMS P3I w/APAM	4	—	—	—	—	—	3	4
w. ATACMS Blk II w/BAT	3	—	—	—	—	—	—	8
x. ATACMS P3I w/BAT P3I	4	—	—	—	—	—	2	5
y. M1A3	4	—	—	—	—	2	5	—
z. Future Main Battle Tank	4	—	—	—	—	1	5	1
aa. M2A3	4	—	—	—	—	2	5	—
bb. Future Infantry Fighting Veh.	4	—	—	—	—	1	5	1
cc. LRAS3	9	—	—	—	1	1	—	—
dd. Future Scout Vehicle	5	—	—	—	3	1	2	—
ee. LONGFOG	11	—	—	—	—	—	—	—
ff. LOCAAS	11	—	—	—	—	—	—	—
gg. RFAM	11	—	—	—	—	—	—	—
hh. Ferret	3	—	—	—	—	—	2	6
ii. Javelin	9	—	—	—	2	—	—	—
kk. Improved Javelin	11	—	—	—	—	—	—	—
ll. ARMADILLO	11	—	—	—	—	—	—	—

2. In terms of contributing to Blue Force **survivability**, how would you rate the following new technology systems/suite of munitions?

	Not Observed	Extreme Negative Effect	Moderate Negative Effect	Slight Negative Effect	No Effect	Slight Positive Effect	Moderate Positive Effect	Extreme Positive Effect
a. Longbow	5	—	—	—	—	1	1	4
b. LOSAT	9	—	—	—	—	—	—	2
c. Comanche	3	—	—	—	—	—	—	8
d. AFAS	4	—	—	—	—	1	1	5
e. 120 Mortar	9	—	—	—	2	—	—	—
f. SADARM	5	—	—	—	—	3	—	3
g. EFOG-M	8	—	—	—	—	1	2	—
h. EFOG-AD	8	—	—	—	—	1	2	—
i. Stinger Blk II	7	—	—	—	—	1	2	1
j. UAV	1	—	—	—	—	—	1	9
k. Wide Area Mine	2	—	—	—	—	1	—	8
l. TACAWS/JAWS	4	—	—	—	—	1	—	6
m. Battle Cmd Veh	11	—	—	—	—	—	—	—
n. Combat ID	10	—	—	—	1	—	—	—
o. SPEC 2	11	—	—	—	—	—	—	—
p. ASAS	7	—	—	—	—	—	1	3
q. Total Asset Vis	10	—	—	—	1	—	—	—
r. Enhance Land Warrior Ensemble	11	—	—	—	—	—	—	—
s. 2nd Gen FLIR	5	—	—	—	—	1	1	4

t. Extended Range MLRS	4	—	—	—	—	1	2	4
u. ATACMS Blk I	4	—	—	—	—	—	1	6
v ATACMS P3I w/APAM	4	—	—	—	—	—	3	4
w. ATACMS Blk II w/BAT	4	—	—	—	—	—	—	7
x.. ATACMS P3I w/BAT P3I	4	—	—	—	—	—	2	5
y. M1A3	4	—	—	—	1	2	2	2
z. Future Main Battle Tank	4	—	—	—	—	1	3	3
aa. M2A3	4	—	—	—	1	2	2	2
bb. Future Infantry Fighting Veh.	4	—	—	—	—	1	3	3
cc. LRAS3	10	—	—	—	—	1	—	—
dd. Future Scout Vehicle	6	—	—	—	—	3	2	—
ee. LONGFOG	11	—	—	—	—	—	—	—
ff. LOCAAS	11	—	—	—	—	—	—	—
gg RFAM	11	—	—	—	—	—	—	—
hh. Ferret	5	—	—	—	—	—	1	5
ii. Javelin	9	—	—	—	2	—	—	—
kk. Improved Javelin	10	—	—	—	1	—	—	—
ll. ARMADILLO	11	—	—	—	—	—	—	—

3. In terms of contributing to Blue Force <u>op tempo</u>, how would you rate the following new technology systems/suite of munitions?

	Not Observed	Extreme Negative Effect	Moderate Negative Effect	Slight Negative Effect	No Effect	Slight Positive Effect	Moderate Positive Effect	Extreme Positive Effect
a. Longbow	6	—	—	—	1	—	—	4
b. LOSAT	10	—	—	—	1	—	—	—
c. Comanche	3	—	—	—	—	1	—	7
d. AFAS	5	—	—	—	—	3	—	3
e. 120 Mortar	9	—	—	—	2	—	—	—
f. SADARM	5	—	—	—	3	1	1	1
g. EFOG-M	8	—	—	—	2	1	—	—
h. EFOG-AD	8	—	—	—	2	1	—	—
i. Stinger Blk II	8	—	—	—	—	1	1	1
j. UAV	2	—	—	—	—	—	—	9
k. Wide Area Mine	4	—	—	—	1	1	1	4
l. TACAWS/JAWS	5	—	—	—	—	2	1	3
m. Battle Cmd Veh	11	—	—	—	—	—	—	—
n. Combat ID	10	—	—	—	1	—	—	—
o. SPEC 2	11	—	—	—	—	—	—	—
p. ASAS	7	—	—	—	—	—	1	3
q. Total Asset Vis	10	—	—	—	1	—	—	—
r. Enhance Land Warrior Ensemble	11	—	—	—	—	—	—	—
s. 2nd Gen FLIR	5	—	—	—	—	2	—	4

t. Extended Range MLRS	6	—	—	—	—	1	1	3
u. ATACMS Blk I	4	—	—	—	—	—	2	5
v ATACMS P3I w/APAM	4	—	—	—	—	—	3	4
w. ATACMS Blk II w/BAT	3	—	—	—	—	—	1	7
x. ATACMS P3I w/BAT P3I	4	—	—	—	—	—	2	5
y. M1A3	4	—	—	—	4	1	2	—
z. Future Main Battle Tank	4	—	—	—	4	1	1	1
aa. M2A3	4	—	—	—	4	1	2	—
bb. Future Infantry Fighting Veh.	4	—	—	—	4	1	1	1
cc. LRAS3	9	—	—	—	1	1	—	—
dd. Future Scout Vehicle	5	—	—	—	3	2	1	—
ee. LONGFOG	11	—	—	—	—	—	—	—
ff. LOCAAS	11	—	—	—	—	—	—	—
gg RFAM	11	—	—	—	—	—	—	—
hh. Ferret	5	—	—	—	1	—	2	3
ii. Javelin	9	—	—	—	2	—	—	—
kk. Improved Javelin	10	—	—	—	1	—	—	—
ll. ARMADILLO	11	—	—	—	—	—	—	—

ANNEX I-III

TO APPENDIX I

NEW TECHNOLOGIES INFLUENCE ON

PLANNING AND CONDUCT OF OPERATIONS

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PLANNING AND CONDUCT OF OPERATIONS

Item 4.

a. Item 4.a. asked the MSF-2010 participants if the presence of any of the new technology systems had an impact on the correlation of forces factors in their planning, when contrasted with currently equipped forces. In response, 10 of the participants indicated "yes", none indicated "no", and the remaining one individual made no indication, at all.

b. Item 4.b. requested those individuals responding "yes" in 4.a. to mark those new technology systems that required significant adjustments to the correlation of forces factors in their planning. Directly below is a list, in descending order, of the new technology systems deemed to require adjustments in the correlation of forces along with the number of indications received for each system.

UAV	7
ATACMS Blk II w/BAT	7
Comanche	5
ATACMS Blk I	5
ATACMS P3I w/BAT P3I	5
TACAWS/JAWS	4
ATACMS P3I w/APAM	4
Ferret	4
Wide Area Mine	3
Longbow	2
AFAS	2
ASAS	2
Extended Range MLRS	2
SADARM	1
2nd Gen FLIR	1
Future Scout Vehicle	1
JSTARS (as write in)	1
All others	0

c. Item 4.c. asked the respondents to describe the major planning adjustments required regarding the correlation of forces factors for the new technology systems marked in Item 4.b. Ten responses were received and the descriptions were as follows:

1-st Respondent: CAMEX Gamer; Branch: INF
Systems Identified: AFAS, UAV, TACAWS/JAWS, ASAS, ATACMS Blk I, ATACMS P3I w/APAM, ATACMS Blk II w/BAT, ATACMS P3I w/BAT P3I, Future Scout Vehicle, Ferret

"UAV/ASAS -- extended depth of fight for each echelon. Required planning to deal with greater number of follow-on/supporting units.

JAWS/AFAS/ATACMS -- Extended area of influence for all echelons. Required deconflicting who handled what, when, & at what range."

2-nd Respondent: Aviation Officer; Branch: AVN
Systems Identified: Longbow, Comanche, UAV, Wide Area Mine; TACAWS/JAWS, Ferret

"RAH-66, Recon capability, extended flight time due to external tank & stealth.
Ferret, Excellent precision deep strike munition.
WAM, Shaped both deep & close engagement areas."

3-rd Respondent: CAMEX Gamer; Branch: MP
Systems Identified: UAV, ASAS, ATACMS Blk I, ATACMS P3I w/APAM, ATACMS Blk II w/BAT, ATACMS P3I w/BAT P3I

No description provided.

4-th Respondent: CAMEX Controller; Branch: Armor
Systems Identified: Comanche, Wide Area Mine, TACAWS/JAWS, Extended Range MLRS, ATACMS Blk I, ATACMS P3I w/APAM, ATACMS Blk II w/BAT, ATACMS P3I w/BAT P3I

"New capability of a deep battle below corps provided MSF a chance to maneuver deep fires to impact (almost eliminate) the close fight. Major consideration is the ability to start shaping the battlefield at 100+ Km."

5-th Respondent: Div Fscoord; Branch: FA
Systems Identified: Longbow, Comanche, AFAS, SADARM, UAV, Wide Area Mine, TACAWS/JAWS, 2nd Gen FLIR, Extended Range MLRS, ATACMS Blk I, ATACMS P3I w/APAM, ATACMS Blk II w/BAT, ATACMS P3I w/BAT P3I, Ferret

"ATACMS (all blocks), Ferret, UAV, WAM, Extended Range MLRS, AFAS gave a new dimension to the deep battle which we were not able to take advantage of initially. Once we got a handle on those systems and added Longbow/Comanche we were able to defeat 3 divisions in the deep fight by adding their effects to AI."

6-th Respondent: Dep Fscoord; Branch: FA
Systems Identified: Comanche, UAV, ATACMS Blk II w/BAT, ATACMS P3I w/BAT P3I

"(1) UAV allowed us to employ our limited assets when & where they had the most impact on the enemy (had a huge affect on use of ATACMS).
 (2) ATACMS (BAT) allowed us to attrit the enemy forces prior to any close battle."

7-th Respondent: G-2; Branch: MI
Systems Identified: UAV

"Increase in targeting accuracy and faster delivery time if cross-cued by Corps and higher intelligence systems."

8-th Respondent: G-3; Branch: INF
Systems Identified: UAV, ATACMS Blk II w/BAT

No description provided.

9-th Respondent: Asst G-3; Branch: Armor
Systems Identified: Comanche, Extended Range MLRS, ATACMS Blk I, ATACMS Blk II w/BAT, Ferret

"The long range assets checked above must be successful in the deep attack to attrit the three threat divisions in this exercise to below 60% (approx) before ground forces in the MSF would be adequate to defeat them. Large concentration of effort on the deep fight."

10-th Respondent: Air Liaison Officer; USAF
Systems Identified: JSTARS (as write-in)

"Targeting process, near real time."

Item 5.

a. Item 5.a. asked the MSF-2010 participants if the presence of any of the new technology systems had an impact on the task organization for operations, when contrasted with currently equipped forces. In response, 5 of the participants indicated "yes", 4 indicated "no", and the remaining 2 made no indication, what so ever.

b. Item 5.b. requested those individuals responding "yes" in 5.a. to mark those new technology systems that required significant adjustments to the task organization for operations. Directly below is a list, in descending order, of the new technology systems deemed to require adjustments in the task organization for operations along with the number of indications received for each system.

UAV	4
Comanche	3
Extended Range MLRS	2
ATACMS Blk I	2
ATACMS Blk II w/BAT	2
Longbow	1
Wide Area Mine	1

```
ATACMS P3I w/APAM       1
ATACMS P3I w/BAT P3I    1
Ferret                  1
All others              0
```

c. Item 5.c. asked the respondents to describe the major task organization modifications required regarding the operations of the new technology systems marked in 5.b. Six responses were received and the descriptions were as follows:

<u>1-st Respondent</u>: Asst G-3; Branch: Armor
Systems Identified: Comanche, UAV, Extended Range MLRS, ATACMS Blk I, ATACMS Blk II w/BAT

"-- The R&S force needed to be a 3 ground/3 air cav troop organization. Primarily to provide screen/guard/recon mission for a multi-prong, full-dimensional operations by the MSF. The R&S troop from the AAG was pulled consistently to support the total MSF effort.

-- Air Assault Group requires a UAV to conduct recon, BDA. Close-range UAV would be adequate (same as MSG).

-- In Alternative One (Base & replace MLRS with 2 AFAS Bns) the 2 MLRS batteries in the MSGs were pulled to support the deep fight early in the operations. Due to the ranges being fired AFAS was not adequate."

<u>2-nd Respondent</u>: G-2; Branch: MI
Systems Identified: UAV

"Long range targeting ability allows the addition of long range weapons systems, specifically ATACMS."

<u>3-rd Respondent</u>: Div Fscoord; Branch: FA
Systems Identified: Wide Area Mine, Extended Range MLRS, ATACMS Blk I, ATACMS P3I w/APAM, ATACMS Blk II w/BAT, ATACMS P3I w/BAT P3I

"Employment of deep attack munitions required pulling the MSG MLRS batteries and using them as GS to the MSF. This happened in the case where the MAG was organized with one MLRS Battalion and two AFAS battalions."

<u>4-th Respondent</u>: CAMEX Controller; Branch: Armor
Systems Identified: Comanche, UAV

"The ability to provide perfect intel (UAV, JSTARS) allowed for deep strike assets and field artillery assets to move forward or with the MSF. This movement eliminated intermediate C^2 for these assets."

5-th Respondent: CAMEX Gamer; Branch: INF
Systems Identified: Longbow, Comanche, Ferret

"Organization of Cav was very fluid based on mission requirements -- loads, loiter time, number mix, etc."

6-th Respondent: G-2; Branch: MI
Systems Identified: UAV

"-- UAV D.S. to AAG
-- Base on msn - controlling/flying UAV by different CMDs to spt execution of deep battle (Atk helo Bde/DIVARTY) - may not reflect change on task organization but coordination required for execution."

Item 6.

    a. Item 6.a. asked the MSF-2010 participants if the presence of any of the new technology systems had an impact on the operational art, tactics, techniques, or procedures when contrasted with currently equipped forces. In response, 10 of the participants indicated "yes", none indicated "no", and the remaining one individual made no indication, at all.

    b. Item 6.b. requested those individuals responding "yes" in 6.a. to mark those new technology systems that required significant changes to the operational art or tactics, techniques or procedures. Directly below is a list, in descending order, of the new technology systems deemed to require changes in the operational art or tactics, techniques or procedures along with the number of indications received for each system.

UAV	6
ATACMS Blk II w/BAT	5
Ferret	4
Wide Area Mine	3
ATACMS Blk I	3
ATACMS P3I w/APAM	3
ATACMS P3I w/BAT P3I	3
ASAS	2
Extended Range MLRS	2
JSTARS (as write-in)	2
Comanche	1
All others	0

c. Item 6.c. asked the respondents to describe one or two of the changes required relating to the operational art, tactics, techniques or procedures as a result of the new technology systems marked in Item 6.b. Ten responses were received and the descriptions were as follows:

1-st Respondent: CAMEX Gamer; Branch: INF
Systems Identified: UAV, ASAS, ATACMS Blk I, ATACMS Blk II w/BAT, Ferret

"Deep targeting -- decide, detect, deliver takes on new importance. AF/AA/Arty pieces of the pie. Dynamic replanning based on near real time BDA."

2-nd Respondent: Aviation Officer: Branch: AVN
Systems Identified: ATACMS P3I w/APAM, Ferret

"Ferret -- Used in deep precision strike and confirmed targeting for Arty Deep Atk. (220 Kms from launch platform (AH-64D or RAH-66)):

ATACMS P3I w/APAM -- 330 Km Deep Atk capability; strip away enemy arty early on in deep fight."

3-rd Respondent: CAMEX Controller; Branch: Armor
Systems Identified: UAV, Extended Range MLRS, ATACMS Blk I, ATCAMS P3I w/APAM, ATACMS Blk II w/BAT, ATACMS P3I w/BAT P3I, Ferret

"Major change occurred in deep battle; relationship in intel and systems used in deep attack changed significantly. In many cases basic missions may change due to reduced risk due to 100% knowledge of battlefield. Deep intel provides knowledge on enemy forces -- this could eliminate meeting engagement and move to contact."

4-th Respondent: Div Fscoord; Branch: FA
Systems Identified: UAV, Wide Area Mine, Extended Range MLRS, ATACMS Blk I, ATACMS Blk II w/APAM, ATACMS Blk IIw/BAT, ATACMS P3I w/BAT P3I, Ferret

"The extended targeting and attack munitions required tasking the targeting system deeper, working hand off between UAVs, scheduling BDA runs, reattack criteria dissemination. Ferret and ATACMS were used together for joint precision strikes: e.g., Ferret confirms target, ATACMS attacks, Ferret assesses and attacks any surviving elements."

5-th Respondent: Dep Fscoord; Branch: FA
Systems Identified: Comanche, Wide Area Mine, ATACMS Blk II w/BAT, ATACMS P3I w/BAT P3I

"(1) Having a deep attack system in the artillery that could kill pin point moving targets altered the way we fought. This deep Atk capability allowed us to defeat the enemy without closing with maneuver.

(2) WAM allowed us to close the lower end of deep engagement areas so that AI + Atk Helo's could kill the enemy."

<u>6-th Respondent</u>: G-2; Branch: MI
Systems Identified: UAV

"Battle space was increased significantly. And the emphasis on deep battle and full dimensional operations."

<u>7-th Respondent</u>: Asst G-3; Branch: Armor
Systems Identified: UAV

"UAVs were determined to be needed for Battle Damage Assessment after long range artillery/Air Force attacks. These assessments were important to determine affects, additional targeting, etc."

<u>8-th Respondent</u>: G-3; Branch: INF
Systems Identified: Wide Area Mine, ATACMS Blk II w/BAT

"Range & impact of Blk II required us to plan to hit enemy much further out. Combined w/ the use of WAM we could form an engagement area deep and strike enemy at the time & location of our choosing."

<u>9-th Respondent</u>: Air Liasion Officer; USAF
Systems Identified: JSTARS (as write-in)

"Understanding of targeting (sensor -- shooter) interface."

<u>10-th Respondent</u>: G-2; Branch: MI
Systems Identified: UAV, ASAS, JSTARS (as a write-in)

"UAV -- TTP on battlehand off of UAVs between units/areas of coverage/missions.
UAV -- TTP on BDA procedures against offensive vice defensive force.
ASAS -- Common situational awareness; constant targeting data input.
UAV -- Extention of deliver phase of Decide/Detect/Deliver to include BDA/assessment for
          redeliver if prescribed during decide phase.
JSTARS -- Critical for 'big' picture situation awareness."

<u>Item 7</u>.

        a. Item 7.a. asked the MSF-2010 participants if the presence of any of the new technology systems had an impact on the allocation of resources within the task organization when contrasted with currently equipped forces. In response, 5 of the paricipants indicated "yes", 3 indicated "no", and the remaining 3 made no indication, what so ever.

b. Item 7.b. requested those individuals responding "yes" in 7.a. to mark those new technology systems that necessitated significant changes in the allocation of resources. Directly below is a list, in descending order, of the new technology systems deemed to require significant changes in the allocation of resources along with the number of indications received for each system.

ATACMS P3I w/APAM	4
ATACMS Blk II w/BAT	4
ATACMS Blk I	3
ATACMS P3I w/BAT P3I	3
UAV	2
Extended Range MLRS	2
AFAS	1
Ferret	1

c. Item 7.c. asked the respondents to describe one or two of the changes necessitated in the allocation of resources as a result of the new technology systems marked in Item 7.b. Five responses were received and the descriptions were as follows:

1-st Respondent: CAMEX Controller; Branch: Armor
Systems Identified: AFAS, ATACMS Blk I, ATACMS P3I w/APAM, ATACMS Blk II w/BAT, ATACMS P3I w/BAT P3I

"Due to the heavy play of FA assets the possible addition of an additional truck battalion is needed to carry additional ammo."

2-nd Respondent: G-2; Branch: MI
Systems Identified: UAV

"Emphasis shifted significantly toward the deep battle."

3-rd Respondent: Dep Fscoord; Branch: FA
Systems Identified: ATACMS P3I w/APAM, ATACMS Blk II w/BAT

"Focused our CSS to carry heavy rockets and missiles."

4-th Respondent: Div Fscoord; Branch: FA
Systems Identified: UAV, Extended Range MLRS, ATACMS Blk I, ATACMS P3I w/APAM, ATACMS Blk II w/BAT, ATACMS P3I w/BAT P3I, Ferret

"MLRS batterys from the MSGs had to fire primarily ATACMS in the variant where we had only 1 MLRS battalion in the MAG. ATACMS missiles were allocated to specific deep strike missions and fired from MSF battalions. The commitment of the AAG required holding some ATACMS missiles to protect the AAG. Several targets were refired to support the AAG."

<u>5-th Respondent</u>: Asst G-3; Branch: Armor
Systems Identified: Extended Range MLRS, ATACMS Blk I, ATACMS P3I w/APAM,
ATACMS Blk II w/BAT, ATACMS P3I w/BAT P3I

"The MSF relies heavily on deep fires to attrit overwhelming threat forces. The munitions checked above are needed for this scenario and take a great number of trucks to haul ammo. More so than tank rounds."

<u>Item 8</u>.

  a. Item 8.a. asked the MSF-2010 participants to classify the extent to which the addition of the 2nd generation FLIR affected their METT-T assessments in the Staff Estimate/ Commander's Decision Process. The frequency of responses obtained were as follows:

Not Observed	8
Extreme Negative Effect	0
Moderate Negative Effect	0
Slight Negative Effect	0
No Effect	0
Slight Positive Effect	0
Moderate Positive Effect	1
Extreme Positive Effect	2

  b. Item 8.b. asked the respondents to describe how the 2nd generation FLIR affected the assessment process if either a moderate or extreme effect was indicated in item 8.a. Two responses were received and the descriptions were as follows:

<u>1-st Respondent</u>: CAMEX Controller; Branch: Armor

"Increased range and resolution allows earlier detection."

<u>2-nd Respondent</u>: Aviation Officer; Branch: AVN

"Extended range, resolution & effectiveness through obscurants."

<u>Item 9</u>.

  a. Item 9.a. asked the MSF-2010 participants what command relationship did you determine as most appropriate in the employment of AFAS Battalions. The following data were received:

Command Relationship	Frequency
Assigned	0
Attached	0
Organic	5
Op Con	0
No Response	6

b. Item 9.b. asked the MSF-2010 participants what tactical missions they determined as most appropriate in the employment of AFAS Battalions. Note that in several instances, multiple missions were identified by the participants. The following data were received:

Tactical Mission	Frequency
Direct Support (DS)	8
General Support (GS)	0
General Support Reinforcing (GSR)	1
Reinforcing (R)	3
No Response	4

Item 10.

a. Item 10.a. asked the MSF-2010 participants what command relationship did they determine as most appropriate in the employment of the 120 MM Mortar. Note that in one instance, two command relationships were identified by a single participant. The following data were received:

Command Relationship	Frequency
Assigned	1
Attached	0
Organic	5
Op Con	0
No Response	6

b. Item 10.b. asked the MSF-2010 participants what tactical missions they determined as most appropriate in the employment of the 120 MM Mortar. The following data were received:

Tactical Mission	Frequency
Direct Support (DS)	6
General Support (GS)	0
General Support Reinforcing (GSR)	0
Reinforcing (R)	0
No Response	5

Item 11.

a. Item 11.a. asked the MSF-2010 participants what command relationship did they determine as most appropriate in the employment of EFOG-M. The following data were received:

Command Relationship	Frequency
Assigned	0
Attached	1
Organic	2
Op Con	0
No Response	8

b. Item 11.b. asked the MSF-2010 participants what tactical missions they determined as most appropriate in the employment of the EFOG-M. The following data were received:

Tactical Mission	Frequency
Direct Support (DS)	5
General Support (GS)	0
General Support Reinforcing (GSR)	0
Reinforcing (R)	0
No Response	6

Item 12. This item attempted to determine if EFOG-M could be used as intended in the MSF-2010 gaming exercise.

a. Item 12.a. asked the MSF-2010 participants for their intended use of EFOG-M in this exercise. Two responses were received and they were as follows:

<u>1-st Respondent</u>: Dep Fscoord: Branch: FA

"Not used in an offensive capacity."

<u>2-nd Respondent</u>: CAMEX Gamer; Branch: MP

"Not expressed by staff."

      b. Item 12.b. attempted to ascertain the events that triggered the use of EFOG-M in this exercise. Three responses were received and they were as follows:

<u>1-st Respondent</u>: CAMEX Gamer; Branch: MP

"Automated DS fires."

<u>2-nd Respondent</u>: CAMEX Gamer; Branch: INF

"Automated DS Arty fires."

<u>3-rd Respondent</u>: CAMEX Controller; Branch: Armor

"Not visible in this simulation."

      c. Item 12.c. asked the MSF-2010 participants to rate if the EFOG-M could be used as intended. Thre following data were received:

<u>Rating</u>	<u>Frequency</u>
Never	0
Rarely	1
Occasionally	2
Usually	0
Always	0
No Observation	8

      d. Item 12.d. asked the respondents why couldn't EFOG-M be used as intended if they responded either "never", "rarely", or "occasionally" in Item 12.c. Three comments were obtained and they were as follows:

<u>1-st Respondent</u>: CAMEX Gamer; Branch: MP

"Not expressed by staff."

<u>2-nd Respondent</u>: CAMEX Gamer; Branch: INF

"No clear-cut employment concept was articulated by the planning staff."

3-rd Respondent: Dep Fscoord; Branch: FA

"Was rarely played."

Item 13. This item attempted to determine if SADARM could be used as intended in the MSF-2010 gaming exercise.

     a. Item 13.a. asked the MSF-2010 participants for their intended use of SADARM in this exercise. Six responses were received and they were as follows:

1-st Respondent. Div Fscoord; Branch: FA

"Primary: counterfire against SP artillery and attack of armored vehicles, secondary. Note: Most missions were executed by the computer automatically."

2-nd Respondent: Aviation Officer; Branch: AVN

"Counterfire against SP arty."

3-rd Respondent: Asst G-3; Branch: Armor

"Counterfire at the MSF & MSG level."

4-th Respondent: CAMEX Gamer; Branch: MP

"Counterbattery fires."

5-th Respondent: CAMEX Gamer; Branch: INF

"Counterbattery munition."

6-th Respondent: Dep Fscoord; Branch: FA

"- Break up armor/arty concentrations in the MSG close battle.
- Only used in a few of the alternatives."

     b. Item 13.b. attempted to ascertain the events that triggered the use of SADARM in this exercise. Six responses were received and they were as follows:

<u>1-st Respondent</u>: Div Fscoord; Branch: FA

"Entry of SP FA into range fan and confirmed by UAV. Attack armored vehicles if artillery threat is attrited. Counterfire missions triggered by Q-37 acquisitions; most SADARM missions were executed automatically by the computer. SADARM munition from MLRS and AFAS killed the majority of the systems killed by MLRS/AFAS. "

<u>2-nd Respondent</u>: Aviation Officer; Branch: AVN

"Counterfire missions."

<u>3-rd Respondent</u>: Asst G-3; Branch: Armor

"Firing of Red SP artillery."

<u>4-th Respondent</u>: CAMEX Gamer; Branch: MP

"Automated counterbattery."

<u>5-th Respondent</u>: CAMEX Gamer; Branch: INF

"Automated counterbattery fires."

<u>6-th Respondent</u>: Dep Fscoord; Branch: FA

"Automatic DS role of CAMEX."

     c. Item 13.c. asked the MSF-2010 participants to rate if the SADARM could be used as intended. The following data were received:

Rating	Frequency
Never	0
Rarely	0
Occasionally	1
Usually	4
Always	1
No Observation	5

     d. Item 13.d. asked the respondents why couldn't SADARM be used as intended if they responded either "never", "rarely", or "occasionally" in Item 13.c. No responses were received.

<u>Item 14</u>. This item attempted to determine if the Wide Area Mine system could be used as intended in the MSF-2010 gaming exercise.

a. Item 14.a. asked the MSF-2010 participants for their intended use of the Wide Area Mine system in this exercise. Nine responses were received and they were as follows:

1-st Respondent: CAMEX Controller; Branch: Armor

"Used to shape battlefield and reinforcing existing obstacles."

2-nd Respondent: Div Fscoord; Branch: FA

"Shaping deep engagement areas, denying crossing sites, disrupting and separating enemy echelons."

3-rd Respondent: Air Liaison Officer; USAF

"As part of an obstacle plan, the Gator mine could be/was used to delay, destroy maneuver forces."

4-th Respondent: G-3; Branch: IN

"(1) Used deep to delay enemy in engagement areas.
(2) Used by AAG as protective minefield. Also employed along air avenues of approach against enemy helicopters."

5-th Respondent: Aviation Officer; Branch: AVN

"Shaping the battle (engagement areas) separating enemy forces, delaying movement."

6-th Respondent: Asst G-3; Branch: Armor

"To shape engagement areas, separate forces, protect the AAG."

7-th Respondent: CAMEX Gamer; Branch: MP

"Canalize/block threat in engagement area."

8-th Respondent: CAMEX Gamer; Branch: INF

"(1) Hasty engagement area creation.
(2) WAM-ADA to protect MAGs from HOKUMs."

9-th Respondent: Dep Fscoord; Branch: FA

"(1) Used to slow the enemy at river. Deep obstacle.
(2) Once to defend the AAG.
(3) Had a much greater impact than planned."

b. Item 14.b. attempted to ascertain the events that triggered the use of the Wide Area Mine System in this exercise. Eight responses were received and they were as follows:

1-st Respondent: CAMEX Controller; Branch: Armor

"Enemy movement."

2-nd Respondent: Div Fscoord; Branch: FA

"Dropping bridges, UAV reports of lead regiments reaching trigger points (Based on JSTARS tracks, Comanche reports)."

3-rd Respondent: G-3; Branch: IN

"In deep attack employed by arty based on enemy location."

4-th Respondent: Dep Fscoord; Branch: FA

"Movement of the enemy."

5-th Respondent: Aviation Officer; Branch: AVN

"In most cases its use was integrated/synchronized in the deep attack."

6-th Respondent: Asst G-3; Branch: Armor

"Development of an engagement area in the deep attack. Three regiments, still basically intact, it was determined was best attacked by ground forces if the last regiment was separated by a WAM."

7-th Respondent: CAMEX Gamer; Branch: MP

"On order of staff."

8-th Respondent: CAMEX Gamer; Branch: INF

"Order to emplace for - #2; call for fire for - #1."

c. Item 14.c. asked the MSF-2010 participants to rate if the Wide Area Mine System could be used as intended. Thre following data were received:

Rating	Frequency
Never	0
Rarely	0
Occasionally	0
Usually	5
Always	4
No Observation	2

d. Item 14.d. asked the respondents why couldn't the Wide Area Mine System be used as intended if they responded either "never", "rarely", or "occasionally" in Item 14.c. No responses were received.

Item 15. This item attempted to determine if the Extended Range MLRS could be used as intended in the MSF-2010 gaming exercise.

a. Item 15.a. asked the MSF-2010 participants for their intended use of the Extended Range MLRS in this exercise. Six responses were received and they were as follows:

1-st Respondent: CAMEX Controller; Branch: Armor

"Used to eliminate enemy arty out to 50 Km."

2-nd Respondent: Div Fscoord; Branch: FA

"Mass on maneuver forces if SADARM munitions were effective on artillery targets. Attack enemy artillery units if required."

3-rd Respondent: G-3; Branch: IN

"Defeat enemy arty. Counterbattery."

4-th Respondent: Dep Fscoord; Branch: FA

"To fight the MSG deep battle to allow the BDE Cdr to shape its battle."

5-th Respondent: Aviation Officer; Branch: AVN

"Strip away long shooters early in deep fight & mass on maneuver."

6-th Respondent: Asst G-3; Branch: Armor

"DS to MSG's for MSG deep battle."

b. Item 15.b. asked the MSF-2010 gaming participants what effect the Extended Range MLRS exhibited on shaping the battle space. Four responses were received and they were as follows:

1-st Respondent: CAMEX Controller; Branch: Armor

"Helped to shape deep fight."

2-nd Respondent: Div Fscoord; Branch: FA

"Hard to assess because most missions were executed automatically by the computer. There were missions fired with the rockets, but the munition report does not distinguish between M26 and ER rocket."

3-rd Respondent: Dep Fscoord; Branch: FA

"(1) We never really closed with the enemy.
(2) The CAMEX model did not allow us to interface with the model.
(3) For all intents the ER-MLRS was played by the computer in the automatic mode."

4-th Respondent: Asst G-3; Branch: Armor

"Due to limited combat on the part of MSG's, this was not really observed."

c. Item 15.c. attempted to ascertain the events that triggered the use of the Extended Range MLRS in this exercise. Four responses were received and they were as follows:

1-st Respondent: CAMEX Controller; Branch: Armor

"Enemy locations and movement."

2-nd Respondent: Div Fscoord; Branch: FA

"Counterfire, entry of maneuver forces into engagement areas."

3-rd Respondent: Aviation Officer; Branch: AVN

"Force orientation/movement."

4-th Respondent: Asst G-3; Branch: Armor

"The advance of the threat against the ground forces of MSG's."

d. Item 15.d. asked the MSF-2010 participants to rate if the Extended Range MLRS could be used as intended. Thre following data were received:

Rating	Frequency
Never	0
Rarely	0
Occasionally	2
Usually	1
Always	2
No Observation	6

e. Item 15.e. asked the respondents why couldn't the Extended Range MLRS be used as intended if they responded either "never", "rarely", or "occasionally" in Item 15.d. Two responses were received and they were as follows:

1-st Respondent: Dep Fscoord; Branch: FA

"(1) Normally we never closed into a close fight.
(2) Model did not allow us interface to this level."

2-nd Respondent: Asst G-3; Branch: Armor

"Threat didn't close with MSG."

Item 16. This item attempted to determine if ATACMS P3I w/APAM could be used as intended in the MSF-2010 gaming exercise.

a. Item 16.a. asked the MSF-2010 participants for their intended use of ATACMS P3I w/APAM in this exercise. Eight responses were received and they were as follows:

1-st Respondent: CAMEX Controller; Branch: Armor

"330 Km - primarily SEAD and towed artillery."

2-nd Respondent: Div Fscoord; Branch: FA

"Joint precision strikes vs. C^3, deep attack of ADA systems, SEAD to support AI, attack of towed artillery if needed, attack of attack helo FARPs."

3-rd Respondent: G-3; Branch: IN

"SEAD for AI; Helo FARPs"

4-th Respondent: Dep Fscoord; Branch: FA

"-- We used BAT munitions almost exclusively
-- APAM was used to SEAD and interdict C^2 targets."

5-th Respondent: Aviation Officer; Branch: AVN

"Strip enemy arty long shooters in deep attrit mission."

6-th Respondent: Asst G-3; Branch: Armor

"In the deep attack it was used primarily for SEAD."

7-th Respondent: CAMEX Gamer; Branch: MP

"C^2 and ADA."

8-th Respondent: CAMEX Gamer; Branch: INF

"Targeting C^2, ADA, & some maneuver attrition."

        b. Item 16.b. asked the MSF-2010 gaming participants what effect ATACMS P3I w/APAM exhibited on shaping tne battle space. Seven responses were received and they were as follows:

1-st Respondent: CAMEX Controller; Branch: Armor

"Worked well, but limited in application."

2-nd Respondent: Div Fscoord; Branch: FA

"It was effective against ADA systems. The simulation gave no visible payback for attacking C^3 or attacking FARPs. There were some attack helo kills, but these were evaluated off line."

3-rd Respondent: Dep Fscoord; Branch: FA

"-- Allowed us to SEAD deep to support attack helo + fixed wing."

4-th Respondent: Aviation Officer; Branch: AVN

"Positive."

5-th Respondent: Asst G-3; Branch: Armor

"Moderate positive effect."

6-th Respondent: CAMEX Gamer; Branch: MP

"Minor due to reduced payload."

7-th Respondent: CAMEX Gamer; Branch: INF

"Limited, reduced payload lacks the dominate effect of Block I."

     c. Item 16.c. attempted to ascertain the events that triggered the use of ATACMS P3I w/APAM in this exercise. Eight responses were received and they were as follows:

1-st Respondent: CAMEX Controller; Branch: Armor

"Identification of enemy unit and maneuver scheme."

2-nd Respondent: Div Fscoord; Branch: FA

"Acquisition of ADA systems, commitment of AI, finding FARPs, ferret confirmation of Corps HQs."

3-rd Respondent: G-3; Branch: IN

"Enemy location."

4-th Respondent: Dep Fscoord; Branch: FA

"-- Force directed against the enemy."

5-th Respondent: Aviation Officer; Branch: AVN

"Synchronization of deep attrit/attack missions."

6-th Respondent: Asst G-3; Branch: Armor

"Entry of threat forces into the engagement area, engagement of threat forces by AI."

7-th Respondent: CAMEX Gamer; Branch: MP

"On order of staff."

8-th Respondent: CAMEX Gamer; Branch: INF

"Call for fire."

d. Item 16.d. asked the MSF-2010 participants to rate if ATACMS P3I w/APAM could be used as intended. Thre following data were received:

Rating	Frequency
Never	0
Rarely	0
Occasionally	1
Usually	3
Always	4
No Observation	3

e. Item 16.e. asked the respondents why couldn't ATACMS P3I w/APAM be used as intended if they responded either "never", "rarely", or "occasionally" in Item 16.d. One response was received and it was as follows:

1-st Respondent: Dep Fscoord; Branch: FA

"Seemed we could never get good effects using the APAM warhead."

Item 17. This item attempted to determine if ATACMS P3I w/BAT P3I could be used as intended in the MSF-2010 gaming exercise.

a. Item 17.a. asked the MSF-2010 participants for their intended use of ATACMS P3I w/BAT P3I in this exercise. Seven responses were received and they were as follows:

1-st Respondent: CAMEX Controller; Branch: Armor

"Deep strike beyond 330 Km for armored vehicles."

2-nd Respondent: Div Fscoord; Branch: FA

"Attack of: SCUDs, Heavy MLRS, Long Range SP artillery, maneuver formations if required."

3-rd Respondent: G-3; Branch: IN

"Defeat enemy systems during deep strike usually done in conjunction with WAM. Against Corps arty & maneuver systems."

4-th Respondent: Dep Fscoord; Branch: FA

"As a deep strike weapon to allow the MSF Cdr to shape the battlefield/enemy force. BAT warhead allowed us to hit moving targets or specific targets such as arty/MRLS.

5-th Respondent: Asst G-3; Branch: Armor

"Deep attack against SP artillery, maneuver forces."

6-th Respondent: CAMEX Gamer; Branch: MP

"Attrition of arty, tank, and mech forces."

7-th Respondent: CAMEX Gamer; Branch: INF

"Long range attrition of arty & maneuver elements."

     b. Item 17.b. asked the MSF-2010 gaming participants what effect ATACMS P3I w/BAT P3I exhibited on shaping the battle space. Seven responses were received and they were as follows:

1-st Respondent: CAMEX Controller; Branch: Armor

"Great effect."

2-nd Respondent: Div Fscoord; Branch: FA

"Initially none except on maneuver forces. Probability of acquisition data was incorrect on MRLS, SP FA. Much better payback after data was corrected. That allowed us to strip off long range artillery and then shift to maneuver forces with Block II.

3-rd Respondent: G-3; Branch: IN

"Significant, with WAM were able to isolate enemy regt's & defeat them."

4-th Respondent: Dep Fscoord; Branch: FA

"A great effect. By the later alternatives we were getting good kill ratios with the BAT submunitions."

5-th Respondent: Asst G-3; Branch: Armor

"Extreme positive effect. Successfully attrited, slowed + confused enemy forces deep.

6-th Respondent: CAMEX Gamer; Branch: MP

"Minor due to reduced payload."

7-th Respondent: CAMEX Gamer; Branch: INF

"Limited. Lacks the 'bang' of Block II."

       c. Item 17.c. attempted to ascertain the events that triggered the use of ATACMS P3I w/BAT P3I in this exercise. Seven responses were received and they were as follows:

1-st Respondent: CAMEX Controller; Branch: Armor

"Enemy location and overall plan."

2-nd Respondent: Div Fscoord; Branch: FA

"UAV confirmations of SP FA, MRLs and SCUDs maneuver formations. By the end of the game we got good results on SP FA and MRLs, as well as maneuver."

3-rd Respondent: G-3; Branch: IN

"Enemy location."

4-th Respondent: Dep Fscoord; Branch: FA

"Again force directed."

5-th Respondent: Asst G-3; Branch: Armor

"Entry of threat forces into the engagement areas."

6-th Respondent: CAMEX Gamer; Branch: MP

"On order of staff."

7-th Respondent: CAMEX Gamer; Branch: INF

"Call for fire."

       d. Item 17.d. asked the MSF-2010 participants to rate if ATACMS P3I w/BAT P3I could be used as intended. Thre following data were received:

Rating	Frequency
Never	0
Rarely	0
Occasionally	1
Usually	2
Always	4
No Observation	4

      e. Item 17.e. asked the respondents why couldn't ATACMS P3I w/BAT P3I be used as intended if they responded either "never", "rarely", or "occasionally" in Item 17.d. One response was received and it was as follows:

1-st Respondent: CAMEX Gamer; Branch: INF

"If CAMEX captured the effect of attrition on C^2 and targets were located 'pinpoint', some greater benefit may have resulted."

Item 18.

      a. Item 18.a. asked the MSF-2010 respondents to identify what combat tasks they were able to assign to the Comanche that they could not assign to an Apache equipped force and why. Seven responses were received and they were as follows:

1-st Respondent: CAMEX Controller; Branch: Armor

"Used in recon/scout role due to armaments and increased stealth."

2-nd Respondent: Div Fscoord; Branch: FA

"Reconaissance and security. More stealthy, better acquisition and better survivability."

3-rd Respondent: Dep Fscoord; Branch: FA

"(1) Counter enemy helo ... much more stealthy. Had greater range. More survivable."

4-th Respondent: Aviation Officer; Branch: AVN

"Reconnaissance, Comanche due to its stealth exibited increased survivability and protected the force."

5-th Respondent: Asst G-3; Branch: Armor

"Reconnaisance. A stealthier, more survivable helicopter. Visibility out to a greater range."

6-th Respondent: CAMEX Gamer; Branch: MP

"Aviator specific question."

7-th Respondent: CAMEX Gamer; Branch: INF

"Not my call. LTC Bunch is the only one who can answer this!"

        b. Item 18.b. asked the MSF-2010 participants to identify those changes in FARP support tactics that were, if any, in the employment of the Comanche. Seven comments were received and they were as follows:

1-st Respondent: CAMEX Controller; Branch: Armor

"None."

2-nd Respondent: Div Fscoord; Branch: FA

"Unknown."

3-rd Respondent: Dep Fscoord; Branch: FA

"Best left to AVN Officer to answer."

4-th Respondent: Aviation Officer; Branch: AVN

"None, turn around time is decreased over AH-64D."

5-th Respondent: Asst G-3; Branch: Armor

"None. Not really played."

6-th Respondent: CAMEX Gamer; Branch: MP

(same as above) -- "Aviator specific question."

7-th Respondent: CAMEX Gamer; Branch: INF

(same as above; I just executed the plan) -- "Not my call. LTC Bunch is the only one who can answer this!"

Item 19. This item asked the MSF-2010 participants what combat tasks they were able to assign to a Land Warrior equipped dismounted infantry force that they could not assign to a current dismounted infantry force and why. Four responses were received and they were as follows:

1-st Respondent: CAMEX Controller; Branch· Armor

"Not visible in this simulation."

2-nd Respondent: Div Fscoord; Branch: FA

"Unknown."

3-rd Respondent: Asst G-3; Branch: Armor

"Not played."

4-th Respondent: CAMEX Gamer; Branch: INF

"Not gamed!"

Item 20.

a. Item 20.a. asked the MSF-2010 participants how they would characterize the effect of the Total Asset Visibility system on rearming, refueling and resupplying times. The following data were received:

No Effect	1
Slight Reduction	0
Moderate Reduction	0
Big Reduction	0
No Observation	10

b. Item 20.b. asked the MSF-2010 participants how they would characterize the effect of the Total Asset Visibility system on reconstitution times. The following data were received:

No Effect	1
Slight Reduction	0
Moderate Reduction	0
Big Reduction	0
No Observation	10

Item 21. This item asked the MSF-2010 participants what combat tasks they were able to assign to a Javelin equipped dismounted infantry force that they could not assign to a current dismounted infantry force and why. Four responses were received and they were as follows:

1-st Respondent: CAMEX Controller; Branch: Armor

"Close fight was not really visible."

2-nd Respondent: Asst G-3; Branch: Armor

"None, was assigned a conventional mission."

3-rd Respondent: CAMEX Gamer; Branch: MP

"Need a higher resolution scenario/model."

4-th Respondent: CAMEX Gamer; Branch: INF

"None, wrong secenario to measure anything having to do with dismounted infantry missions/arms."

ANNEX I-IV

TO APPENDIX I

NEW TECHNOLOGY INTERACTIVE EFFECTS

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SYNERGETIC EFFECTS

Item 22. This item asked the MSF participants what five new technology systems would appear to have the greatest synergetic effect if added as single system to the current force. The respondents were asked to provide their first through fifth place choices. In response, 10 of the 11 individuals completed this item as designed. The remaining individual marked the five systems he preferred, but failed to provide the requested ranking. The table below shows the frequencies received for the new technology systems from those 10 individuals that provided their rankings. Note that there are 11 second place choices indicated in the table as one individual identified two systems as tying for second place. The systems marked by the remaining individual were as follows: ATACMS Blk II w/BAT, Comanche, Ferret, SADARM , and JSTARS (as a write-in), although no ordering could be determined. No votes were received for the other new technology systems that are not listed.

	FIRST CHOICE	SECOND CHOICE	THIRD CHOICE	FOURTH CHOICE	FIFTH CHOICE
UAV	3	3	2	1	
ATACMS Blk II w/BAT	3	2	1		
COMANCHE	2		4	3	
Wide Area Mine	1		1	2	
ASAS	1		1	1	1
ATACMS P3I w/BAT P3I		3		1	1
LONGBOW		2			2
X-Range MLRS		1			
ATACMS P3I w/APAM			1		
Ferret				1	2
Future Main Battle Tank				1	
TACAWS/ JAWS					2
Future Infantry Fighting Veh.					1

Item 23. This item requested the MSF respondents to identify those new technology systems that should make up a suite of systems. Nine responses were received and the suites of systems identified were as follows:

1-st Respondent: Asst G-3, Branch: Armor

Suite 1: Wide Area Mine, UAV, ATACM P3I w/BAT, & Ferret

2-nd Respondent: G-2, Branch: MI

Suite 1: Comanche, UAV, ASAS, 2nd Gen FLIR, X-Range MLRS, ATACMS Blk I, ATACMS P3I w/APAM, ATACMS Blk II w/BAT, ATACMS P3I w/BAT P3I

3-rd Respondent: Dep Fscoord, Branch: FA

Suite 1: (Deep Atk) UAV, Comanche, Wide Area Mine, ATACMS (all munitions) & Air Force Assets
Suite 2: (Mvr) Future Main Battle Tank, Future Infantry Fighting Vehicle, Future Scout Vehicle, AFAS, Extended Range MLRS
Suite 3: (Air Deep Atk) Comanche, UAV, AH-64, Wide Area Mine, & Air Force Assets

4-th Respondent: Div Fscoord, Branch: FA

Suite 1: Comanche, UAV, ASAS, ATACMS Blk I, ATACMS Blk II w/BAT, ATACMS P3I w/APAM, ATACMS P3I w/BAT P3I, Ferret

5-th Respondent: Wargame Controller, Branch: Armor

Suite 1: Comanche, UAV, Combat ID, ASAS, ATACMS P3I w/BAT P3I, Ferret
Suite 2: Wide Area Mine, Battle Command Vehicle, 2nd Gen FLIR, Future Main Battle Tank, Future Infantry Fighting Vehicle, Future Scout Vehicle, M2A3, LRAS3

6-th Respondent: G-2, Branch: MI

Suite 1: UAV, Wide Area Mine, Battle Command Vehicle, ATACMS Blk I, ATACMS Blk II w/BAT, JSTARS, ASAS, AFAS, Comanche, Extended Range MLRS, Ferret, Future Main Battle Tank, Future Infantry Fighting Vehicle, Future Scout Vehicle

7-th Respondent: CAMEX Gamer, Branch: MP

Suite 1: UAV, ASAS, Longbow, Comanche, ATACMS Blk I, ATACMS Blk II w/BAT

<u>8-th Respondent</u>: Aviation Ofc, Branch: AVN

Suite 1: (Designed for Deep Ops) Comanche, TACAWS/JAWS, Wide Area Mine, 2nd Gen FLIR, ATACMS P3I w/APAM, Ferret

<u>9-th Respondent</u>: CAMEX Gamer, Branch: IN

Suite 1: UAV, Longbow, Comanche, ASAS, ATACMS Blk I, ATACMS Blk II w/BAT, Ferret

ANNEX I-V

TO APPENDIX I

OPFOR REACTIONS

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OPFOR Counter Reactions

Item 24.

    a. Item 24.a. asked the MSF-2010 participants if they observed any extraordinary actions taken by the OPFOR that appeared to reduce or eliminate any advantage in lethality provided to the friendly forces by the New Technology Systems. In response, 3 of the participants indicated "yes", 6 indicated "no", and the remaining 2 made no indication, at all.

    b. Item 24.b. requested that those responding "yes" to please describe the circumstances. The circumstances stated were as follows:

1-st Respondent: Asst G-3, Branch: Armor

"OPFOR surged fixed wing and Hokum helicopters against our MLRS battalions and AH-64s taking out many systems."

2-nd Respondent: G-3, Branch: Infantry

"Hokum standoff from Stinger."

3-rd Respondent: Dep Fscoord, Branch: Field Artillery

"Enemy was able to focus his Attack Helo's against our deep fire assets ... mainly our MLRS/ ATACMS Launchers."

Item 25.

    a. Item 25.a. asked the MSF-2010 participants if they observed any extraordinary actions taken by the OPFOR that appeared to reduce or eliminate any advantage in survivability provided to the friendly forces by the New Technology Systems. In response, 5 of the participants indicated "yes", 5 indicated "no", and the remaining 1 made no indication, at all.

    b. Item 25.b. requested that those responding "yes" to please describe the circumstances. The circumstances stated were as follows:

1-st Respondent: CAMEX Gamer, Branch: Infantry

"Massed Fixed Wing/Hokum/'killer UAV' against MAGs. ADA coverage is suspect: stinger ----> (GAP) ----> HIMAD"

2-nd Respondent: CAMEX Gamer, Branch: Military Police

"Surge by threat fixed and rotary wing penetrated ADA coverage."

<u>3-rd Respondent</u>: Dep Fscoord, Branch: Field Artillery

(as also stated in items 24.b. and 26.b.) "Enemy was able to focus his Attack Helo's against our deep fire assets ... mainly our MLRS/ATACMS Launchers."

<u>4-th Respondent</u>: G-2, Branch: Military Intelligence

"Surging aircraft"

<u>5-th Respondent</u>: G-2, Branch: Military Intelligence

"- Hokum with greater standoff range than our attack helos
 - UAV with bombs
 - UAV deep look
 - BMP2"

<u>Item 26</u>.

 a. Item 26.a. asked the MSF-2010 participants if they observed any extraordinary actions taken by the OPFOR that appeared to reduce or eliminate any advantage in <u>op tempo</u> provided to the friendly forces by the New Technology Systems. In response, 4 of the participants indicated "yes", 5 indicated "no", and the remaining 2 made no indication, at all.

 b. Item 26.b. requested that those responding "yes" to please describe the circumstances. The circumstances stated were as follows:

<u>1-st Respondent</u>: CAMEX Gamer, Branch: Infantry

"Chem attack. Must develop decon on the move capability."

<u>2-nd Respondent</u>: CAMEX Gamer, Branch: Military Police

"Chemical attack demonstrated need for decon capability."

<u>3-rd Respondent</u>: Dep Fscoord, Branch: Field Artillery

(as also stated in items 24.b. and 25.b.) "Enemy was able to focus his Attack Helo's against our deep fire assets ... mainly our MLRS/ ATACMS Launchers.

Also enemy use of chemicals."

<u>4-th Respondent</u>: G-2, Branch: Military Intelligence

"Chemical attacks."

<u>5-th Respondent</u>: G-2, Branch: Military Intelligence

"Hokum attks."

ANNEX I-VI

TO APPENDIX I

LACKING CAPABILITIES AND ADDITIONAL INSIGHTS

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LACKING CAPABILITIES
&
ADDITIONAL INSIGHTS

At the end of the MSF- 2010 New Technologies Questionnaire, the two final questions attempted to elicit feedback on any remaining lacking capabilities and any additional insights. This section reports on the comments received as a result of solicting this information.

Lacking Capabilities. Specifically, Question 27 put forth the following question: "What capabilities were lacking in the Mobile Strike Force that should be added?" The responses received were as follows:

1-st Respondent: Div Fscoord; Branch: FA

"1. Decon, more haul capability for FA ammunition. If MSF UAVs cannot be dedicated to targeting/BDA, field UAV to the Mobile Artillery Group.

2. A2C2 element, mini ASOC if MSF is to utilize as many AI aircraft as played in this scenario."

2-nd Respondent: G2; Branch: MI .

"Chemical Decon capabilities."

3-rd Respondent: ALO; USAF

"-- More theater level air assets to shape and focus the fight.

-- There is, no doubt, a major piece of the corps and theater AI effort focused on MSF areas and targets of interest. Servicing these targets before the MSF encounters them in the Deep and/or close fight would significantly effect resulting data."

4-th Respondent: Dep Fscoord; Branch: FA

"(1) Decon capability ... the mix of overpressurized/non-pressurized systems would separate our combat and C^2/CSS.

(2) Additional transportation assets for the MAG ... to haul additional ATACMS MSLs.

5-th Respondent: CAMEX Gamer; Branch: MP

"-- Close fight capability?
-- ADA coverage."

6-th Respondent: Aviation Ofc; Branch: Avn
"-- Decon
-- Engineer Co(Light)
-- Trans BN in the MAG for Arty ammo haul.
-- One additionl air cav trp (12 RAH-66)
-- One company of CH-47Ds"

7-th Respondent: CAMEX Gamer; Branch: Inf
"-- Better dedicated ADA coverage.
-- UAV availability is critical to deep fight. Not sure current #'s are adequate."

8-th Respondent: Asst G-3; Branch: Armor

"-- Organic decon capability.
-- Transportation battalion in the MAG to haul ammo.
-- Engineer Company in the AAG.
-- One additional Air Cav troop (total of 3 air/3 ground).
-- One company of CH-47D medium lift (155 towed)."

9-th Respondent: Controller; Branch: Armor

"-- Organic Decon
-- Additional truck hauling capability in MAG
-- Engineer - mobility/countermobility.
-- Additional Air Cav troop and company of CH-47 for recon and lift."

10-th Respondent: G2; Branch: MI

"-- UAV capability to spt DS to AAG.
-- Sufficient # of UAV flyers/control devices (CGS) to fly simultaneously.
    - 3 per Bde
    - 6-10 for Div GS Msn
        * 2-3 atk helo
        * 4-6 for Div Arty
        * 2-4 unit training.
-- 1 ASAS not well defined enough to ensure ASAS intel down to lowest levels."

Additional Insights. In detail, Question 28 put forth the following question: "Are there any additional insights that you feel merit consideration regarding the New Technology Systems from the Mobile Strike Force exercise? (Please tie any additional insights provided to the specific portions of the battle that formed the basis for the insight.)" The responses received were as follows:

<u>1-st Respondent</u>: Div Fscoord; Branch: FA

"Mobile Artillery Group should be organic to the MSF to facilitate training and employment.

We made several mistakes in targeting during the basecase which were repeated through Alt 1 through Alt 4. There were problems with BAT footprints and effectiveness data which were not resolved until Alt 6.

FSEs are absolutely critical to the execution of fire support for this force. They must have robust ability at MSF level to conduct the deep fight in the areas of targeting, A2C2, positioning and moving attack units, etc.

The FSE at MSG and BN levels must be organized and manned to conduct the fight out to 50K, handling target acquisition assets, etc.

Targeting and engagement techniques were flawed in the Base case and this was continued through Alt 5.

The MAG Commander must be the FSCOORD on an assigned basis for the MSF, like todays Div Arty. I don't think a 'plug' unit from corps can function rapidly as an effective FSCOORD even with digitization."

<u>2-nd Respondent</u>: G2; Branch: MI

"ASAS and the entire Intelligence BOS contributed to the increased situational awareness and targeting accuracy. However the Model used did not reflect this. Therefore, I did not comment on ASAS effectiveness."

<u>3-rd Respondent</u>: CAMEX Gamer; Branch: MP

"See TRAC-OAC brief."

<u>4-th Respondent</u>: Aviation Ofc; Branch: Avn

"Separate session captured this info."

<u>5-th Respondent</u>: CAMEX Gamer; Branch: Inf

"See OAC brief 'Post Prairie Warrior 94 - Mobile Strike Force'."

<u>6-th Respondent</u>: G-3; Branch: Inf

"The only system evaluated/observed or feelings about were deep strike/atk systems."

<u>7-th Respondent</u>: G-2; Branch: MI

" UAV
- survivability in ADA threat environment = # UAV available
- A2C2
- # systems needed to spt BDA/targeting/sit dev reqmts
- IFF required
- counter UAV threat
- cross queing with other systems (lethal & nonlethal)
    (comanche/JSTARS/Q-36/37/AQF-GBCS/Arty)
- Battle hand off between launchers and different units depending on msn
        ex.: UAV SR launched to check out helo flight route to OBJ Python or
            BP111 then to check out OBJ Python or BP111 for AAG insertion then
            DS to the AAG for intel. Who controls/flies the UAV during which
            stages of the msn.
        ex.: UAV checking ATK helo flight route and battle positions prior to mvmt to
            VIC EA Green to spt a phased ATK helo and then ATACMS attack.
- multiple package capable
        ** IMINT only (picture)
        ** IMINT/COMINT/EA mix pkg
        ** MTI/SAR

- Intel system/organization must be able to collect/analyze/EA/report while on the move
    (even continuous leapfrog with full comms) to keep up with and spt MSF deep
    movement

- Intel must have capab & resolution to spt deep attk (multiple focus) and close combat
    SIMULTANEOUSLY.

- Organic Intel systems provide good tgt-specific intel but force (MSF) very dependent
    on corps/EAC assets for the big picture/situation development. (GBCS or EH-60
    don't have the range required for deep look)

- Intel overload/raw data overload at the user level if each CGS or GSM must interpret
    all the data from multiple sensors simultaneously -OR- significant intel ADP
    advancement required to interpret the data for the operator/analyst, with <u>no</u>
    time delay of intel arrival from collector to operator/analyst.

-- Relevance of using manned assets to do what unmanned assets can do -
      ** helo
      ** LRSU
      ** recon
implies need for expendable unmanned systems."

APPENDIX J

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