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Report on the
**TECHNOLOGY BASE SEMINAR WARGAME II
(TBSWG II)**

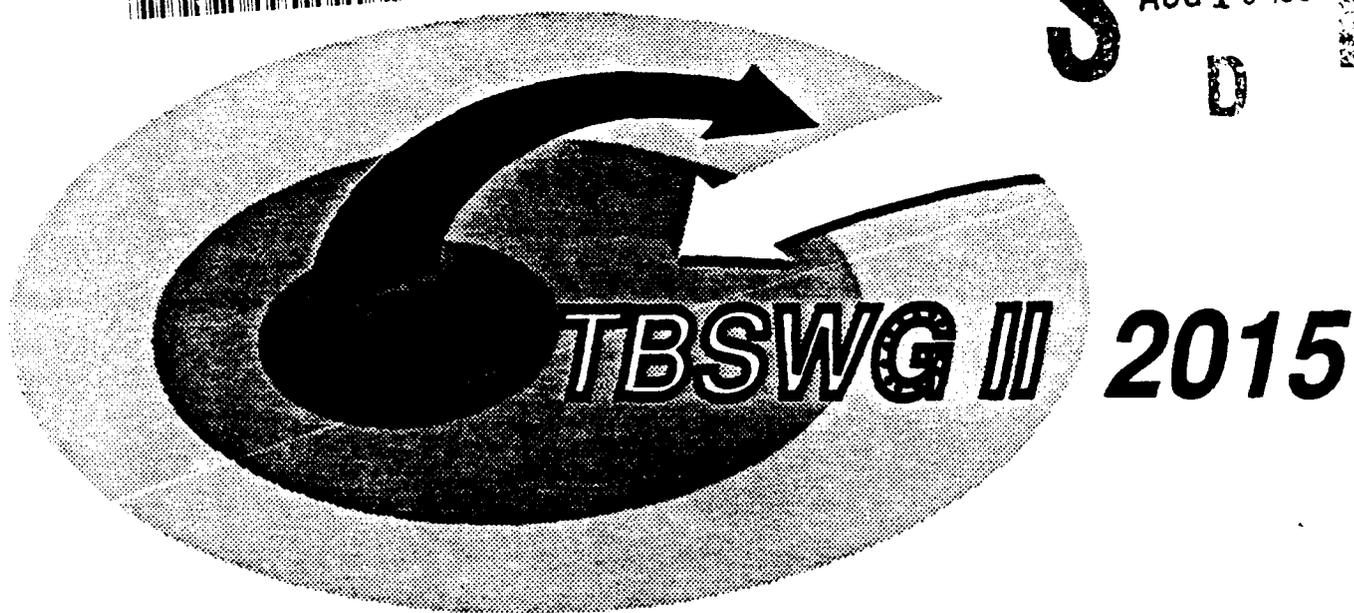
Volume 6: TBSWG II Complete Questionnaire
Results (Appendices R-S)

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Bethesda, Maryland
23-26 April 1990

The Combined Arms Center
Training and Doctrine Command
Ft. Leavenworth, Kansas
6-8 June 1990

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Report on the
TECHNOLOGY BASE SEMINAR WARGAME II
(TBSWG II)

Volume 6: TBSWG II
Complete Questionnaire Results
(Appendices R – S)



20 November 1990

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Preface to Volume 6: Questionnaire Data Reduction

The questionnaire (Appendix R) consisted of several sections: Identification (page 1), Insights (Section A, pages 2-7), Technology Base Investment Strategy (Section B, pages 8-13), and Future Situations (Section C, pages 14-18). In addition, there was an attached ATTD List (7 pages) from which to select the ten "most important." Page 8 of this list provided space for "other additions and comments." There was also a separate 2-page evaluation form, which was completed by some of the participants.

We divided all questions into two types — narrative and quantitative. The answers to each were recorded and analyzed by different techniques.

Quantitative Questions

Answers that could be expressed as numbers or choices were entered into a relational database (Paradox), with one record per person. Scripts were written to reduce the data to tables suitable for graphing with the built-in graphics package. There is a separate graph for each major question in Appendix S, Part 1. The title indicates the question number (or logical extension of the numbering system, as in B.7.a). We validated a random selection of graphs to check their accuracy. To simplify the graphs, we combined the 5 roles into 2 groups as follows:

Role	ID	#	%	Group	#	%
Player-Technologist	PT	30	36	"Tech. Mgmt."	34	41
Synthesis Team	ST	4	5			
Player-Operational	PO	5	6	"Operator"	27	32
Regional Advisor	RA	8	9			
Other Advisor	OA	14	17			
		61	73		61	73

Narrative Questions

We grouped the completed questionnaires by role, then gave each an "ID" consisting of a 2-letter abbreviation for the role and a consecutive number within that role (see Code Listing at the conclusion of this preface). For example, the "Player Technologist" questionnaires are numbered PT-01 to PT-30.

We assigned each question a code (e.g., "A.1." for section A, question 1) and divided up the questionnaires among 11 staff typists. Each typist produced a WordPerfect document for each questionnaire, which consisted of the code for each question followed by that person's response to the question. We reviewed each draft for accuracy and returned it for correction. We also made a "question file" of the original questions in the same format as the responses.

EER Systems Corp. wrote a UNIX program to merge the question text with each person's response to that question. This was imported back into WordPerfect and edited to make it easier to

read (e.g., questions are emphasized, headers indicate the current question, etc.). These responses are given in Appendix S, Part 2.

Evaluation Form

This 2-page form was completed by only 49 participants. The quantitative data (from the first page) was put in a different database, but grouped and graphed similar to that above. We made no attempt to capture the comments from the second page, since the originals seem to be fairly easy to read.

Editing

Editing of the narrative responses turned out to be a major project. Much of the handwriting is difficult to read, and the typists are unfamiliar with the abbreviations and technical jargon used. Each questionnaire requires 2–3 reviews by a reader–editor team. Slight errors in the question codes cause major problems with the merge program. The resulting report requires significant hard work to put it in final format.

Suggestions for the Next Phase

The choice of names for the 2 groups is a compromise that generated a great deal of discussion. It would be beneficial to find names that everyone can agree to.

On many of the graphs, the “no answer” bar was dominant. In accordance with suggestion, this response has been eliminated from many graphs; it is further suggested that data such as the size of each group and the percent not answering be presented in a box on the graph. Also, the identifying box for the horizontal graphs should be reversed, to agree with the bar placement. [Note: This was done before publication.] (These changes may need to be done manually — the database graphics utility does not support such changes.)

We felt that the combination of horizontal and vertical bar graphs provided some welcome variety. For consistency, one might want them all to be the same (probably horizontal, to best display the labels). In any case, all titles and legends should be the same size and style. [Note: This was done before publication.]

We made no attempt to analyze the data, just to present the raw data in a digestible form. This data needs to be reviewed both for format and for content. Conclusions should be drawn and selected graphs (or narrative responses) included in the final report. The complete set of graphs and the report might best be an optional appendix, available to whoever is willing to address it.

The quantitative data lends itself well to further analysis. Since it is in a database, all manner of statistics and correlations can be performed once someone decides what looks most interesting.

Code Listing

ID	Role	Europe	LATAM	SWA	All
CO-01	Control	No	Yes	No	No
CO-02	Control	No	Yes	No	No
CO-03	Control	Yes	No	No	No
CO-04	Control	Yes	No	No	No
CO-05	Control	Yes	No	No	No
CO-06	Control	No	Yes	No	No
CO-07	Control	No	No	Yes	No
CO-08	Control	No	No	Yes	No
CO-09	Control	No	No	Yes	No
CO-10	Control	No	Yes	No	No
CP-11	Control	No	No	No	Yes
GA-01	Game design advisor	No	No	No	Yes
GA-02	Game design advisor	No	Yes	Yes	No
GA-03	Game design advisor	No	Yes	No	No
GA-04	Game design advisor	No	No	No	Yes
GA-05	Game design advisor	No	No	Yes	No
GA-06	Game design advisor	No	Yes	Yes	No
OA-01	Other advisor	No	Yes	Yes	No
OA-02	Other advisor	No	Yes	No	No
OA-03	Other advisor	No	No	No	Yes
OA-04	Other advisor	Yes	Yes	No	No
OA-05	Other advisor	Yes	No	No	No
OA-06	Other advisor	No	Yes	No	No
OA-07	Other advisor	No	No	No	Yes
OA-08	Other advisor	Yes	No	No	No
OA-09	Other advisor	No	No	No	Yes
OA-10	Other advisor	No	Yes	No	No
OA-11	Other advisor	No	No	No	Yes
OA-12	Other advisor	Yes	No	Yes	No
OA-13	Other advisor	Yes	No	No	No
OA-14	Other advisor	No	Yes	Yes	No
OB-01	Observer	No	Yes	No	No
OB-02	Observer	No	No	Yes	No
OB-03	Observer	No	Yes	Yes	No
OB-04	Observer	Yes	Yes	Yes	No
OB-05	Observer	No	No	No	Yes
OB-06	Observer	No	No	No	Yes
PO-01	Player – Operational	No	No	Yes	No
PO-02	Player – Operational	No	No	Yes	No
PO-03	Player – Operational	No	Yes	No	No
PO-04	Player – Operational	No	Yes	No	No
PO-05	Player – Operational	No	Yes	No	No
PT-01	Player – Technologist	No	Yes	No	No
PT-02	Player – Technologist	Yes	No	No	No
PT-03	Player – Technologist	No	No	Yes	No

ID	Role	Europe	LATAM	SWA	All
PT-04	Player – Technologist	Yes	No	No	No
PT-05	Player – Technologist	No	Yes	No	No
PT-06	Player – Technologist	Yes	No	No	No
PT-07	Player – Technologist	No	Yes	No	No
PT-08	Player – Technologist	Yes	No	No	No
PT-09	Player – Technologist	No	Yes	No	No
PT-10	Player – Technologist	No	Yes	No	No
PT-11	Player – Technologist	Yes	No	No	No
PT-12	Player – Technologist	No	No	Yes	No
PT-13	Player – Technologist	No	Yes	No	No
PT-14	Player – Technologist	No	No	Yes	No
PT-15	Player – Technologist	No	Yes	No	No
PT-16	Player – Technologist	No	No	Yes	No
PT-17	Player – Technologist	No	No	Yes	No
PT-18	Player – Technologist	No	Yes	No	No
PT-19	Player – Technologist	No	Yes	No	No
PT-20	Player – Technologist	Yes	No	No	No
PT-21	Player – Technologist	Yes	No	No	No
PT-22	Player – Technologist	No	No	Yes	No
PT-23	Player – Technologist	Yes	No	No	No
PT-24	Player – Technologist	Yes	No	No	No
PT-25	Player – Technologist	No	No	Yes	No
PT-26	Player – Technologist	No	No	Yes	No
PT-27	Player – Technologist	No	No	Yes	No
PT-28	Player – Technologist	No	Yes	No	No
PT-29	Player – Technologist	No	No	Yes	No
PT-30	Player – Technologist	Yes	No	No	No
RA-01	Regional advisor	No	No	Yes	No
RA-02	Regional advisor	No	No	Yes	No
RA-03	Regional advisor	No	Yes	Yes	No
RA-04	Regional advisor	No	Yes	No	No
RA-05	Regional advisor	Yes	No	Yes	No
RA-06	Regional advisor	No	Yes	No	No
RA-07	Regional advisor	No	No	Yes	No
RA-08	Regional advisor	Yes	No	No	No
ST-01	Synthesis team	No	No	No	Yes
ST-02	Synthesis team	No	No	Yes	No
ST-03	Synthesis team	No	No	Yes	No
ST-04	Synthesis team	No	Yes	No	No

APPENDIX R:
PHASE 2 DATA COLLECTION FORM

TECHNOLOGY BASE SEMINAR WARGAME (TBSWG) II

PHASE 2 DATA COLLECTION

We hope that your experiences here and at Phase 1 have been useful in defining and clarifying issues about the use of technologies/future systems on or supporting a future battlefield. The purpose of this data collection instrument is to capture your insights about technologies and Next Generation/Future Systems that will help refine the Army's tech base investment strategy. Please complete applicable questions as thoroughly as possible. Some questions may not be appropriate for each respondent - use your own judgement. To further elaborate on any of the items, please use the reverse sides of the pages and reference the item number.

1. NAME (optional):

2. ROLE (circle one):

Player-Technologist	Synthesis Team
Player-Operational	Regional advisor
Observer	Game design advisor
Control	Other advisor

3. In which region did you participate during this phase?
(circle as many as are appropriate)

Europe	LATAM
SWA	All

SECTION A. INSIGHTS (SYSTEMS, TECHNOLOGIES, ALBF)

This section contains questions about insights you gained from participation in TBSWG II. Please think about how technology and doctrine converged during the play of the game and describe what you learned.

1. Important Insights. What was the single most important thing you learned from participation in TBSWG II?

2. Unexpected Results. What did you learn from TBSWG II that you found particularly surprising or unexpected?

3. Systems and Technologies. On the next pages, in order of importance, list the five (5) systems that you believe most belong in the inventory of the Army of 2015. Consider systems that were actually played as well as systems that now occur to you as being useful even if they were not actually played in the game. For each system:

- List the key enabling technology(ies) that you believe are most critical to development of that system.
- Circle in which of the three (3) gamed regions you believe the system will be most useful.
- Tell us why you think the system will be effective.
- Describe the most likely hostile counter measures to the system and the US counter-counter measures.

a. System 1

Technology(ies)

Region (circle one or more): Europe LATAM SWA

Why is System 1 most important/effective?

What are counter measures and counter-counter measures?

b. System 2

Technology(ies)

Region (circle one or more): Europe LATAM SWA

Why is System 2 one of the most important/effective?

What are counter measures and counter-counter measures?

c. System 3 -

Technology(ies)

Region (circle one or more): Europe LATAM SWA

Why is System 3 one of the most important/effective?

What are counter measures and counter-counter measures?

d. System 4

Technology(ies)

Region (circle one or more): Europe LATAM SWA

Why is System 4 one of the most important/effective?

What are counter measures and counter-counter measures?

e. Systems

Technology(ies):

Region (circle one or more): Europe LATAM SWA

Why is System 5 one of the most important/effective?

What are counter measures and counter-counter measures?

4. Technology Availability. Were there any assumptions made about the availability of technology or the performance of a system that you think was not reasonable given the time frame?

5. Inherent Capabilities. Similarly, were there any assumptions about the "inherent capabilities," i.e., those capabilities of the US force not associated with a particular system that you believe were not warranted?

6. Air Land Battle Future Concept. As a result of TBSWG II, have you developed any new insights about the evolving ALBF? For example, do you believe that the required technology will be available to execute the concept? Or that the concept could be changed in any way to take better advantage of available technology?

7. The Army as a Contingency Force. What are the major weaknesses you see with the Army operating as a contingency force?

8. Space. How do you believe the Army can best exploit Space to enhance the capabilities of the tactical force?

9. Innovative Concepts. What was the single most innovative system or concept you heard discussed?

SECTION B. TECHNOLOGY BASE INVESTMENT STRATEGY

This section deals with how you would change the current Army Tech Base Investment Strategy; i.e., what you would do as a result of the insights you gained from TBSWG II.

1. Current Tech Base Investment Strategy. Do you believe the current Tech Base Investment Strategy is generally appropriate to the needs of 2015 as identified in TBSWG II?

2. Possible Changes to TBIS. If not, what is the single most important change the Army should make in its Tech Base Investment Strategy?

3. Armored System Modernization. Do you believe the Army's current emphasis on Armored System Modernization is consistent with the insight gained from TBSWG II?

4. Emerging Technologies. Consider the technologies listed below in terms of criticality for the requirements of the Army of 2015.

1. Biotechnology
2. Neuroscience
3. Power generation/storage/conditioning
4. Micro-electronics/photonics/acoustic devices
5. Advanced signal processing & computing
6. Artificial intelligence
7. Robotics
8. Advanced propulsion
9. Protection/lethality
10. Directed energy
11. Low observables -
12. Space technology
13. Advanced materials/material processing

a. Using the number to the left of the above emerging technologies as a reference, indicate the 5 technologies you believe are most important and the 5 you believe are next highest in importance in achieving required battlefield capabilities in 2015.

Most Important

Next Highest

b. Indicate the 5 technologies from the 13 listed above in which you believe the Army should invest most heavily given the investments of other Services/government agencies or the private sector.

5. Other Technologies. Are there any other technologies you believe should be added to the list of Army Key Emerging Technologies? Indicate whether the Army should be a principal investor in their development.

Technology	Army	Invest
	Y	N
	Y	N
	Y	N
	Y	N

6. Technologies to Delete. Are there any technologies which you believe the Army should delete from the list of Key Emerging Technologies? If so, which technologies and why?

7. Advanced Technology Transition Demonstrations (ATTD). Rank order the following DA approved ATTD's in terms of their importance to maturing and transitioning technology needed for Next Generation/Future Systems. Mark with an "X" any you believe should be deleted from the current program.

- _____ Soldier Integrated Protective Ensemble
- _____ Rotorcraft Pilot's Associate (Phase 1)
- _____ Advanced Field Artillery System
- _____ Common Chassis
- _____ Component Advanced Technology Testbed
- _____ Combat Mobility Vehicle
- _____ Composite Hull for Combat Vehicle
- _____ Radar Deception and Jamming
- _____ Expendable Jammer Enhancement
- _____ Multirole Survivable Radar (MRSR)
- _____ Directed Energy Anti-Satellite Program
- _____ Kinetic Energy Anti-Satellite Program
- _____ Standoff Minefield Detection
- _____ Advanced Air Defense Electro-optical System
- _____ Multi-Sensor Target Acquisition
- _____ Advanced Chemical/Biological Defense
- _____ Airland Battle Management

8. Proposed New ATTDs. Attached to this questionnaire is a list of proposed new ATTD's (beyond those already approved by DA). Please circle up to ten ATTD's, that you think are most important. There is room at the end of the list to add ATTD's of your own design or provide comments.

9. Systemic Issues and Supporting Capabilities. Listed below are the systemic issues and supporting capabilities that are part of the current Army tech base investment strategy. Please provide comments regarding their importance based on TBSWG II.

Systemic issues

Physical/functional survivability

Manufacturing technology

Lightening the force

Logistics R&D

MANPRINT/human factors/health hazards

Manning and training

Combat casualty care

Environmental effects

Corrosion & deterioration preventive control

Supporting capabilities

Facilities

Assessment technology

Special purpose equipment/computers

Laboratory test & evaluation

Modeling, simulation and wargaming

10. What actions have you taken or do you plan to take to change the tech base program of your Laboratory or RDE Center? (If you are not a laboratory/center director, what advice would you offer?)

11. What issues were raised that you believe warrant further analysis, in terms of:

a. Technical performance of Next Generation/Future Systems -

b. ALBF operations -

c. Scenario/vignette description -

SECTION C: FUTURE SITUATIONS

We would like to know how you feel about certain assertions regarding possible future situations, equipments, and battle concepts. Please mark the degree to which you agree/disagree with the following statements.

	Strongly Disagree	Neutral	Strongly Agree		
a. The scenarios in TBSWG II actually portray possible future Army fighting requirements.	1	2	3	4	5
b. With enough investment in the tech base, I am confident that the technologies needed for the equipment played in TBSWG II could be available by 2015.	1	2	3	4	5
c. The current rate of investment in the tech base is sufficient to insure the required technologies will be available by 2015.	1	2	3	4	5
d. Adversaries will have technology at least as advanced as our own.	1	2	3	4	5
e. Weapons of mass destruction will be less useful as an instrument of war than they have been in the past.	1	2	3	4	5
f. Nonlethal weapons will have significant value in some of the scenarios.	1	2	3	4	5
g. Satellites will be too vulnerable to be the backbone of RISTA or commo systems.	1	2	3	4	5
h. Computer processing will have advanced sufficiently to solve the Intel problem in 2015.	1	2	3	4	5
i. Precision lethality will become even more important for contingency operations.	1	2	3	4	5
j. Air Force assets will be able to provide the required ALBF long range fires.	1	2	3	4	5
k. Direct access to "National Assets" will be required in most scenarios.	1	2	3	4	5
l. Lethal robots will be an effective part of the overall force.	1	2	3	4	5

m.	Chemical agents will not be very effective when used by either side.	1	2	3	4	5
n.	"High flyers" will be more practical than space assets for most tactical purposes.	1	2	3	4	5
o.	Advances in automation, sensor system and "smart" weapons will actually create weaknesses and vulnerabilities due to jamming, spoofing and deception.	1	2	3	4	5
p.	Armor warfare will be less important in the future than it is today.	1	2	3	4	5
q.	The most serious threat US forces will face in 2015 will be from chemical/biological weapons.	1	2	3	4	5
r.	A key characteristic of most future systems will be reduced probability of causing collateral damage.	1	2	3	4	5
s.	Success in future combat will go to the side which can most rapidly and comprehensively coordinate forces-and fires.	1	2	3	4	5
t.	Robots will play a significant role in performing both combat and combat support tasks in 2015.	1	2	3	4	5
u.	The "exoskeleton" is a neat idea but not very practical.	1	2	3	4	5
v.	Military operations in 2015 will be much more dependent on small, high density electrical power sources.	1	2	3	4	5
w.	Tactical high power lasers will become operational by 2015.	1	2	3	4	5
x.	Conventional munitions (explosives/warheads) are a mature technology and not likely to see major improvements in the time frame.	1	2	3	4	5
y.	Air-to-air combat is a critical element of 2015 warfare.	1	2	3	4	5
z.	Ground based active sensors (such as radar) will no longer be viable due to poor survivability.	1	2	3	4	5

aa. Significant applications of biotechnology will be a part of the Army inventory.	1	2	3	4	5
ab. The key to battlefield operations will be the ability to separate friendlies from hostiles (IFF).	1	2	3	4	5
ac. HPM weapons from either ground or airborne platforms will be an effective means of disabling electronic equipment.	1	2	3	4	5
ad. Power supplies for mobile ground electromagnetic guns (including ETC) will be a practical reality.	1	2	3	4	5
ae. Weather control will become an effective procedure under some conditions.	1	2	3	4	5
af. The most serious threat to US forces is our inability to find and destroy mines.	1	2	3	4	5
ag. Improvement in individual soldier weapons is critically important.	1	2	3	4	5
ah. A robust aided target recognition capability will not yet be fielded by 2015.	1	2	3	4	5
ai. An "all electronic vehicle" (main drive, weapon positioning, lethal effect) is a reasonable goal for 2015.	1	2	3	4	5
aj. Smart mines will be very effective against both ground and low flying air targets.	1	2	3	4	5
ak. C3I systems will play a major role in prosecution of ALBF	1	2	3	4	5
al. C3I Countermeasures are essential to ALBF.	1	2	3	4	5
am. Knowledge of the true state of soldiers' ability to fight is essential to extended operations. Therefore, medical research is essential in this area.	1	2	3	4	5
an. Decentralized Command is essential to ALBF.	1	2	3	4	5
ao. UAV's will provide key essential real time support to ALBF.	1	2	3	4	5

ap. Space assets will be sufficiently robust to ensure their availability in all levels of conflict.	1	2	3	4	5
aq. Sensor systems will locate and provide positive identification of enemy systems/platforms.	1	2	3	4	5
ar. The Army as a strategic force will have all the rapid air/sea lift capability to execute its mission.	1	2	3	4	5
as. Investment in "all weather" systems is justified by the likely scenarios in which we will fight.	1	2	3	4	5
at. The US will be willing to use non-lethal chemical weapons.	1	2	3	4	5
au. Future battlefields, including Third World, will be dramatically more lethal than today.	1	2	3	4	5
av. Survivability of a lighter force on the future battlefield poses the greatest technical challenge.	1	2	3	4	5
aw. Non-orbiting space platforms can perform many RISTA functions.	1	2	3	4	5
ax. Increased space assets eliminate the need for RPV's/AUV's.	1	2	3	4	5
ay. Conventional munition advances will eliminate the need for nuclear weapon use against hardened targets.	1	2	3	4	5
az. Launch of tactical space assets and their control is not useful at the Corps level.	1	2	3	4	5
ba. Destructive weapons in space will be deployable against targets on the earth's surface in 2015.	1	2	3	4	5
bb. Space sensors will be able to autonomously identify and locate targets to support precision weapon accuracy requirements in real time by 2015.	1	2	3	4	5

bc. Multi sensor/multi spectral sensor fusion will allow the robust detection of camouflaged targets.	1	2	3	4	5
bd. The key to ALBF is "lightening the force" while preserving/increasing flexibility, lethality and survivability.	1	2	3	4	5
be. Nuclear weapons effects will play a reduced role in future conflict.	1	2	3	4	5
bf. High power microwave systems could provide a useful force deterrent.	1	2	3	4	5
bg. Light weight, truly air droppable, systems are needed.	1	2	3	4	5
bh. Soldier "health" is a major opportunity for force enhancement in 2015.	1	2	3	4	5
bi. Enhancements to the soldier's sensory functions offer major improvements in combat power.	1	2	3	4	5
bj. Over reliance on sensors is a major potential pitfall for ALBF.	1	2	3	4	5

PROPOSED NEW ATTD LIST

INSTRUCTIONS

Please circle up to ten proposed new ATTDs that you think are most important. There is room at the end of the list to add ATTDs of your own design or provide comments.

MANEUVER

HIGH PERFORMANCE ARMAMENT SYSTEM (HIPAS)

Objective: To develop and demonstrate the next generation helicopter armament system technologies incorporating advanced technologies with improved terminal effects at longer ranges.

FUTURE AIRCRAFT ARMAMENT SYSTEM TECHNOLOGY (FAAST)

Objective: To develop and demonstrate revolutionary gun system and fire control technologies that will provide the capabilities-needed for the Future Attack Air Vehicle (FAAV).

EM / ET TANK - ARMAMENT

Objective: To successfully demonstrate electro-magnetic or electro-thermal (EM/ET) propulsion technologies applicable to future armored vehicles. Technology will be demo'ed as a mobile prototype gun system with fire control and autoloader.

FAMILY OF SMALL ARMS

Objective: (1) To quantify performance gains over the baseline M16A2 in scenarios simulating stress and large aiming errors associated with combat.

(2) Additional barriers addressed are excessive weapon & ammo weight and cook-off/vulnerability of the caseless ammo candidate.

ADVANCED PLATFORM TECHNOLOGY (APT) FY93

Objective: (1) Demo / eval military worth of advanced platform technology.

(2) Provide foundation for future combat aviation platform technology.

ANTI-HELO MINE (AHM)

Objective: To successfully demonstrate two (2) Air Defense (AD) mine concepts utilizing advanced IFF, sensor, and tracking technology coupled to a Multiple EFP W/H Launching device.

SOLDIER SURVIVABILITY

Objective: (1) Fabricate, test and demonstrate soldier survivability capabilities.

(2) Integrate advanced technologies for:
- Individual protection (RESPO 21)
- Decontamination (SORBENT)
- Collective protection (Fixed Site)

DIRECTED ENERGY WEAPON - VEHICLE (DEW-V)

Objective: The Directed Energy Weapon Vehicle (DEW-V) is a high energy (100J Class) visible laser weapon system which will provide leap ahead technology to U.S. forces. This ATTD will demonstrate the ability of the DEW-V to acquire, track, engage and defeat ground and aerial targets by attacking and damaging their Optical and Electro-Optical (OEO) Systems.

HIGH ENERGY I (BLOCK IV)

Objective: Integration of electric drive propulsion, advanced weapon systems, composite materials, and armor technologies into high energy tank/assault vehicles.

HIGH TECHNOLOGY LIGHT ASSAULT

Objective: Demonstrate technology spinoffs from the HEATTD as they apply to AGS type assault system.

COMBAT SERVICE SUPPORT

FUTURE ARMORED RESUPPLY VEHICLE (FARV)

Objective: Provide for automated rearm well forward in the combat area protected from indirect fire and battlefield contamination to execute ALBF doctrine.

IMPROVED HAND HELD MINE DETECTOR

Objective: Utilize revolutionary technologies (chemical detection, neutron backscatter) to provide dismounted soldier with effective detection of metallic and non-metallic mines.

IMPROVED DISBURSED EXPLOSIVES

Objective: Demonstrate lightweight explosive systems to clear lanes in anti-personnel and anti-tank mine by blast over-pressure.

HEAVY DRY SUPPORT BRIDGE COMPOSITE TRAVERSING BEAM

Objective: Fabricate and demonstrate composite beam with 50% decrease in weight and 50% increase in length.

CHEMICAL DETECTION

Objective: (1) Fabricate, test and demonstrate advanced CB detection capabilities.

(2) Integrate advanced technologies for:

- BC Generic Module
- Robotic Recon
- Laser Standoff P3I

RSTA

MULTIMODE DIGITAL RADIO - C3

Objective: Technology demonstration to show how digital technology will significantly improve ECCM, interoperability and flexibility of tactical communication.

LIGHTWEIGHT TACTICAL ARMY SATCOM SYSTEM (LTASS) - CCSS

Objective: Provide Army field commander with a survivable dedicated tactical satellite communication system.

- Communications under direct control of field commander.
- Launch on demand to meet critical tactical needs.
- Robust anti-jam communications.
- Rapid launch capabilities.
- Full time coverage with few satellites.
- Small, easily deployed terminals.

ADVANCED PILOT AID

Objective: Demonstrate advanced aviator night vision goggles which enhance operational effectiveness and reduce pilot workload.

OPTICAL COUNTERMEASURE DEMONSTRATOR

Objective: Develop, demonstrate and transition a laser technology, anti-sensor, tactical weapon effective against hardened threats.

DAY-NIGHT SENTRY/PERIMETER SURVEILLANCE

- Objective:
- (1) Demonstrate multi-sensor techniques for remote, all visibility detection and assessment of intruders to a secure area/boundary.
 - (2) Demonstrate compact electro-optic suite that can be covertly implanted behind enemy lines for area surveillance and target acquisition.

ADVANCED INTEGRATED MAN-PORTABLE SENSOR SYSTEM (AIMS)

Objective: Demonstrate low-cost integrated system of ultra-lightweight sensor, display and laser modules configured for multiple infantry missions.

OVER-THE-HORIZON FIBER-OPTIC DATA LINKS

Objective: Explore the application of an enhanced fiber-optic data link to defeat threat tgts beyond 100km.

COMMON GROUND STATION

Objective: Demonstrate ground station that supports all airborne sensor systems.

BI-STATIC RADAR

Objective: Demonstrate low cost airborne transmitter and survivable receivers for counter-battery and air defense roles.

ELECTRO-OPTICAL INFRARED COUNTERMEASURES

Objective: Demonstrate effective helicopter protection against advanced IR seekers.

LOWER ECHELON COMMAND, CONTROL, COMMUNICATION & INTELLIGENCE

Objective: Demonstrate sensor fusion & correlation, along with a data distribution system for BN and below.

FIRES

EXTENDED RANGE ARTILLERY PROJ II (ERA-II)

Objective: To successfully demonstrate extended range artillery technology capable of producing a maximum range out to 50 km. Technology areas include: Projectile (with P3I SADARM, EFP w/h, and Inertial Guidance to provide a CEP <100M), CANNON and Propelling Charge.

ANTI-MATERIEL MUNITIONS

Objective: (1) Fabricate, test and demonstrate anti-materiel flame/incendiary capabilities to degrade/defeat enemy threat materiel and equipment.

(2) Integrate Advanced Technologies for:

- Anti-materiel
- Combat Flame/Incendiary

THE ARMY COUNTER AIR WEAPON SYSTEM (TACAWS)

Objective: Demonstrate an extended range, direct fire, effective weapon against aircraft in battlefield environments.

- >Stinger Range
- Rotary Wing Targets
- Fixed Wing Targets
- Minimum Exposure Time
- Air (primary)/Gnd Platforms
- Clutter/Adverse Weather

AVIATION FIBER OPTIC GUIDED MISSILE (AVNFOG-M)

Objective: Explore the potential of firing a FOG-M in a non-vertical launch mode for application to helicopter platforms.

ARMADILLO AIR DEFENSE WEAPON SYSTEM

- Objective:
- (1) Provide an active terminal defense capability for high value assets on the battlefield against the threat of anti-radiation missiles, UAV's, and TBM.
 - (2) Allow for uninterrupted operations of critical air defense acquisition and guidance radar and battlefield command and control radar functions.
 - (3) Automatically acquire, track, engage, and destroy the threat by intercepting the target on its terminal flight path.

ADVANCED KINETIC ENERGY MISSILE (ADKEM)

Objective: ADKEM is a multi-mission, common kinetic energy missile design (one missile for many launch platforms) that significantly increases launch platform battlefield effectiveness over current and near term line of sight weapon systems. This ATTD will exhibit the capabilities of the ADKEM System to acquire, track, and lethally engage both ground and aerial targets. It will also demonstrate the ability of ADKEM to enhance survivability through the application of virtual launch capability, which allows the ADKEM launch platform to fire from full defilade.

FORWARD AREA AIR DEFENSE (FAAD) LINE OF SIGHT FORWARD LIGHT (LOSF-L) SYSTEM

- Objective:
- (1) Demonstrate existing avenger turret on a light armored vehicle.
 - (2) Demonstrate new improved primary and secondary weapons.
 - (3) Demonstrate sensor fusion.

OTHER ADDITIONS/COMMENTS:

TECH BASE SEMINAR WARGAME (TBSWG) PHASE 2
EVALUATION FORM

To elaborate on any of the following items, please use the reverse side of this sheet and reference the item number.

1. ROLE (circle one):

- | | | | |
|-------------------|---------------------|------------------------|------------|
| 1. Tech player | 3. Synthesis team | 5. Game design advisor | 7. Control |
| 2. Mil/Opn player | 4. Regional advisor | 6. Other advisor | |

2. PREPARATION:

STRONGLY DISAGREE NEUTRAL STRONGLY AGREE

- | | | | | | |
|--|---|---|---|---|---|
| a. I received the read-ahead materials in time to read them. | 1 | 2 | 3 | 4 | 5 |
| b. The read-ahead materials were useful. | 1 | 2 | 3 | 4 | 5 |
| c. I understood the objectives and purpose of TBSWG II Phase 2 prior to arrival. | 1 | 2 | 3 | 4 | 5 |
| d. The materials in the TBSWG II Phase 2 notebook were adequate for my purpose. | 1 | 2 | 3 | 4 | 5 |

3. EXECUTION:

- | | | | | | |
|---|---|---|---|---|---|
| a. The 3 days allocated for this seminar were adequate. | 1 | 2 | 3 | 4 | 5 |
| b. I would have preferred 5 days for this phase. | 1 | 2 | 3 | 4 | 5 |
| c. I would have preferred to play more than one region. | 1 | 2 | 3 | 4 | 5 |
| d. TBSWG Phase 2 helped me understand advanced systems/technologies in relation to AirLand Battle Future-Concept. | 1 | 2 | 3 | 4 | 5 |

4. ADMINISTRATION:

- | | | | | | |
|--|---|---|---|---|---|
| a. Billeting arrangements were satisfactory. | 1 | 2 | 3 | 4 | 5 |
| b. Social time was adequate. | 1 | 2 | 3 | 4 | 5 |
| c. Food arrangements were adequate. | 1 | 2 | 3 | 4 | 5 |
| d. Transportation was timely and adequate. | 1 | 2 | 3 | 4 | 5 |

5. COMMENTS:

a. The one thing I would most want to change is:

b. The one thing I would most want to add is:

c. The one thing I would most want to delete is:

d. Other comments:

Name (optional) _____

**APPENDIX S:
QUESTIONNAIRE RESULTS**

Part 1, Quantitative Question Responses

FIGURE S-B.4.a.1(a): Technologists' Rating of 5 Most Important Technologies

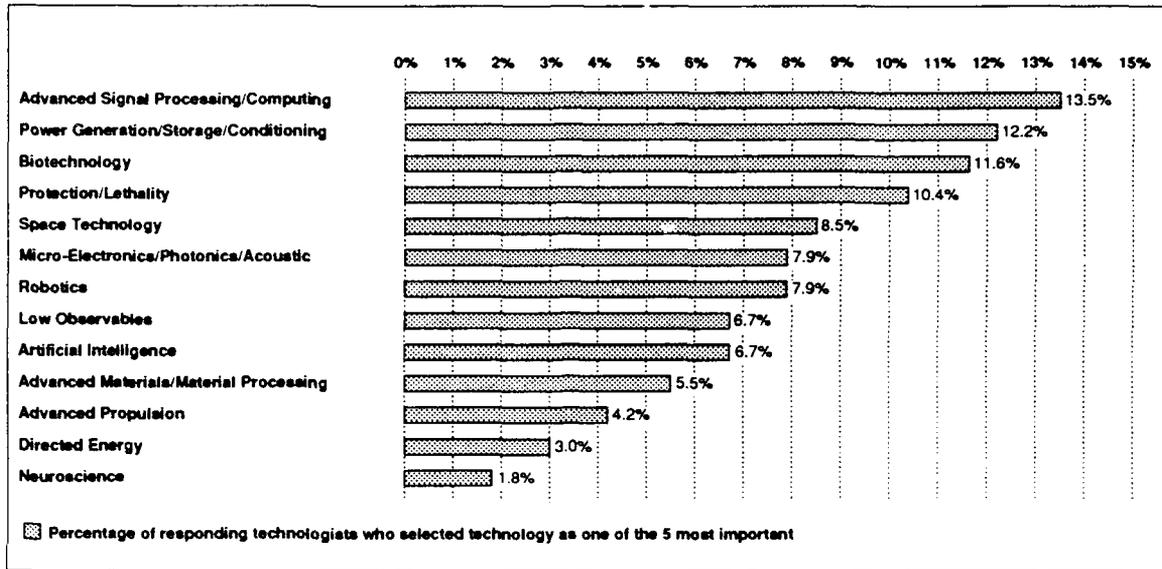


FIGURE S-B.4.a.1(b): Operators' Rating of 5 Most Important Technologies

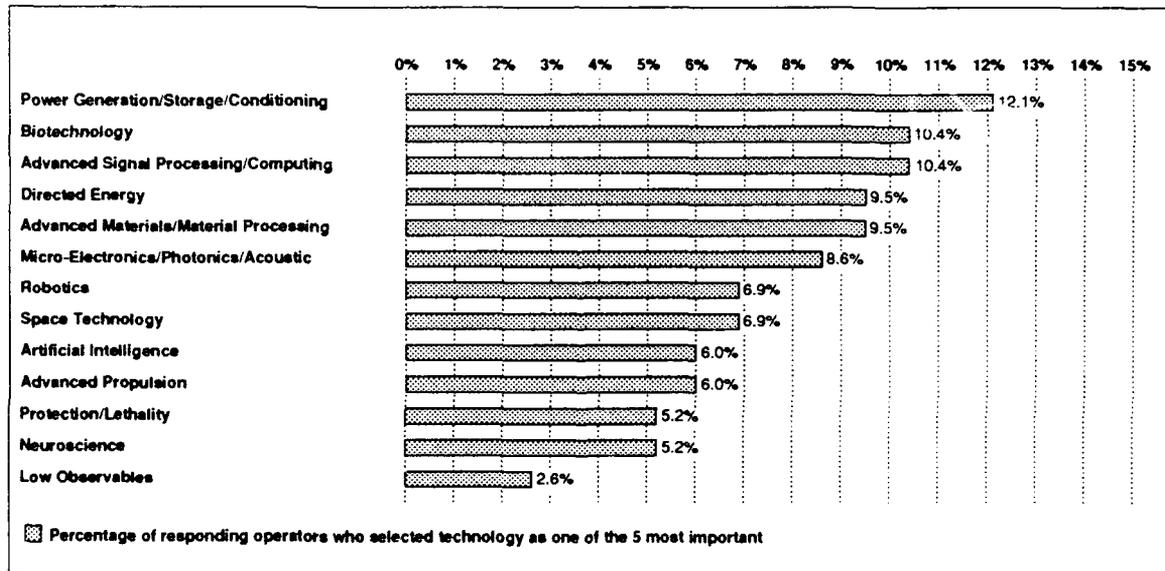


FIGURE S-B.4.a.2(a): Technologists' Rating of 5 Next Most Important Technologies

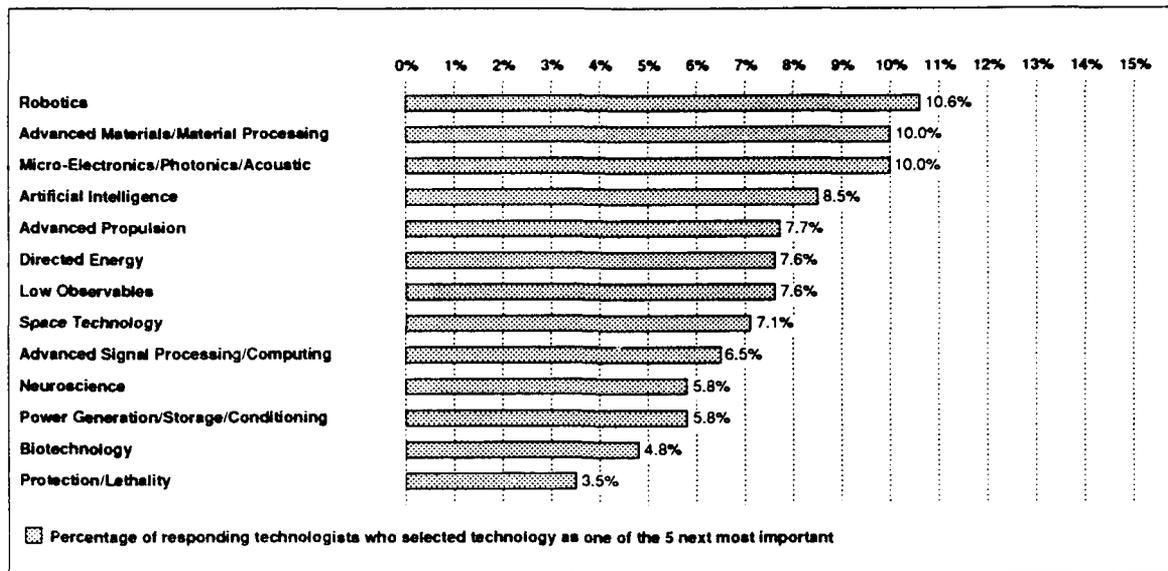


FIGURE S-B.4.a.2(b): Operators' Rating of 5 Next Most Important Technologies

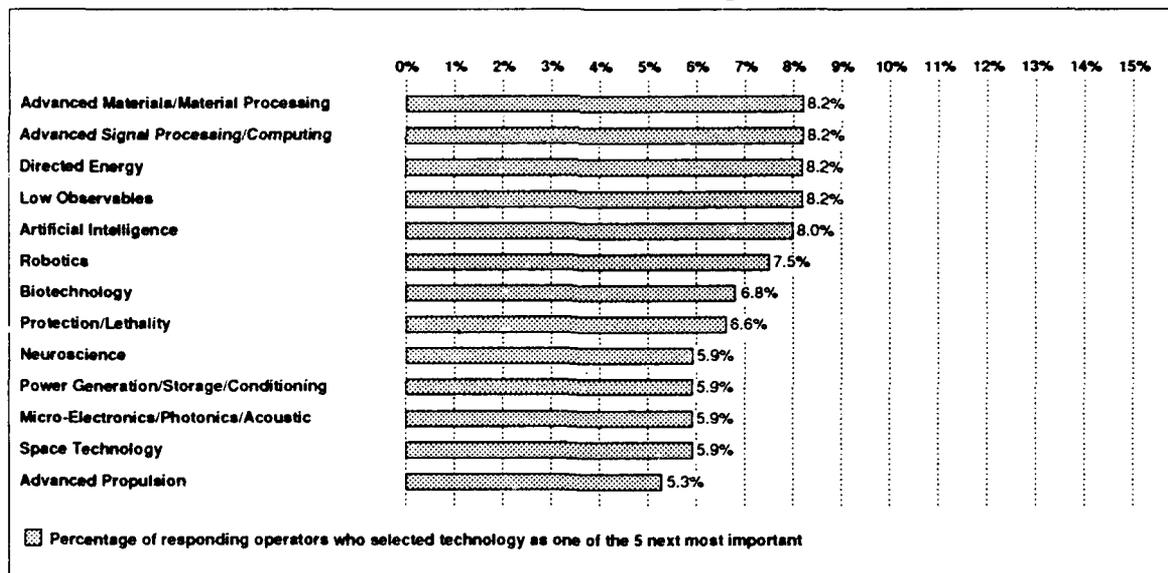


FIGURE S-B.4.b(a): Technologists' Rating of Technology Investment Priorities

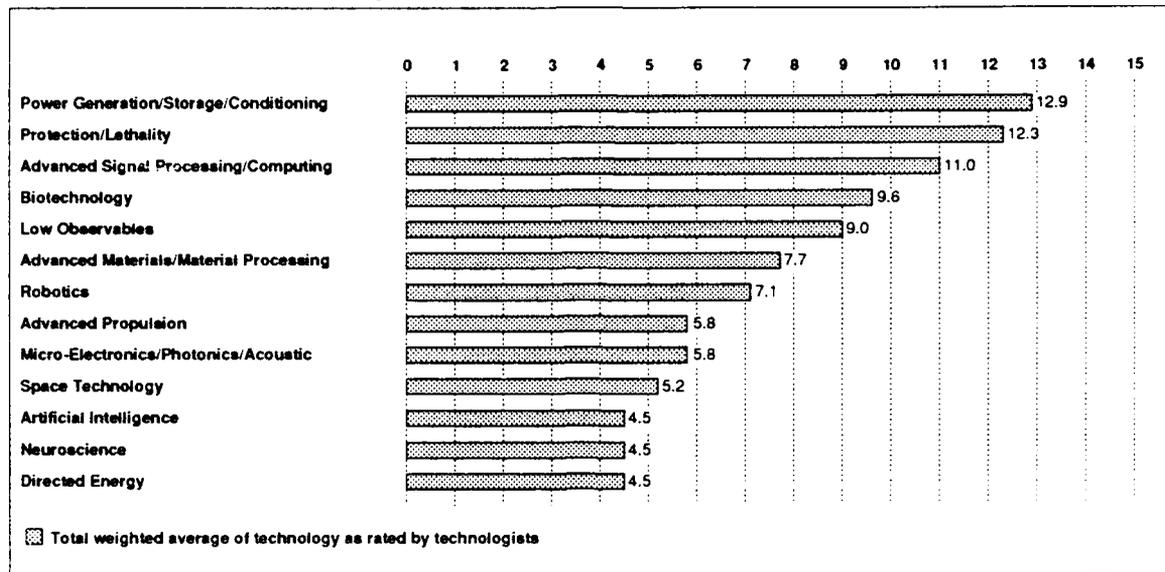


FIGURE S-B.4.b(b): Operators' Rating of Technology Investment Priorities

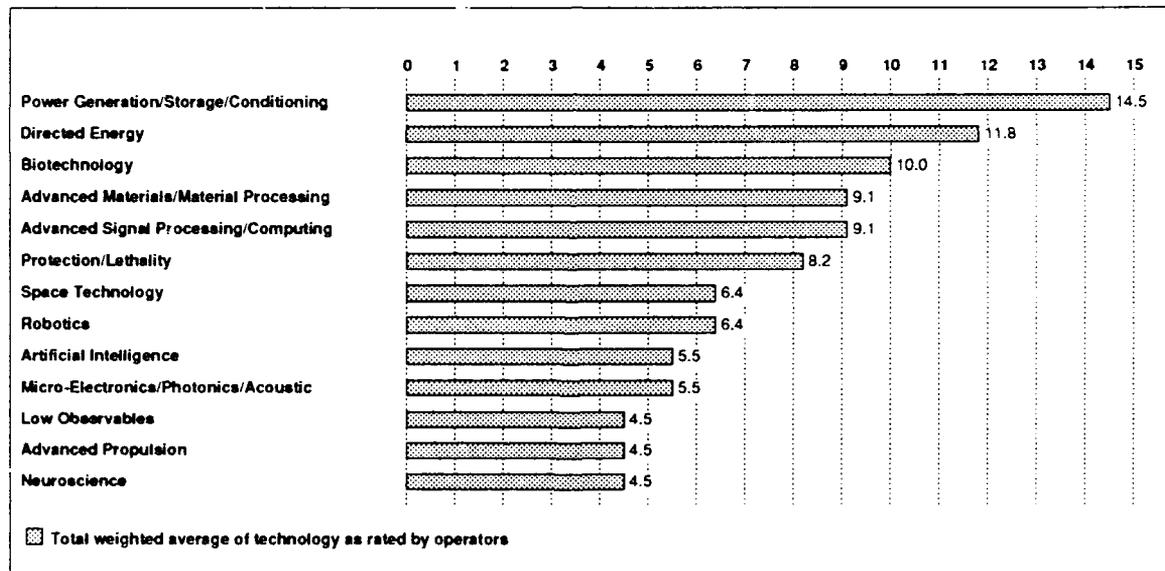


FIGURE S-B.7.1: Important ATTDs, Soldier Integrated Protective Ensemble

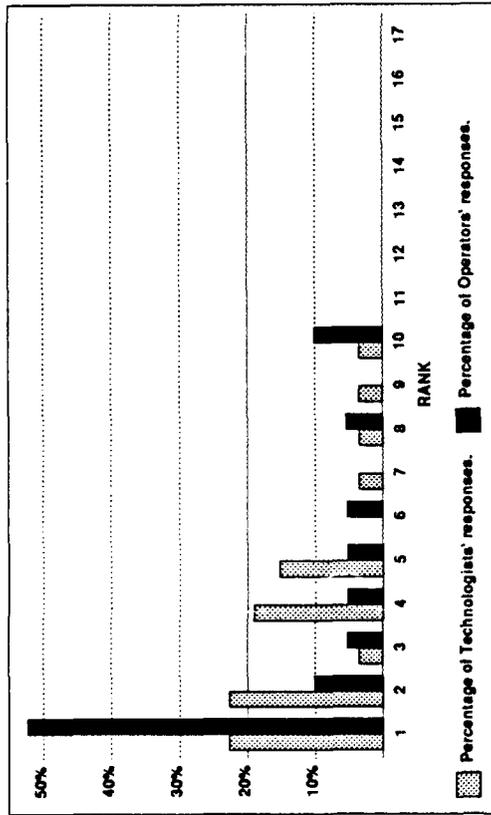


FIGURE S-B.7.3: Important ATTDs, Advanced Field Artillery System

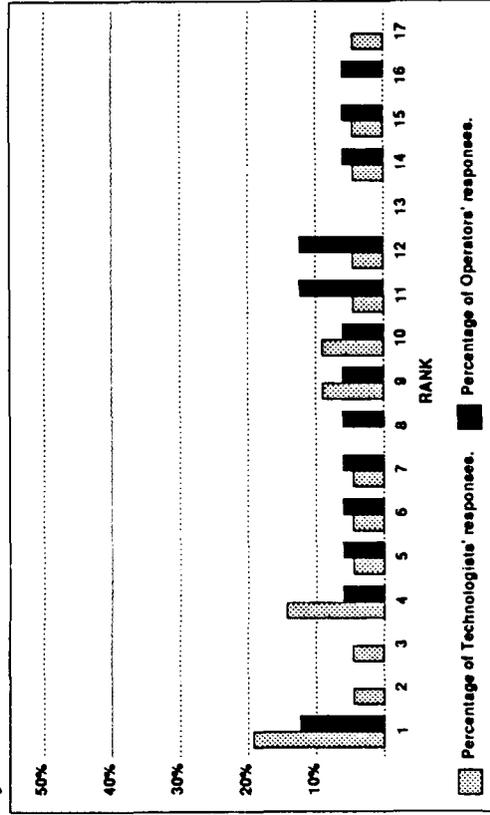


FIGURE S-B.7.2: Important ATTDs, Rotocraft Pilot's Associate (Phase 1)

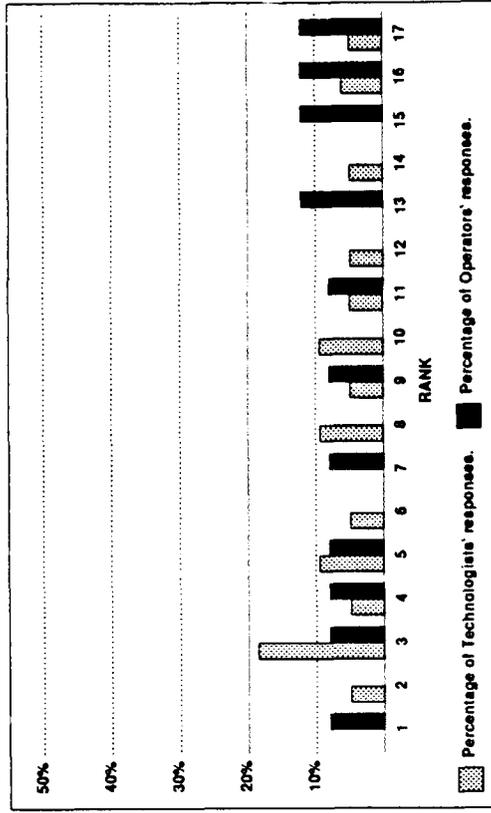


FIGURE S-B.7.4: Important ATTDs, Common Chassis

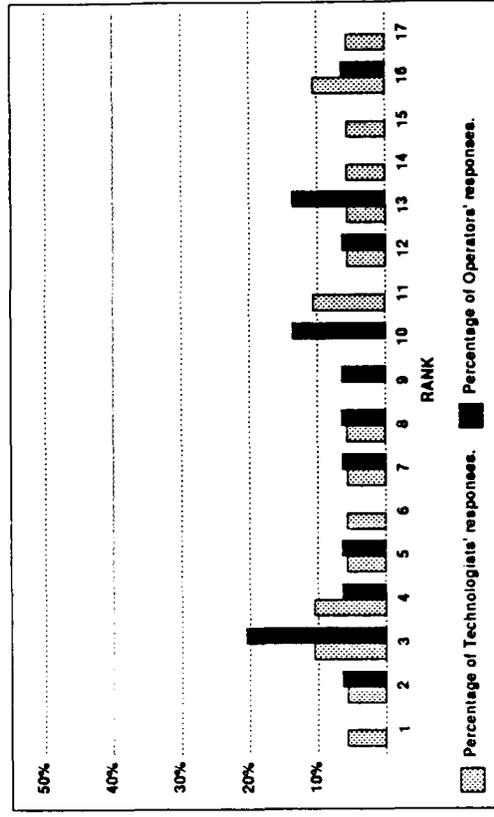


FIGURE S-B.7.5: Important ATTDS, Component Advanced Technology Testbed

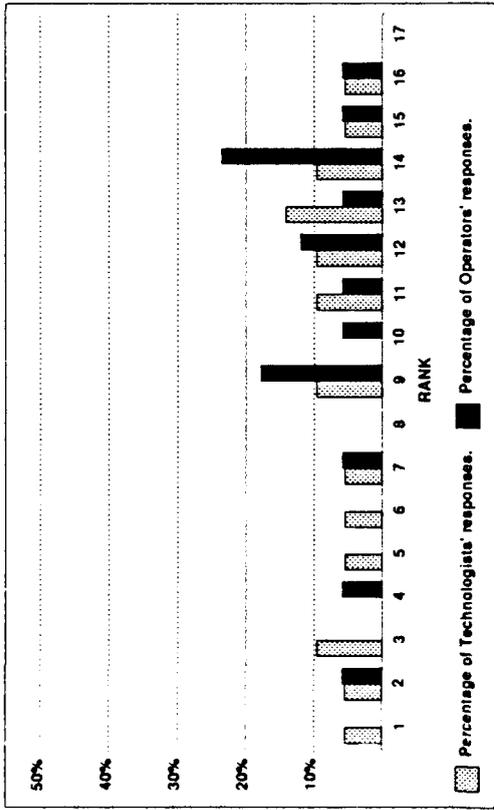


FIGURE S-B.7.6: Important ATTDS, Combat Mobility Vehicle

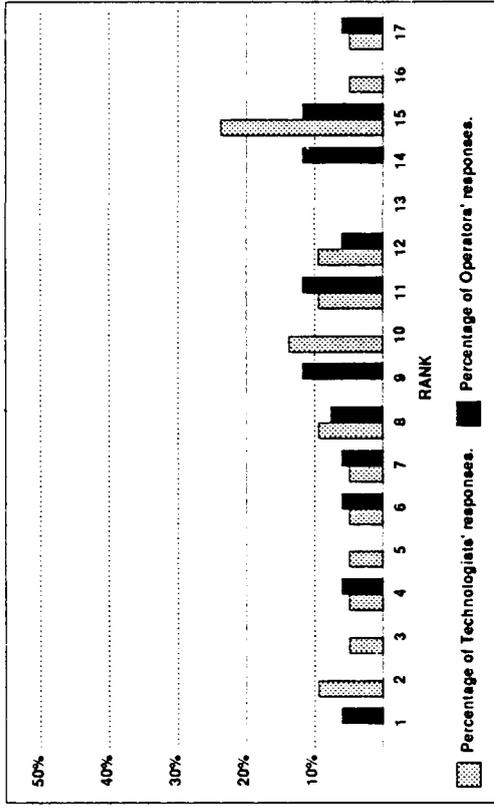


FIGURE S-B.7.7: Important ATTDS, Composite Hull for Combat Vehicle

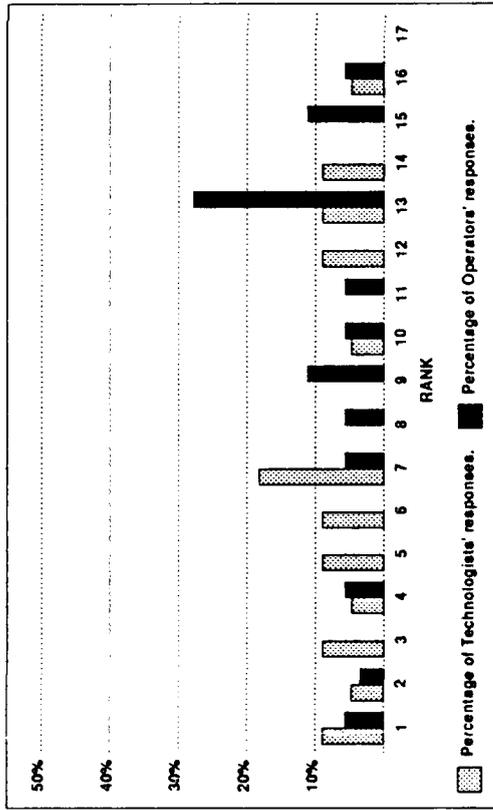


FIGURE S-B.7.8: Important ATTDS, Radar Deception and Jamming

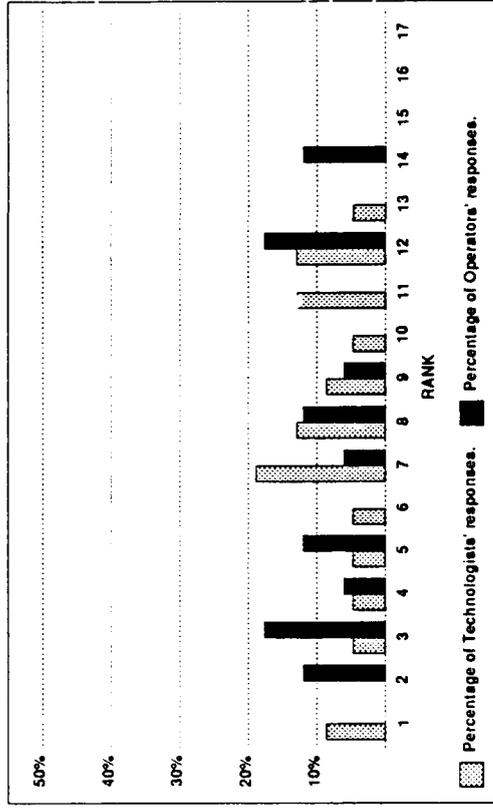


FIGURE S-B.7.9: Important ATTDs, Expendable Jammer Enhancement

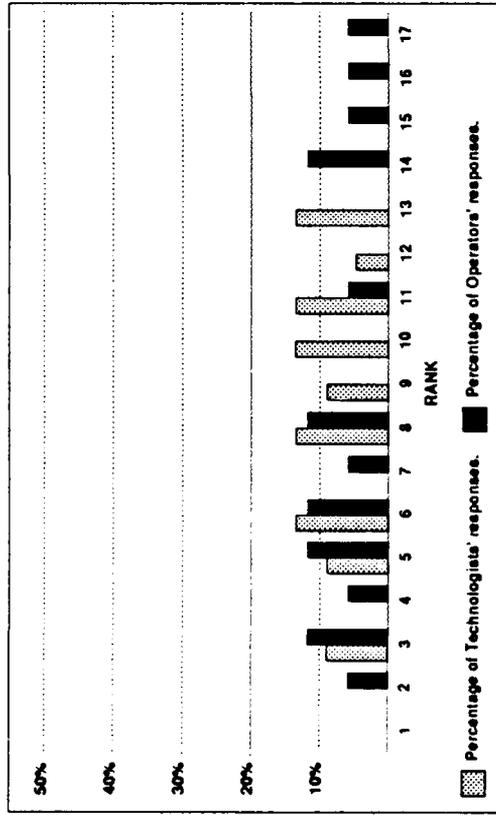


FIGURE S-B.7.10: Important ATTDs, Multirole Survivable Radar

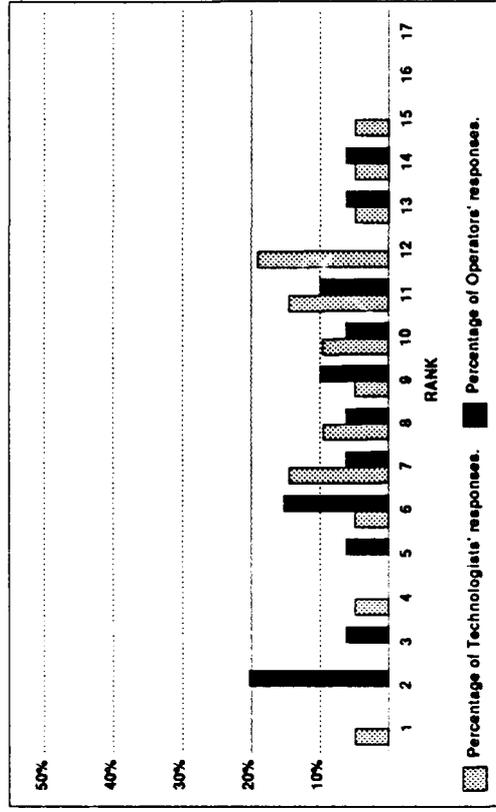


FIGURE S-B.7.11: Important ATTDs, Directed Energy Anti-Satellite Program

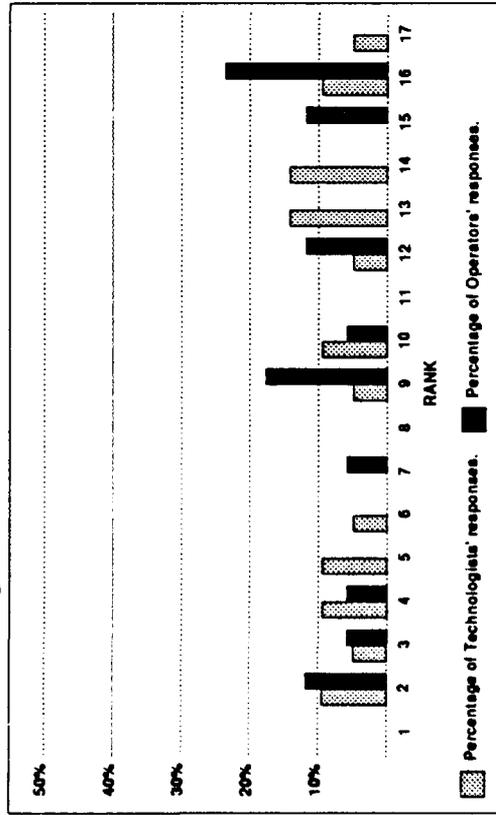


FIGURE S-B.7.12: Important ATTDs, Kinetic Energy Anti-Satellite Program

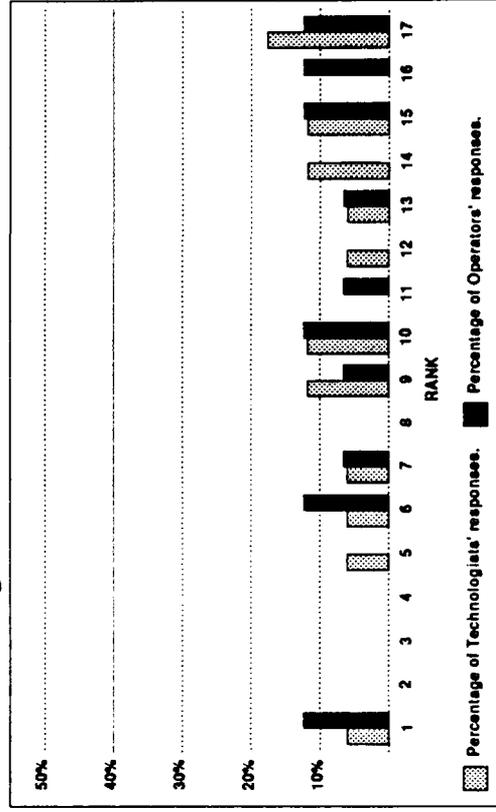


FIGURE S-B.7.13: Important ATTDS, Standoff Minefield Detection

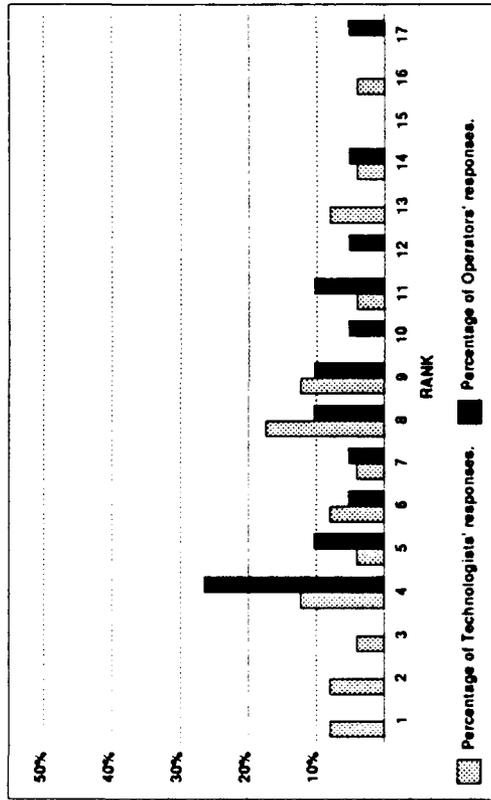


FIGURE S-B.7.15: Important ATTDS, Multi-Sensor Target Acquisition

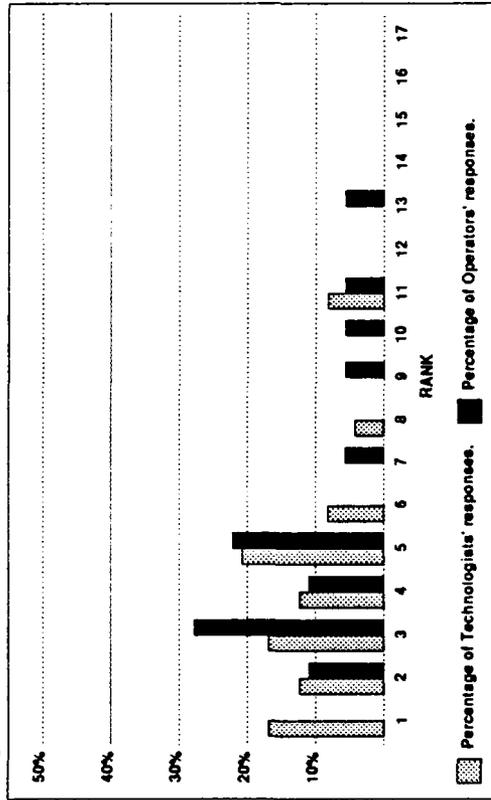


FIGURE S-B.7.14: Important ATTDS, Advanced Air Defense Electro-Optical System

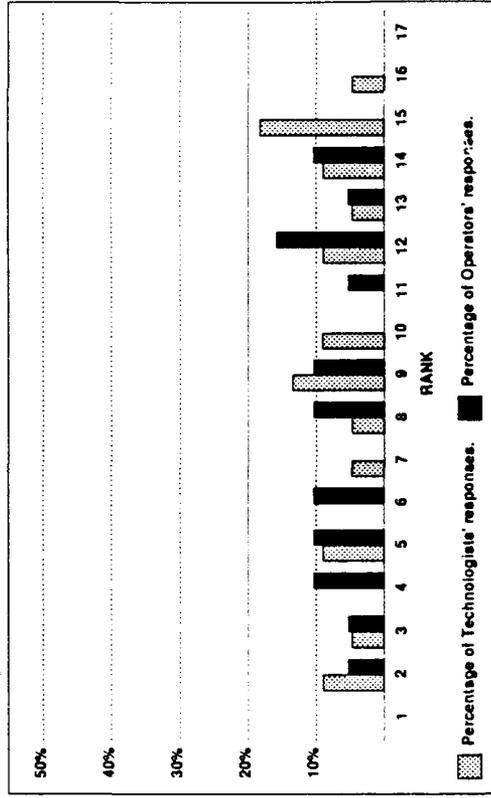


FIGURE S-B.7.16: Important ATTDS, Advanced Chemical/Biological Defense

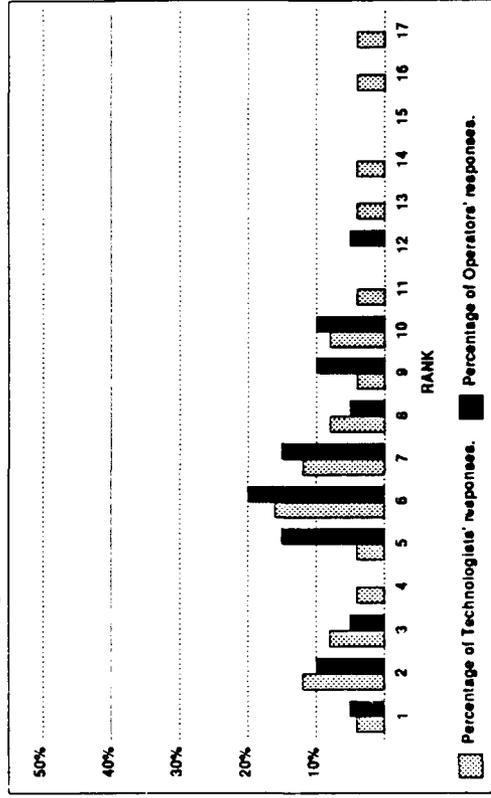


FIGURE S-B.7.17: Important ATTDs, AirLand Battle Management

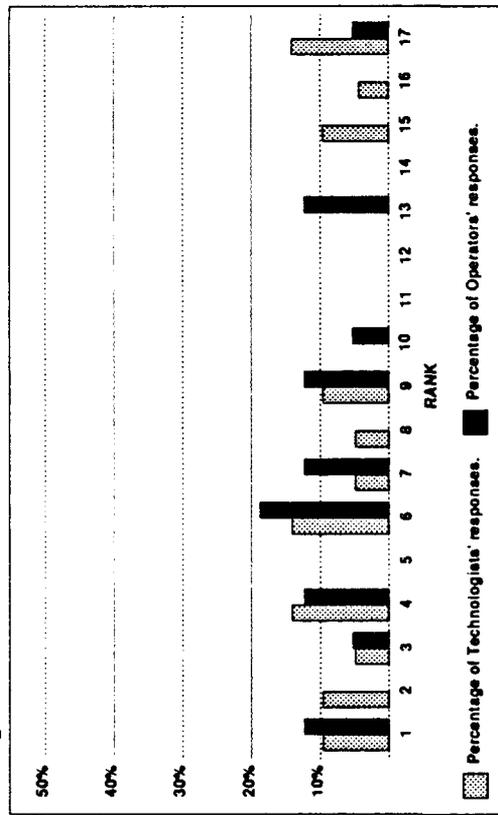


FIGURE S-C-a: Scenarios actually portray possible future Army requirements.

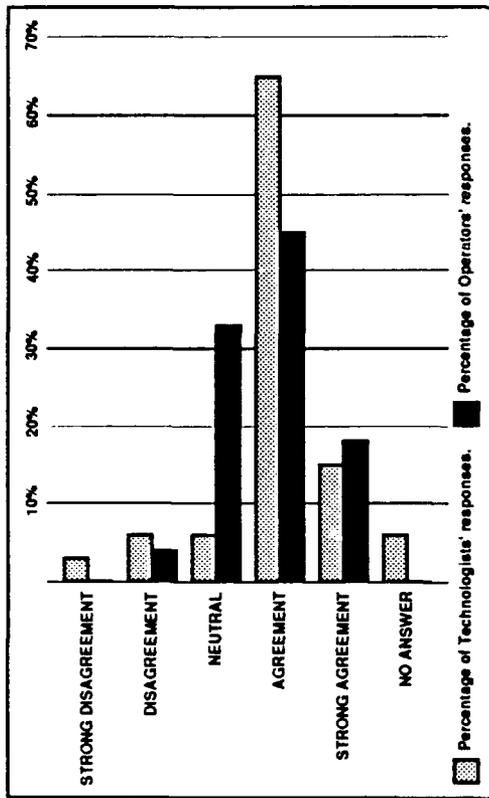


FIGURE S-C-b: I am confident played equipment will be available with enough investment.

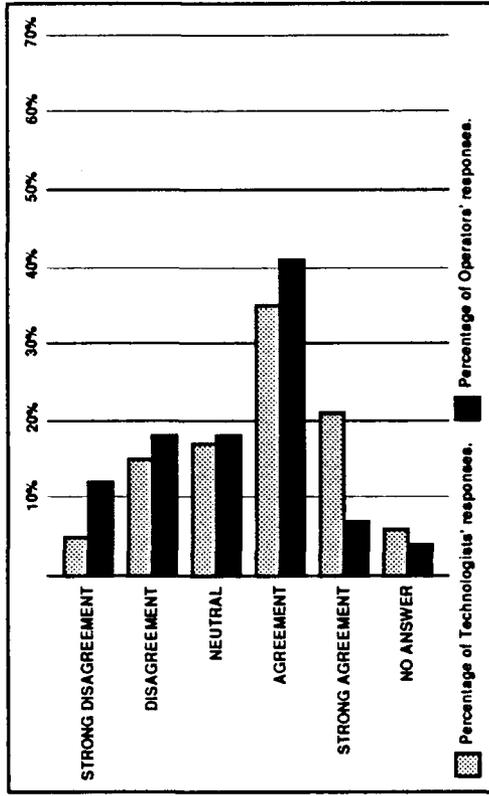


FIGURE S-C-c: Current Tech Base investment will insure availability by 2015.

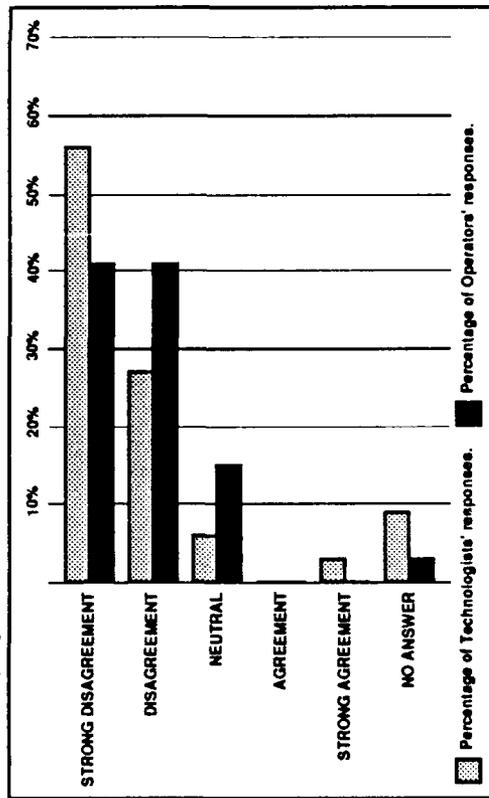


FIGURE S-C-d: Adversaries' technology will be at least as advanced as our own.

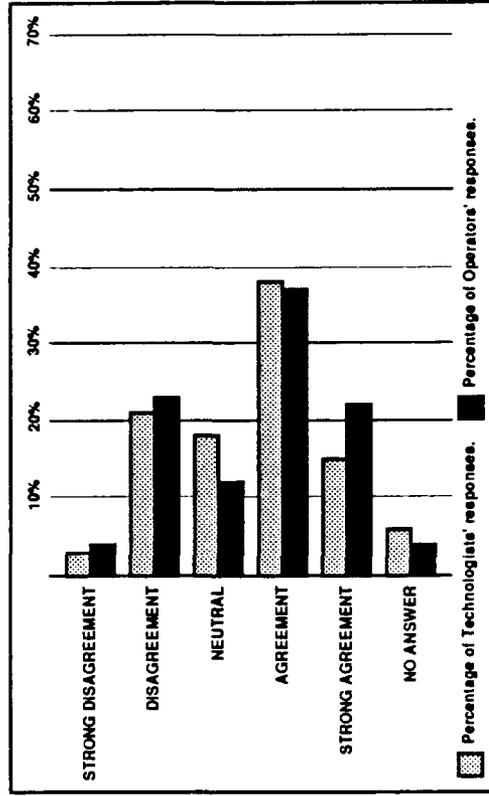


FIGURE S-C.e: Mass destruction weapons will be less useful than they have been.

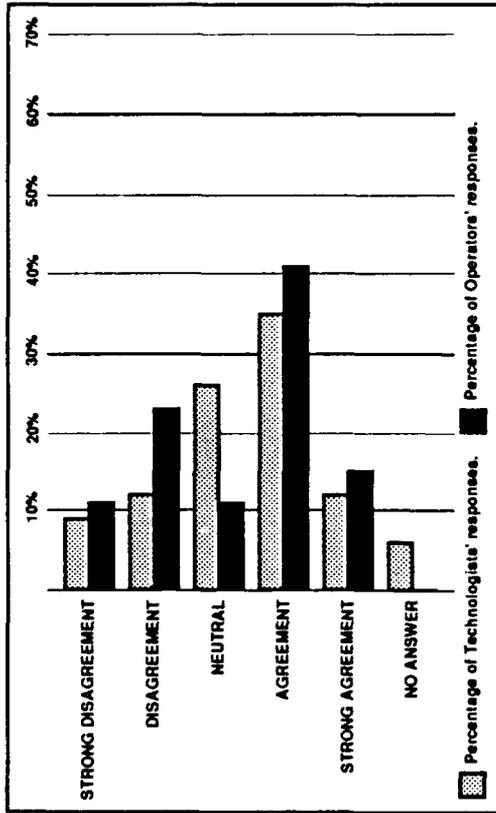


FIGURE S-C.f: Nonlethal weapons will have significant value in some scenarios.

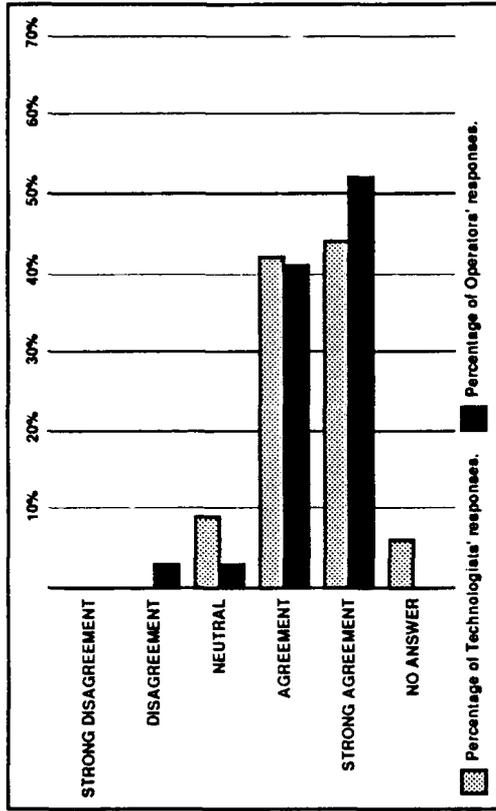


FIGURE S-C.g: Satellites will be too vulnerable for RISTA or commo systems.

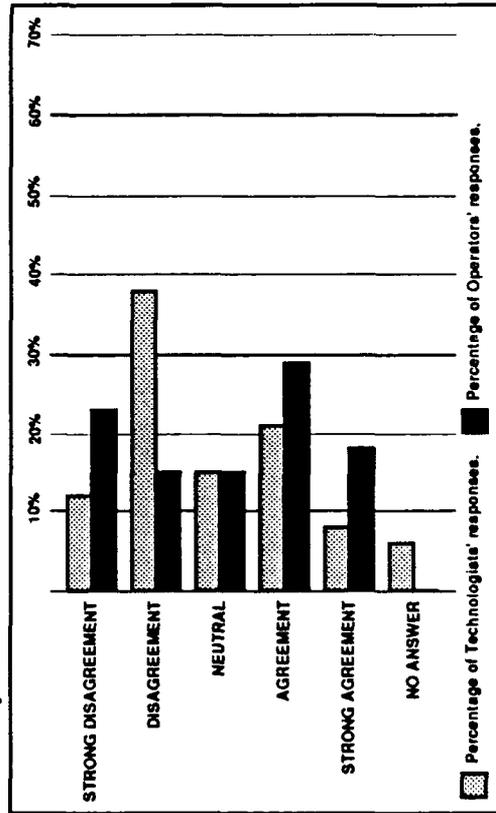


FIGURE S-C.h: Computer processing advances will solve Intel problem by 2015.

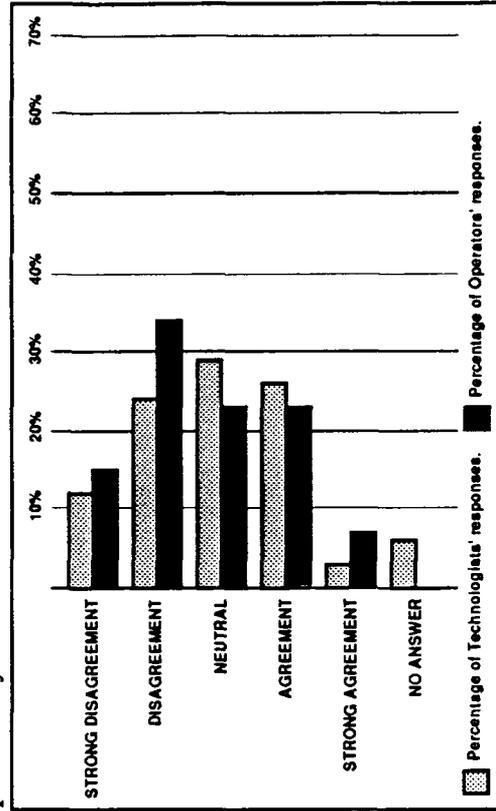


FIGURE S-C.i: Precision lethality will be needed even more for contingency operations.

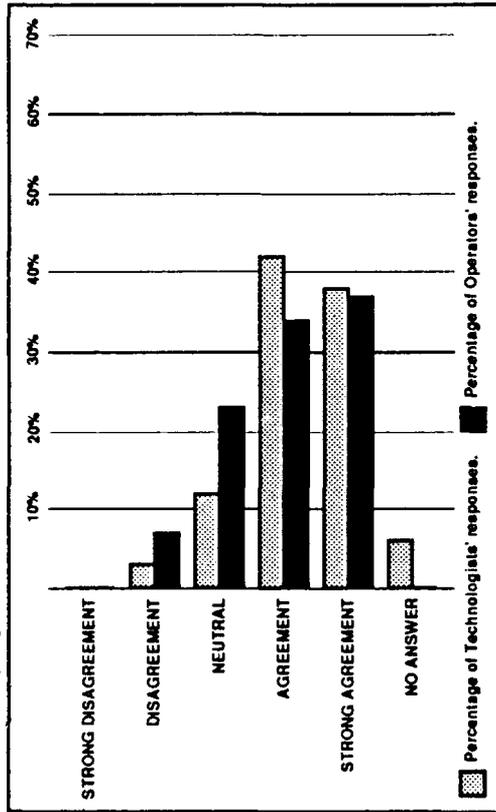


FIGURE S-C.j: Air Force assets will be able to provide ALBF long range fires.

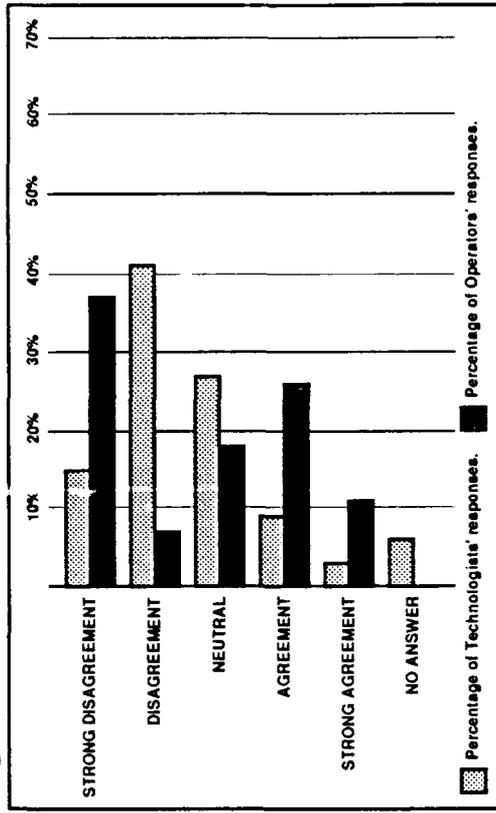


FIGURE S-C.k: Direct access to "National Assets" will be needed in most scenarios.

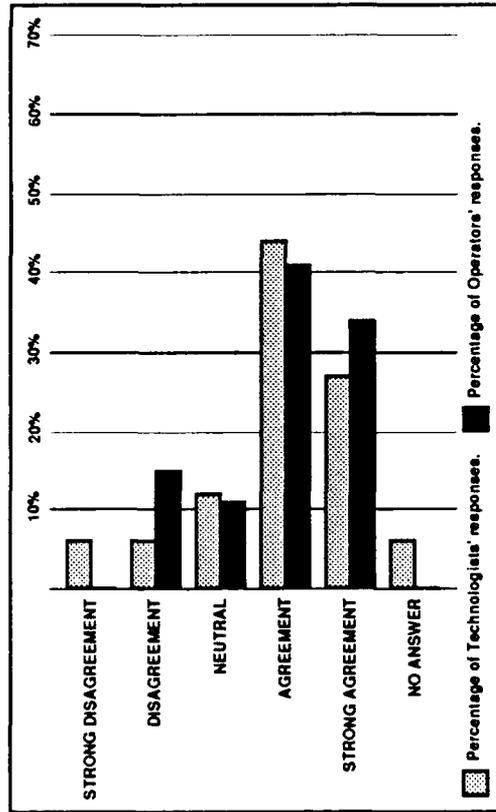


FIGURE S-C.l: Lethal robots will be an effective part of the overall force.

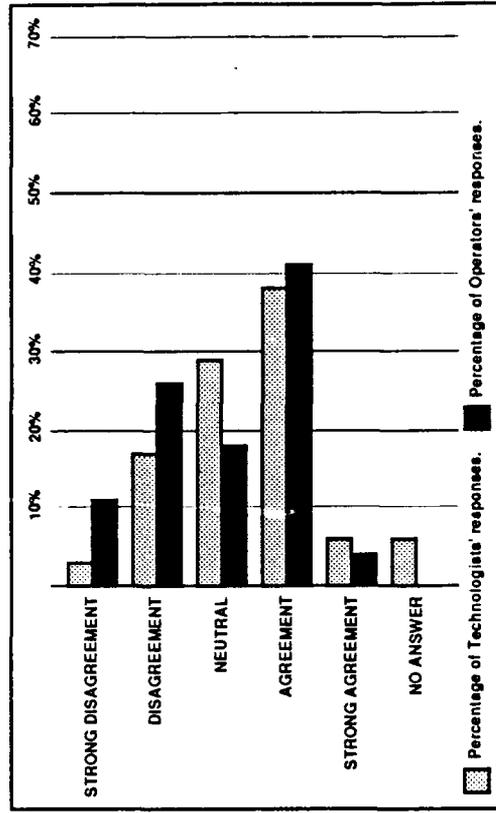


FIGURE S-C.m: Chemical agents will not be very effective when used by either side.

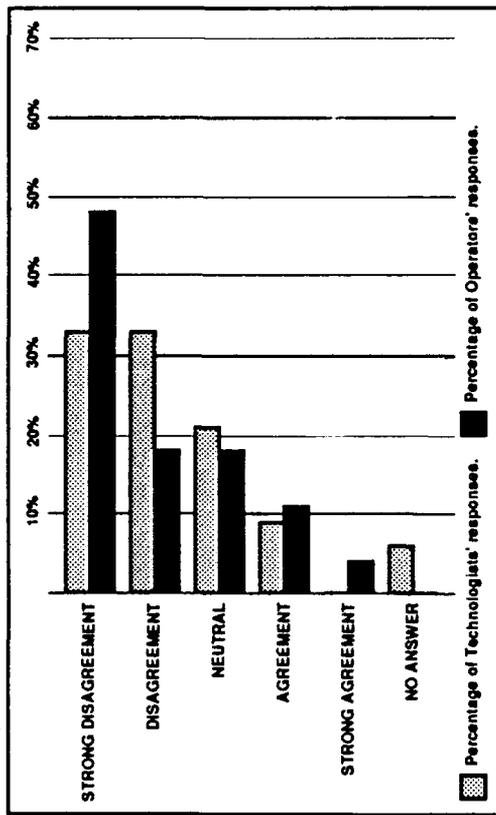


FIGURE S-C.n: "High flyers" are more practical than space assets for tactical purposes.

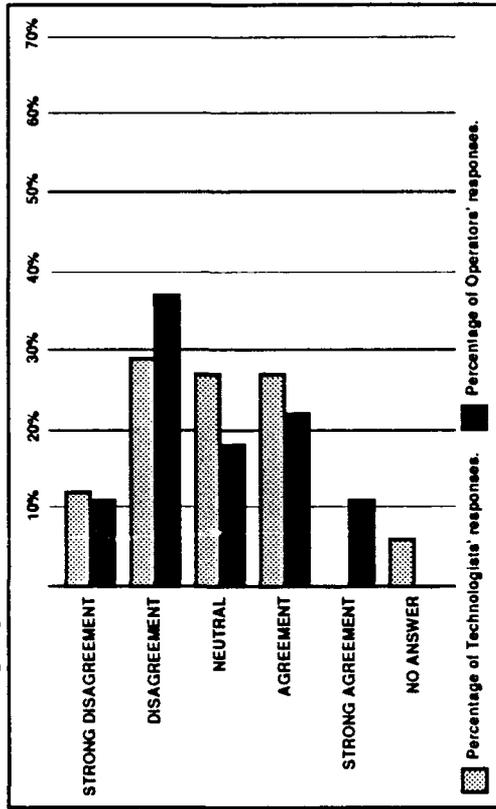


FIGURE S-C.o: Advances in automation and sensors will make weaknesses from jammings, etc.

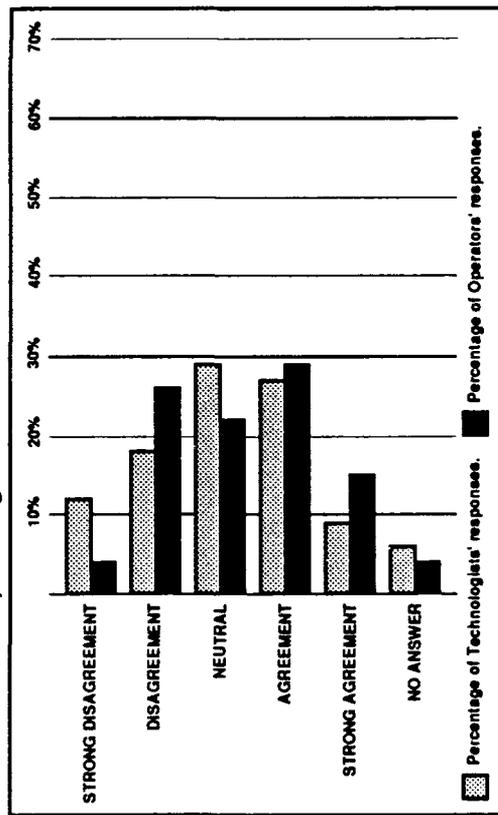


FIGURE S-C.p: Armor warfare will be less important in the future than today.

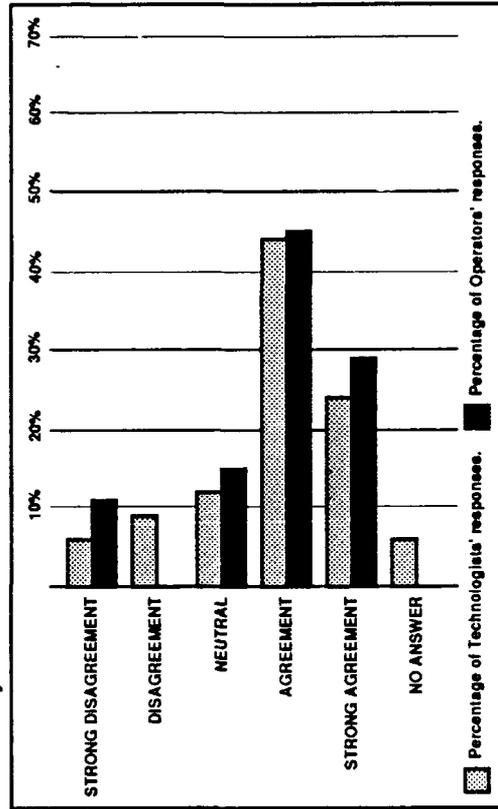


FIGURE S-C-q: The most serious threat in 2015 will be from chemical/biological weapons.

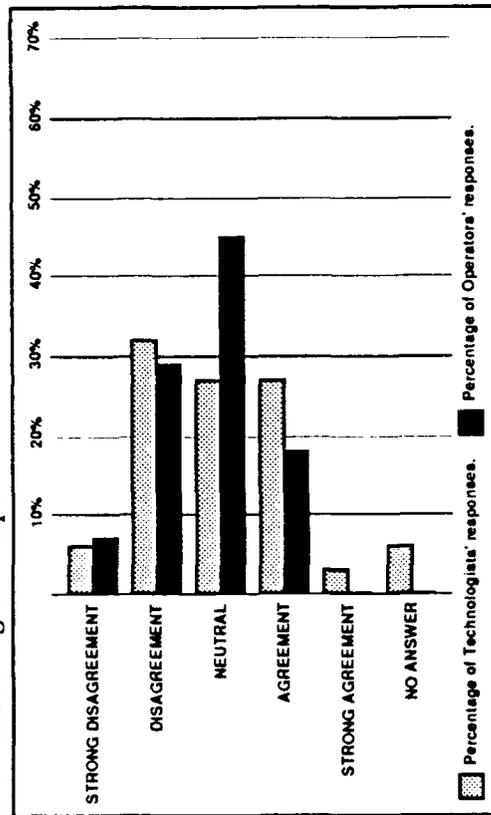


FIGURE S-C-r: A key feature of most future systems will be reduced collateral damage.

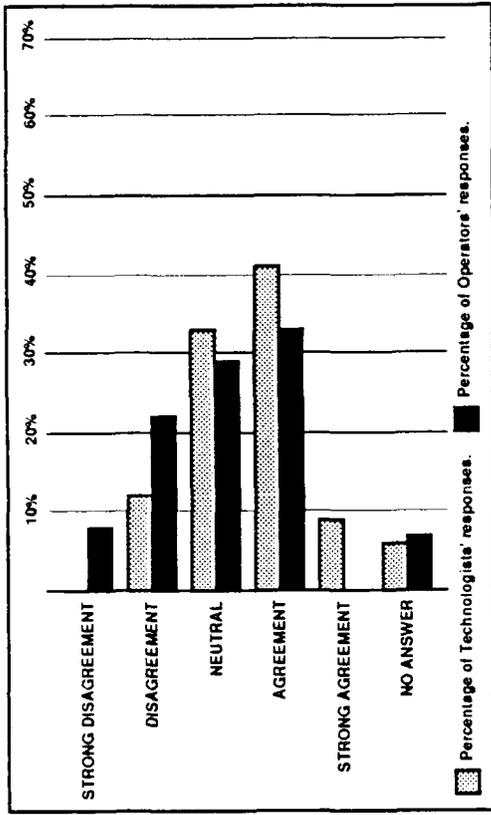


FIGURE S-C-s: Success in combat will go to those who can rapidly coordinate forces and fire.

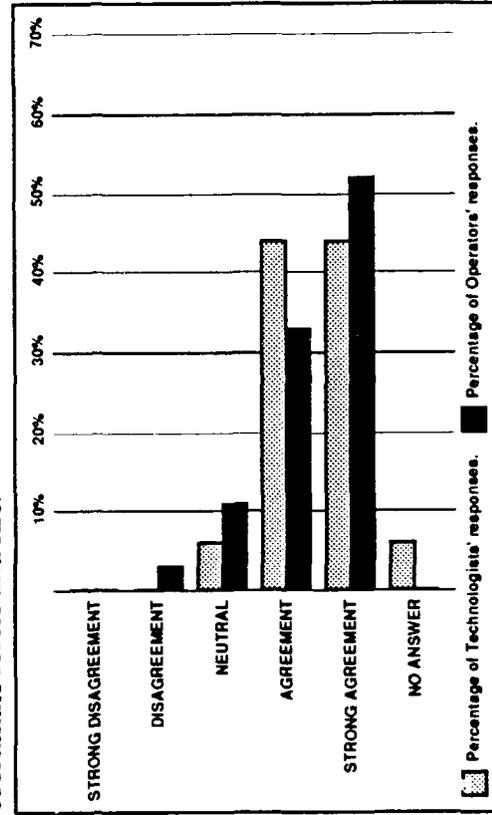


FIGURE S-C-t: Robots will play significant roles in both combat and support tasks.

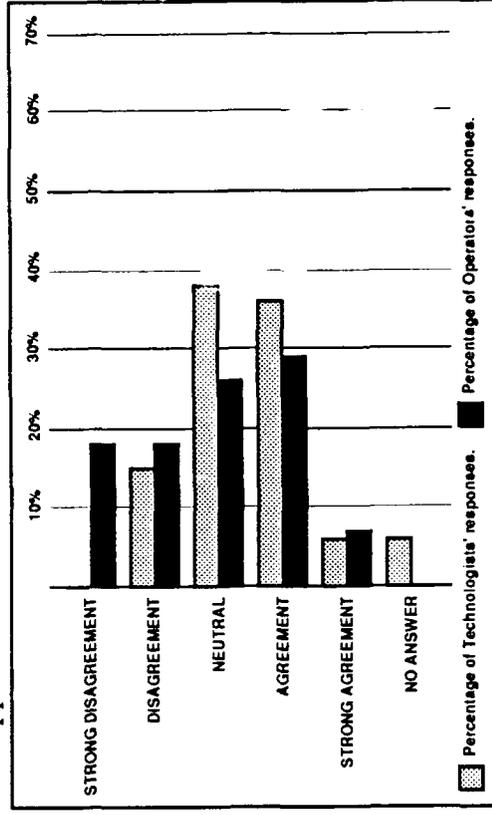


FIGURE S-C.u: The "exoskeleton" is a neat idea but not very practical.

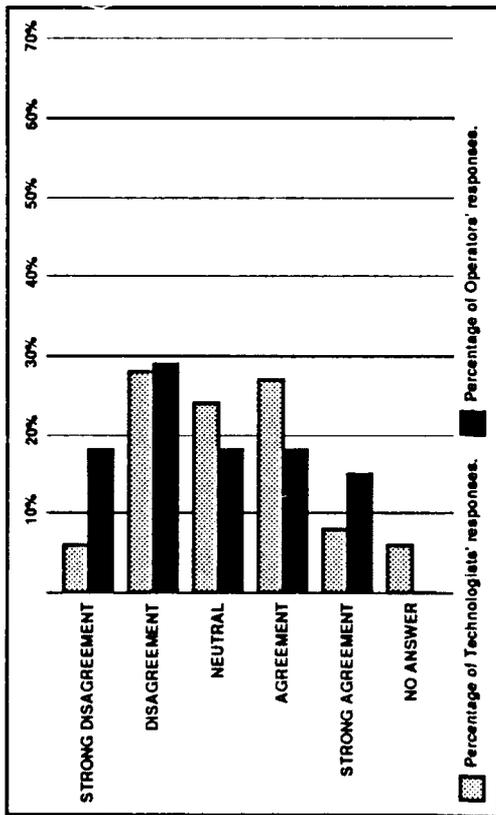


FIGURE S-C.w: Tactical high power lasers will become operational by 2015.

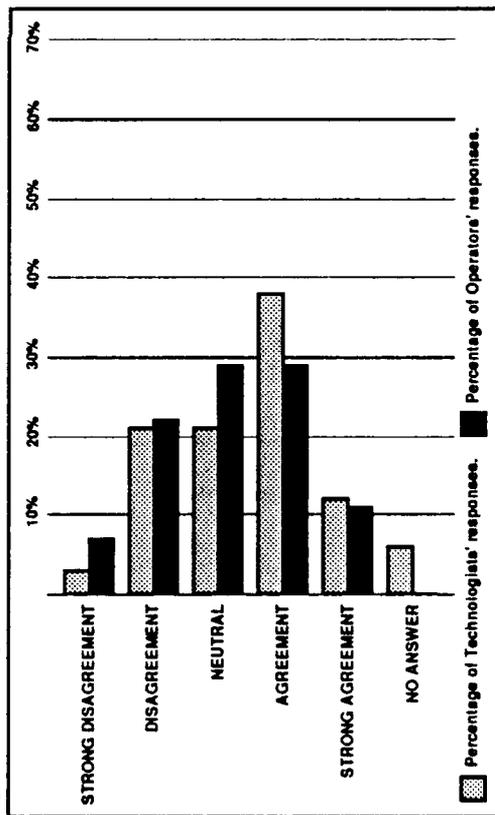


FIGURE S-C.v: Military operations will depend on small electrical power sources.

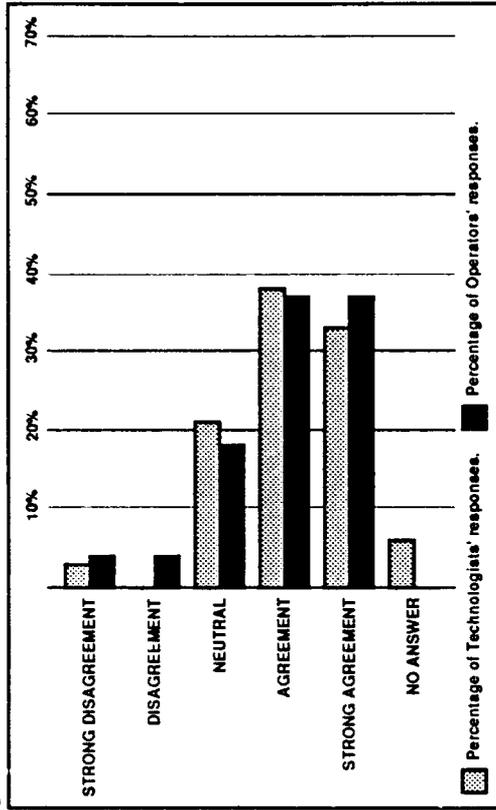


FIGURE S-C.x: Conventional munition technology is mature and not likely to change much.

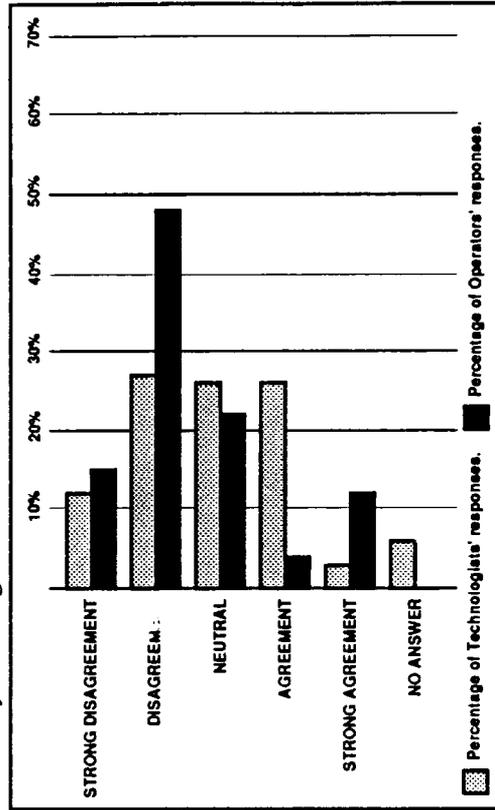


FIGURE S-C.y: Air-to-air combat is a critical element of 2015 warfare.

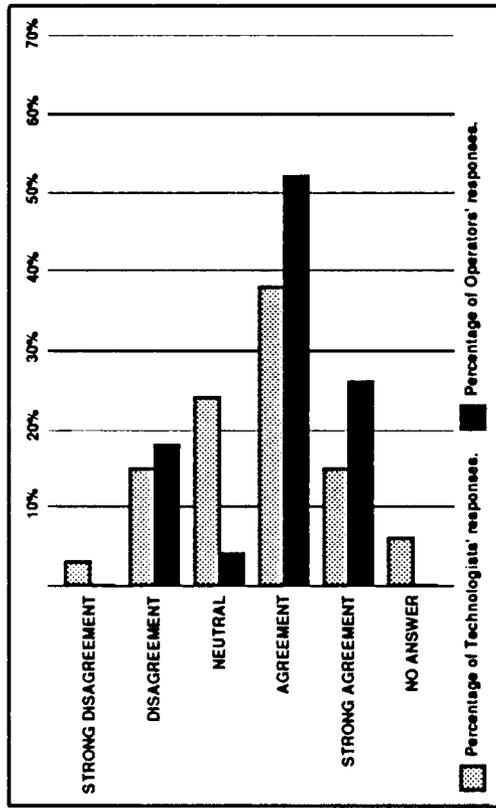


FIGURE S-C.z: Ground based active sensors will not be viable due to poor survivability.

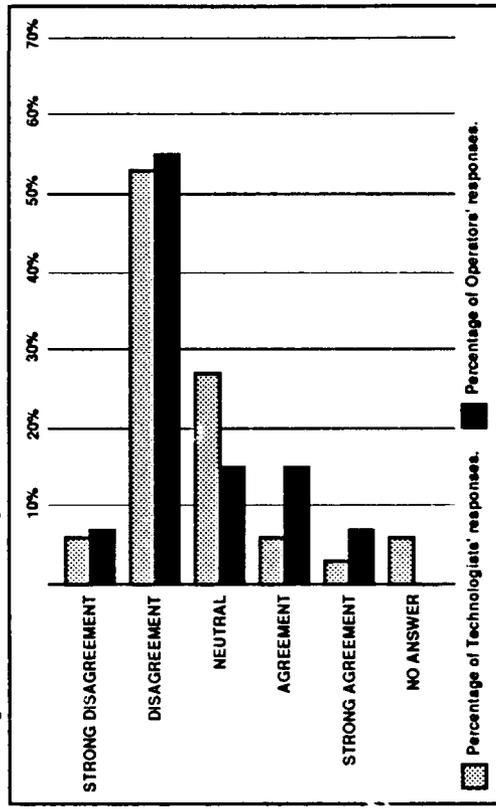


FIGURE S-C.aa: Biotechnology applications will be a part of the Army inventory.

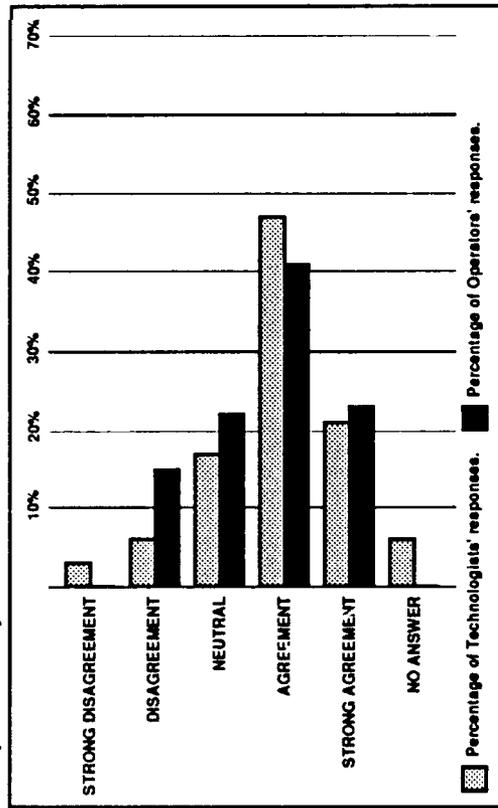


FIGURE S-C.ab: The key to battlefield operations will be separating friend from foe.

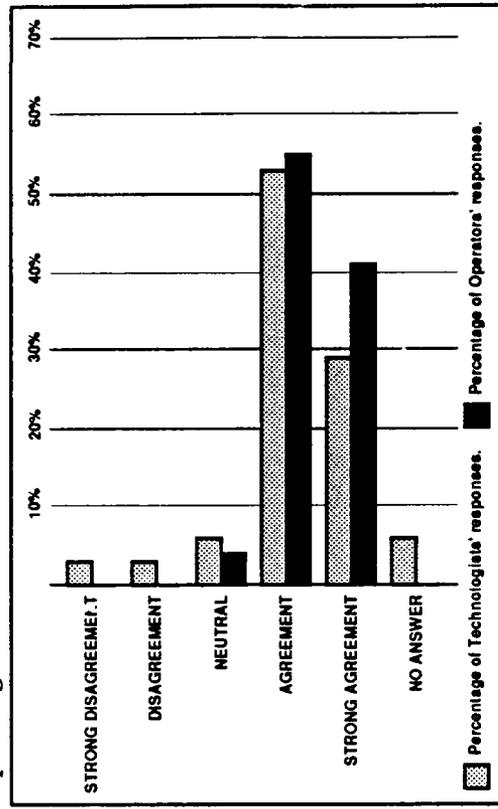


FIGURE S-C.ac: HPM weapons will be an effective means of disabling electronic equipment.

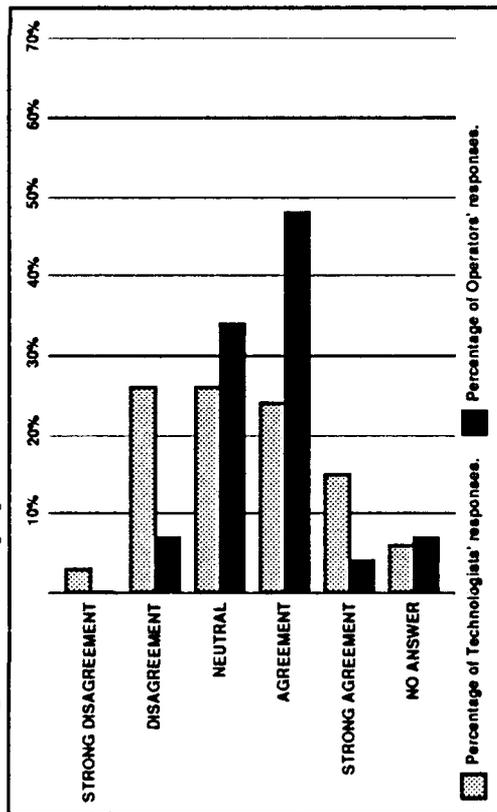


FIGURE S-C.ad: Power supplies for mobile ground EM guns will be a practical reality.

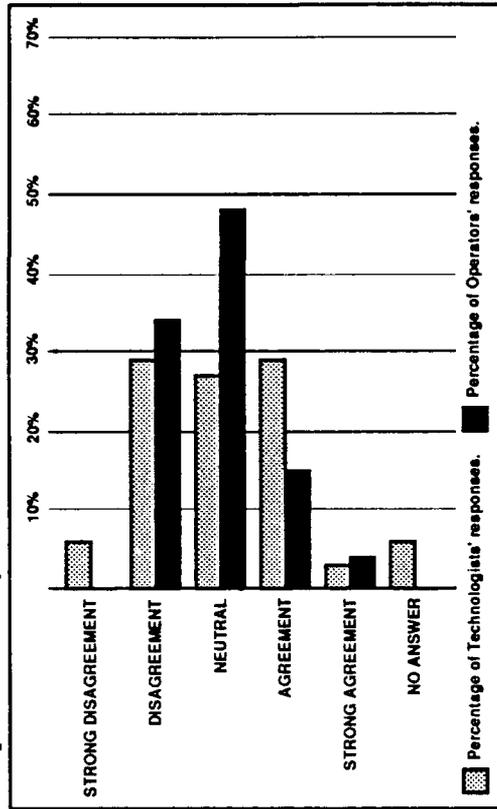


FIGURE S-C.ae: Weather control will be an effective procedure under some conditions.

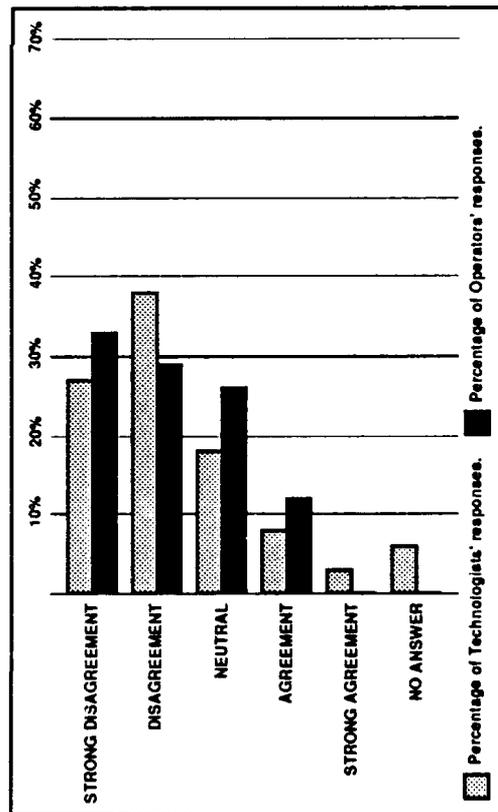


FIGURE S-C.af: The most serious threat is our inability to find and destroy mines.

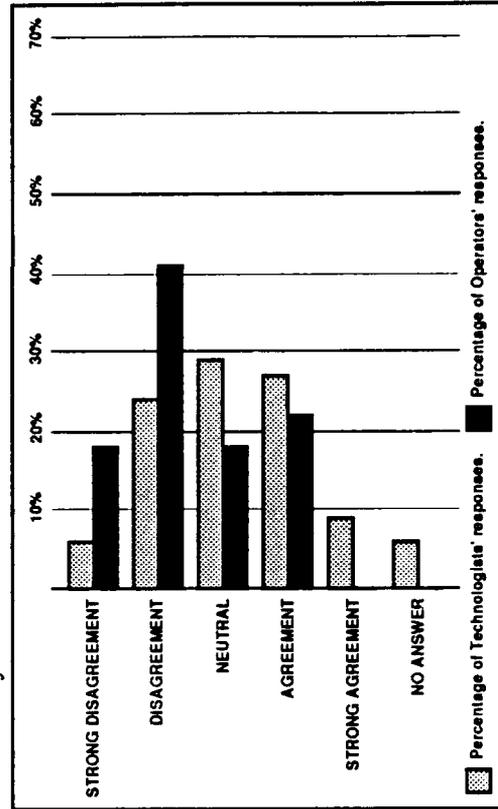


FIGURE S-C.ag: Improvement in individual soldier weapons is critical.

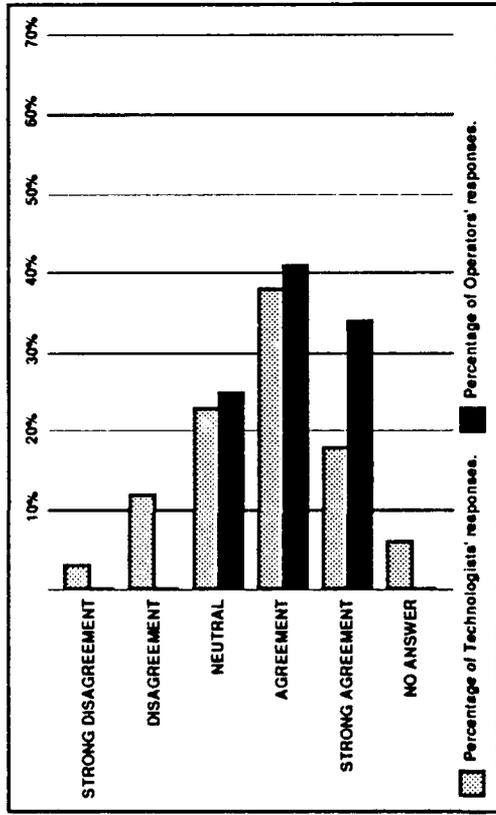


FIGURE S-C.ah: A robust target recognition capability will not yet be fielded by 2015.

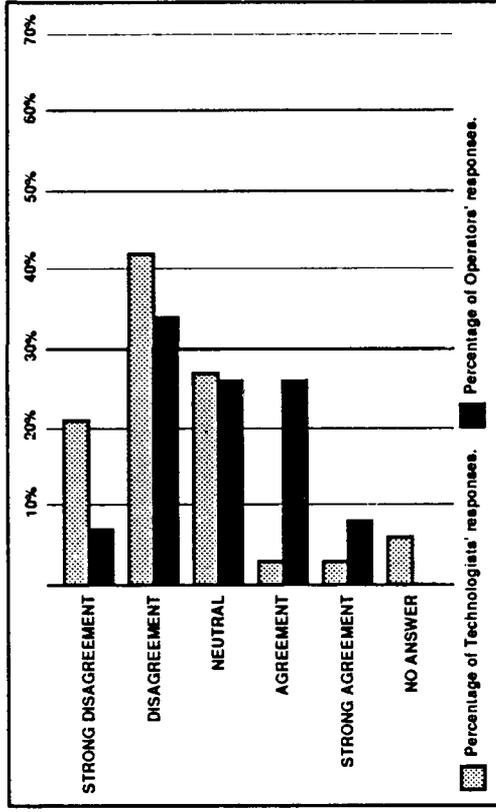


FIGURE S-C.ai: An "all electronic vehicle" is a reasonable goal for 2015

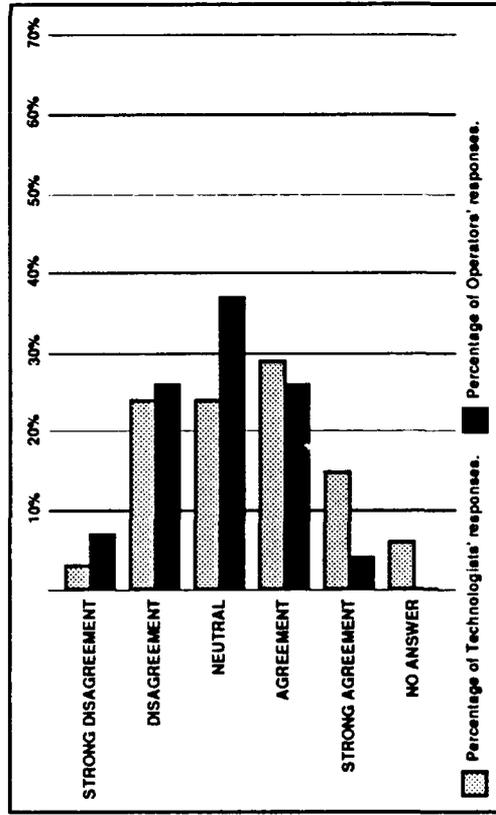


FIGURE S-C.aj: Smart mines will be very effective against air and ground targets.

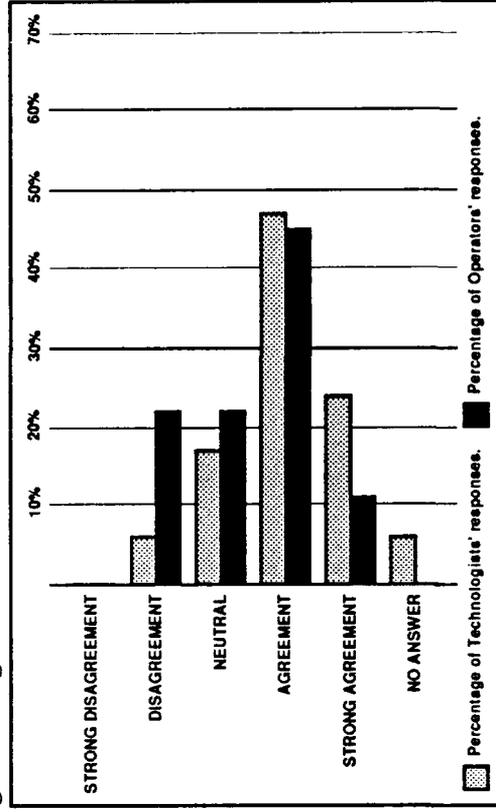


FIGURE S-C.ak: C3I systems will play a major role in ALBF prosecution.

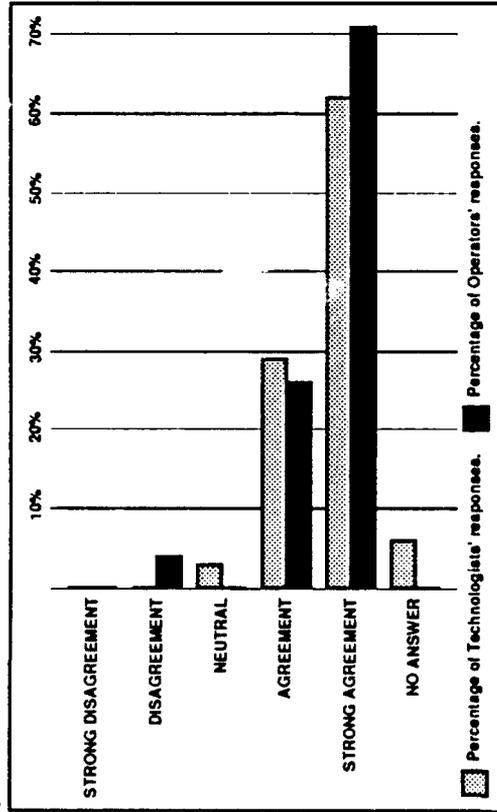


FIGURE S-Cal: C3I countermeasures are essential to ALBF.

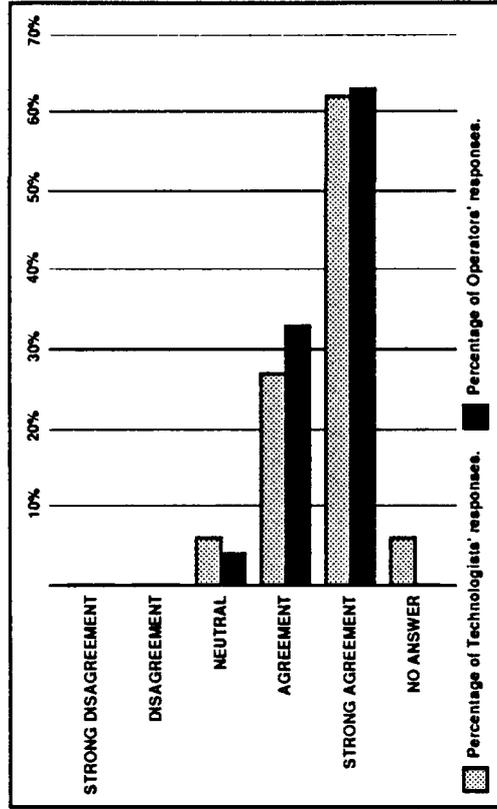


FIGURE S-C.am: Knowledge of soldiers' ability to fight is essential for extended operations.

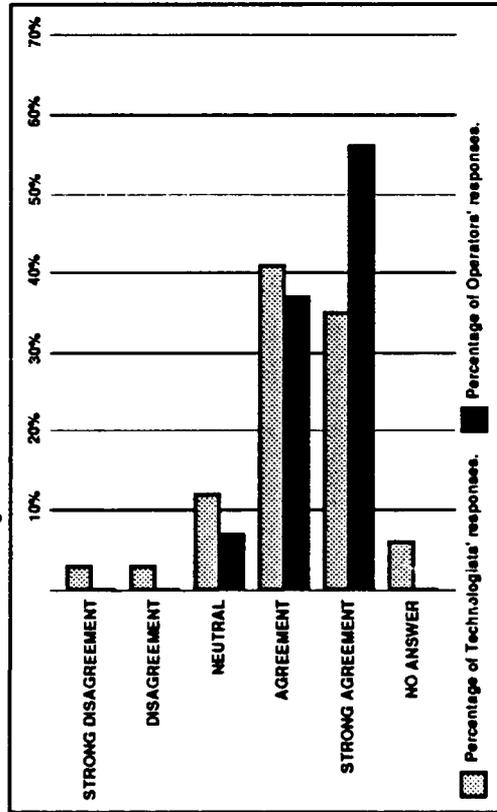


FIGURE S-C.an: Decentralized command is essential to ALBF.

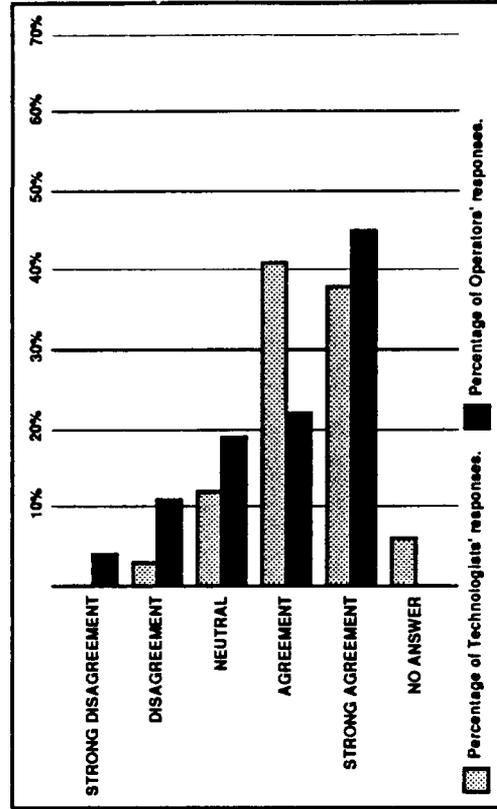


FIGURE S-C.a0: UAVs will provide essential real time support to ALBF.

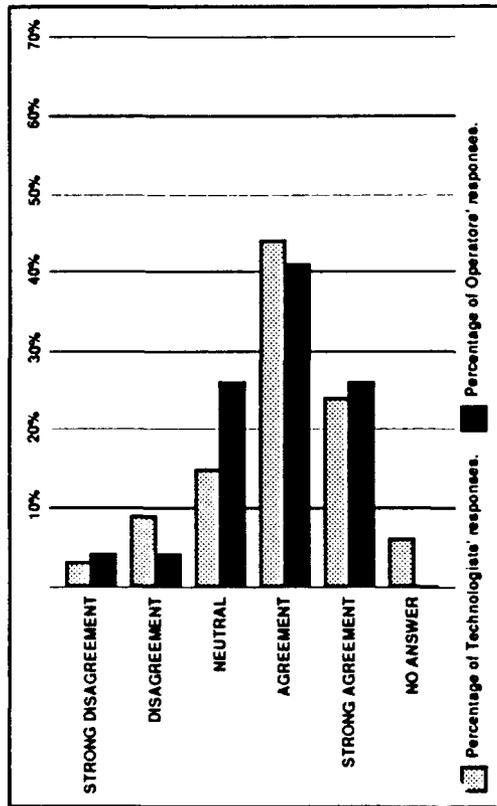


FIGURE S-C.ap: Space assets will be robust to ensure availability in all conflicts.

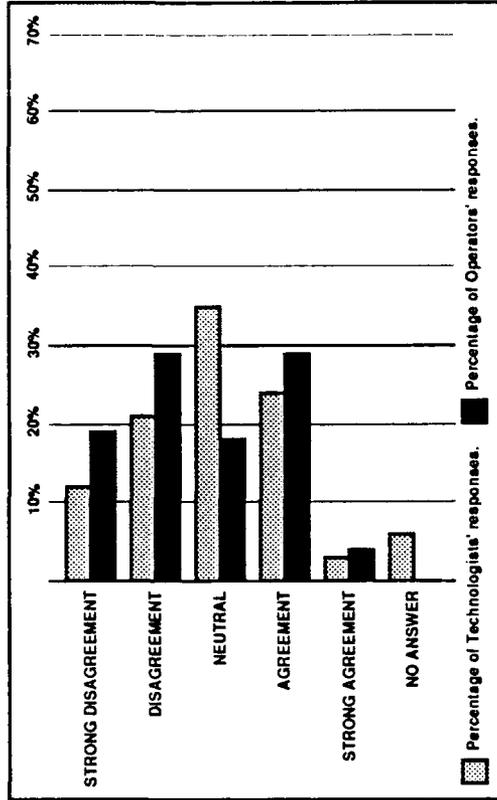


FIGURE S-C.aq: Sensor systems will locate and identify enemy systems.

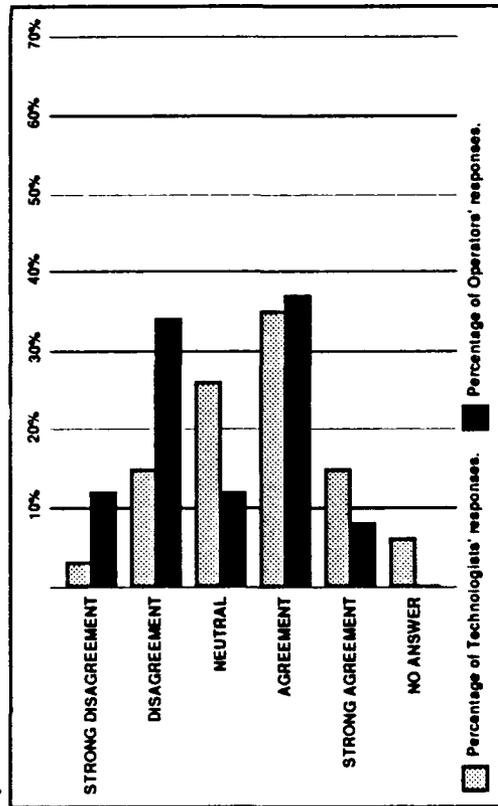


FIGURE S-C.ar: The Army as a strategic force will have sufficient rapid air/sea lift.

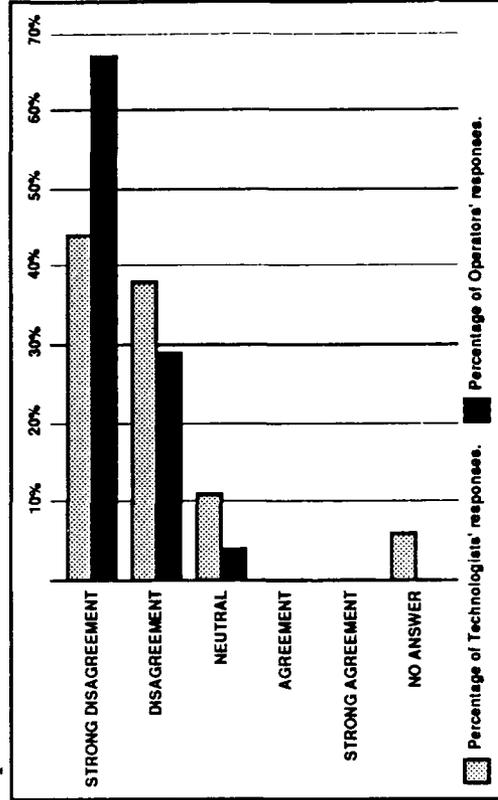


FIGURE S-C.as: Investment in "all weather" systems is justified by likely scenarios.

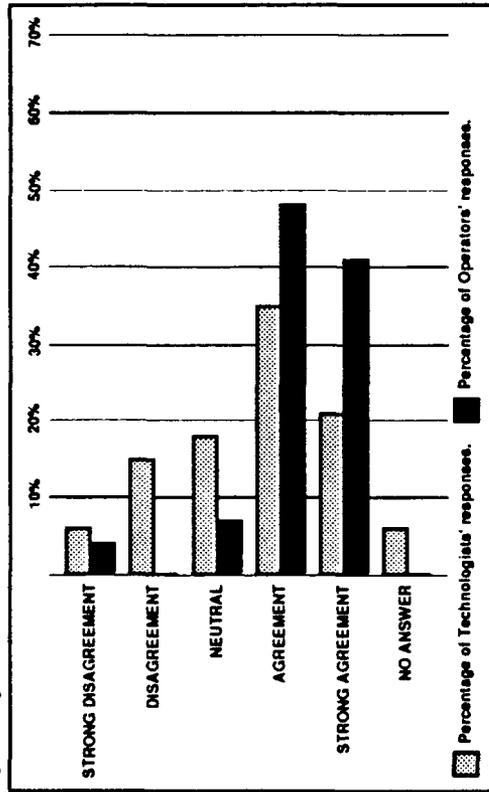


FIGURE S-C.at: US will be willing to use non-lethal chemical weapons.

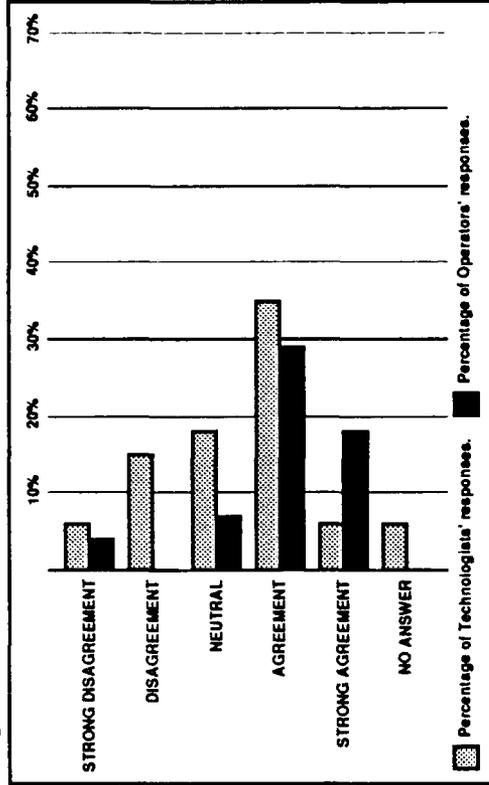


FIGURE S-C.au: All future battlefields will be more lethal than today.

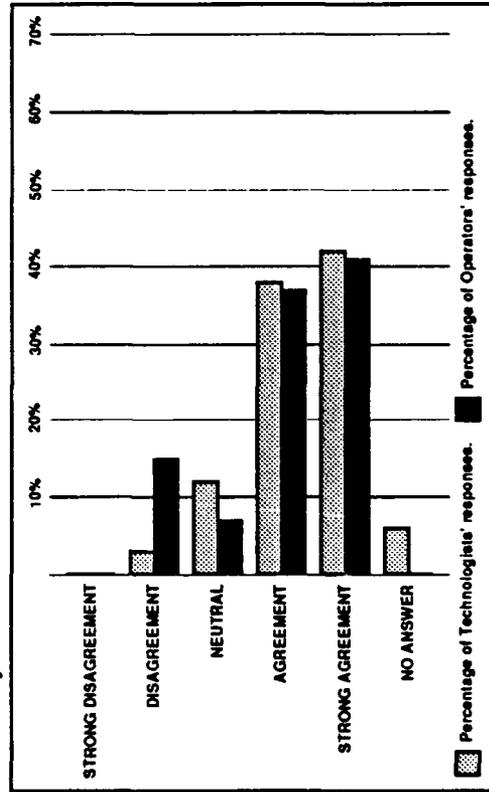


FIGURE S-C.av: Survivability of lighter force poses greatest technical challenge.

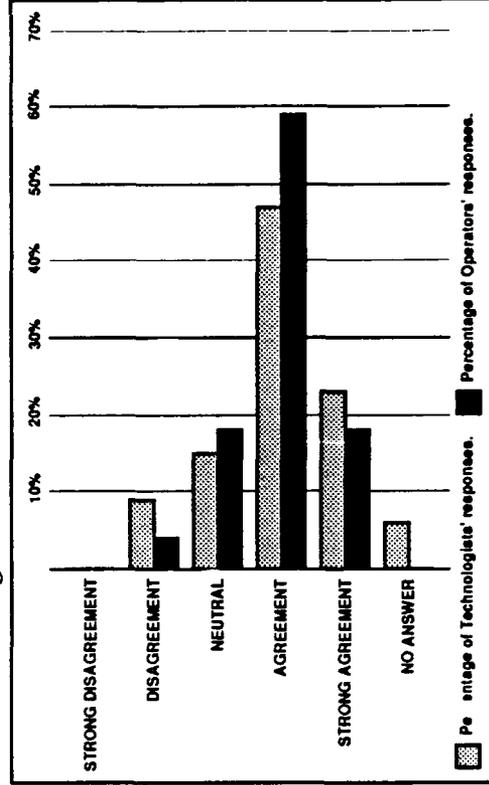


FIGURE S-C.aw: Non-orbiting space platforms can perform many RISTA functions.

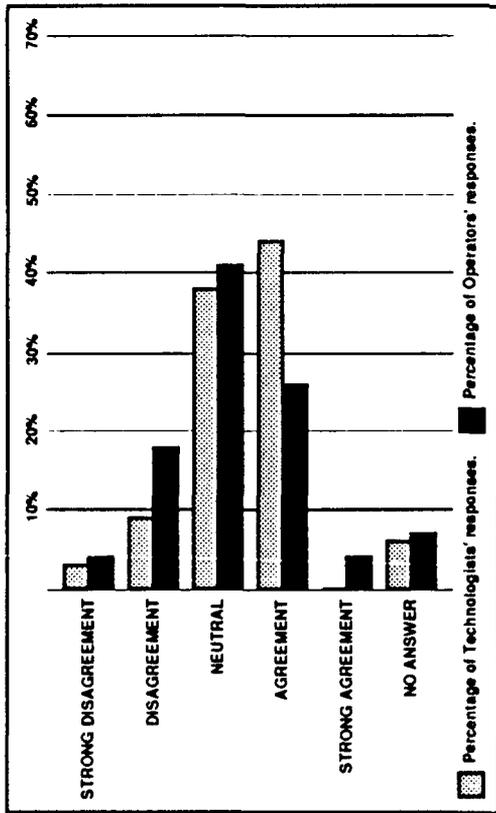


FIGURE S-C.ax: Increased space assets eliminate the need for RPVs/UAVs.

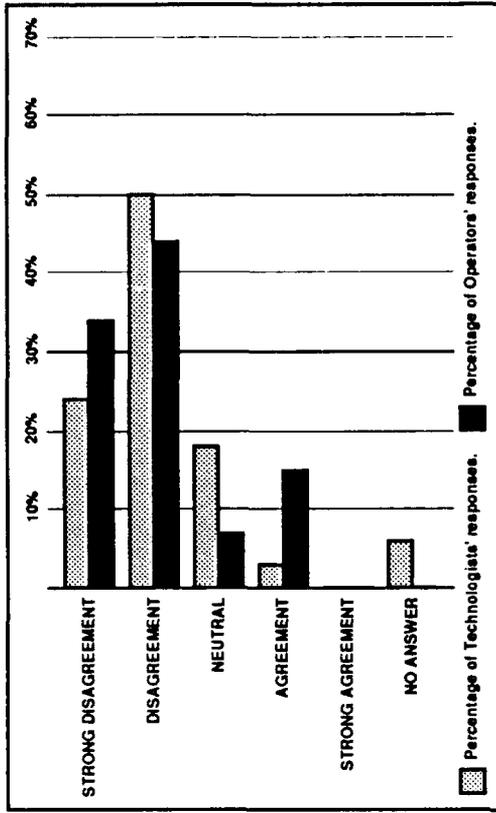


FIGURE S-C.ay: Conventional munition advances will eliminate use of nuclear weapons.

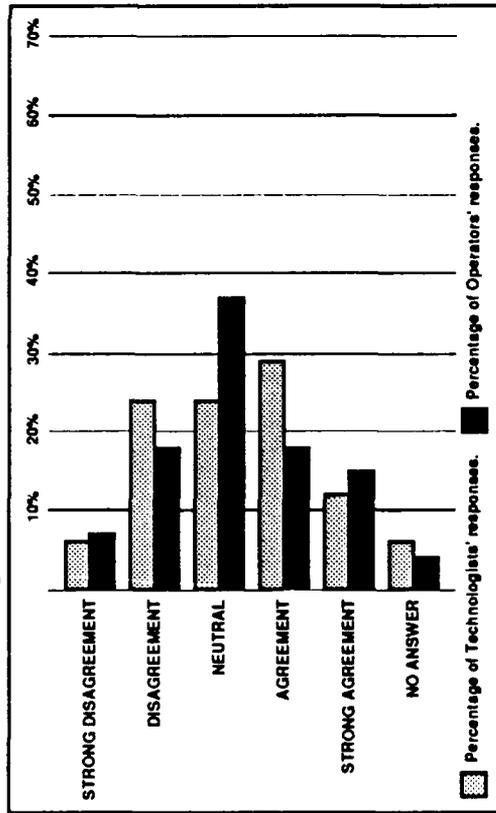


FIGURE S-C.az: Launch and control of tactical space assets is not useful at Corps.

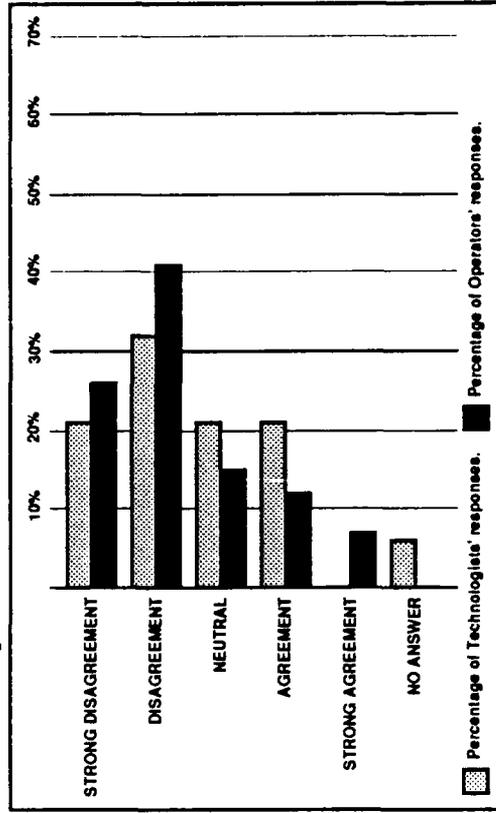


FIGURE S-C.3a: Space weapons will be used against earth targets by 2015.

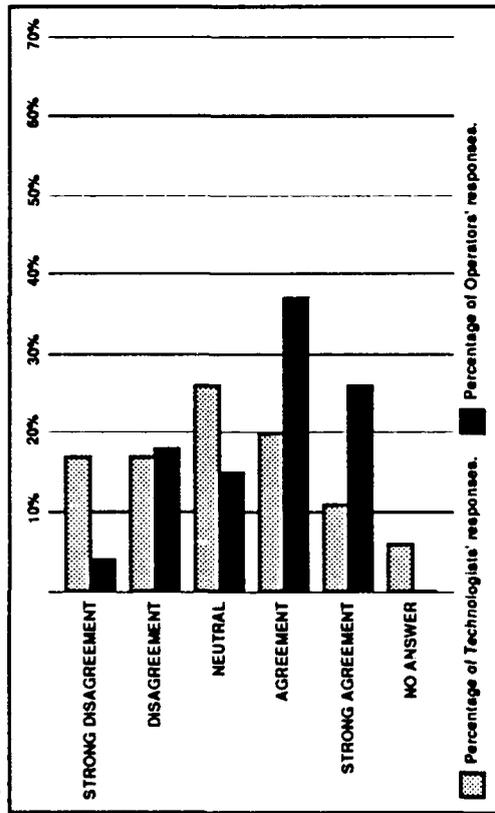


FIGURE S-C.3c: Multi spectral sensor fusion will allow detection of camouflaged targets.

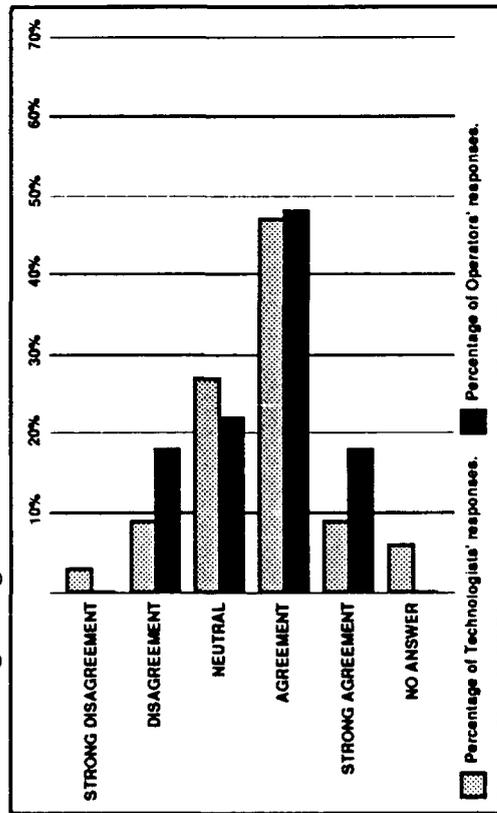


FIGURE S-C.3b: Space sensors will support precision weapon accuracy by 2015.

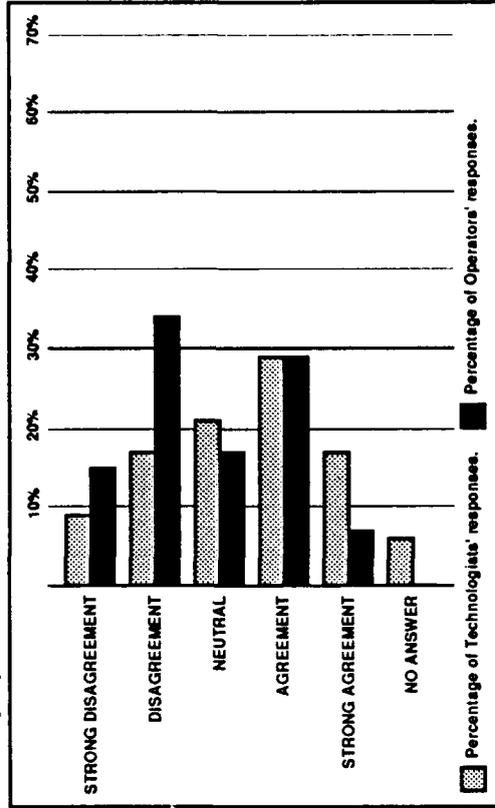


FIGURE S-C.3d: The key to ALBF is lightening while keeping survivability.

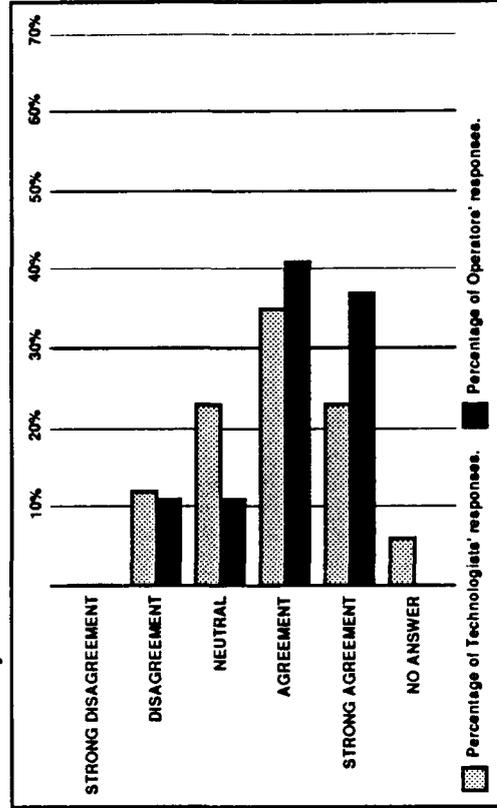


FIGURE S-C.be: Nuclear weapons effects will play a reduced role in future conflict.

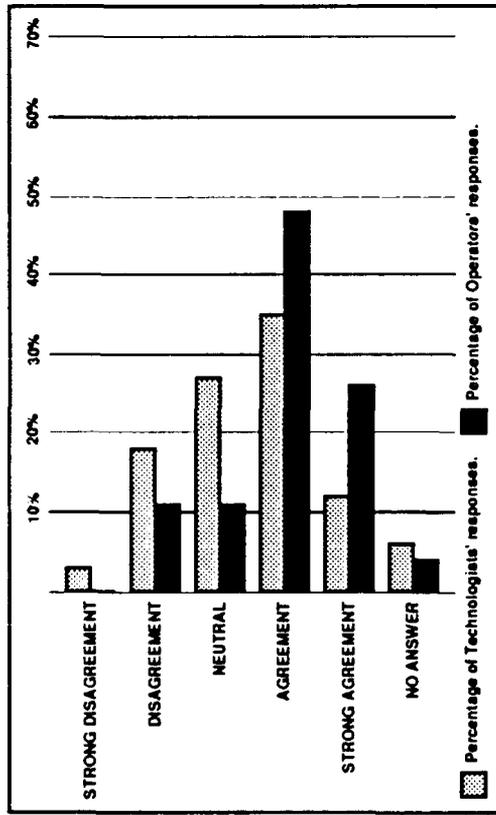


FIGURE S-C.bg: Lightweight, truly air droppable systems are needed.

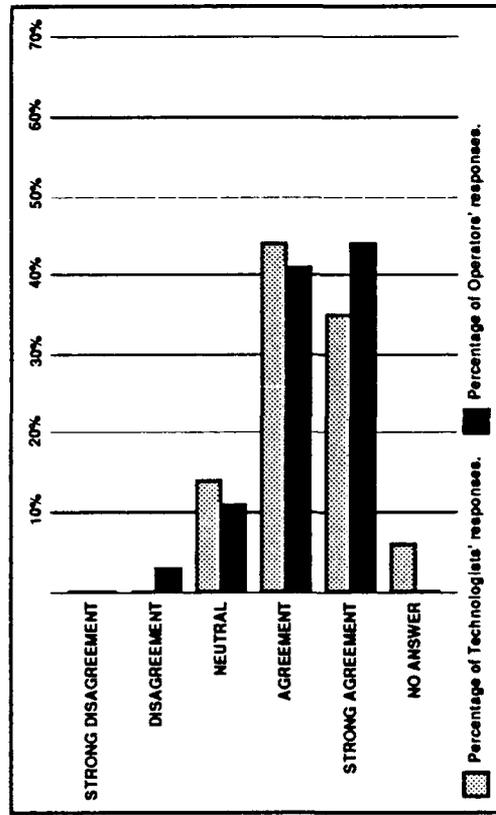


FIGURE S-C.bf: High power microwave systems could provide a useful force deterrent.

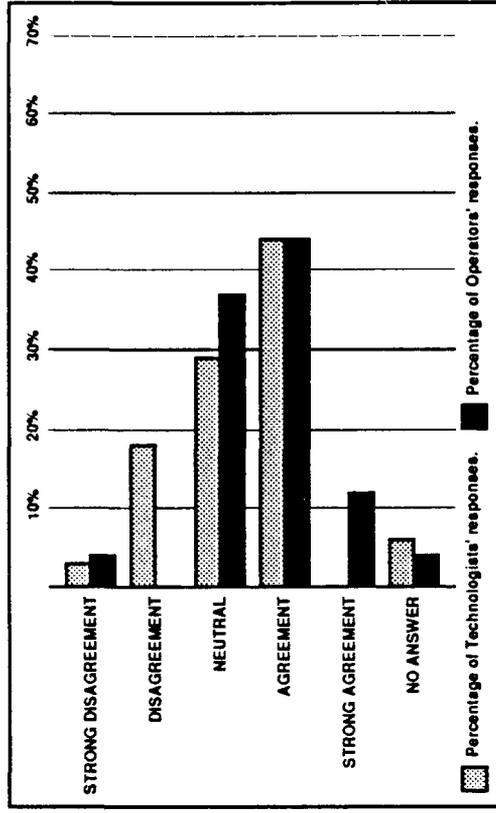


FIGURE S-C.bh: Soldier "health" is an opportunity for force enhancement in 2015.

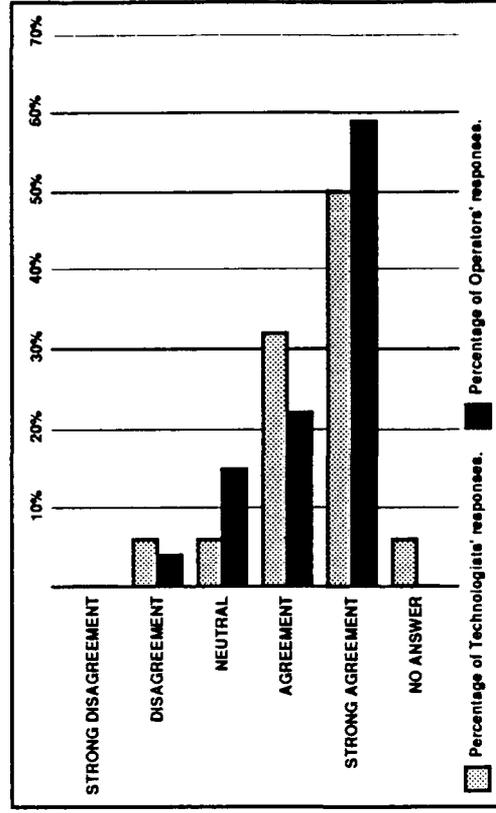


FIGURE S-C.bj: Enhanced soldiers' sensory functions offer improvements in combat power.

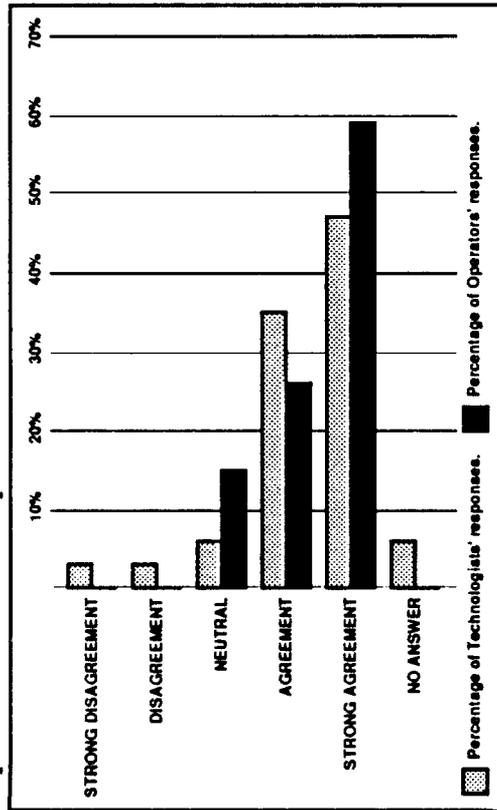


FIGURE S-C.bj: Over reliance on sensors is a major pitfall for ALBF.

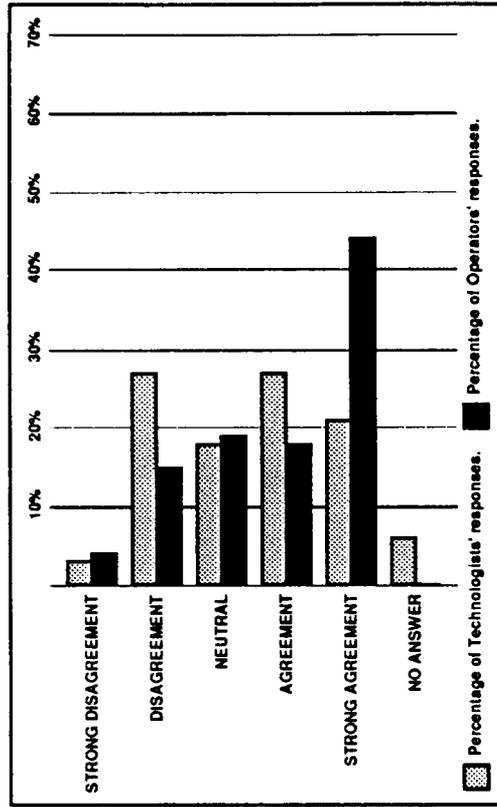


FIGURE S-D.1: Maneuver ATTD Assessments

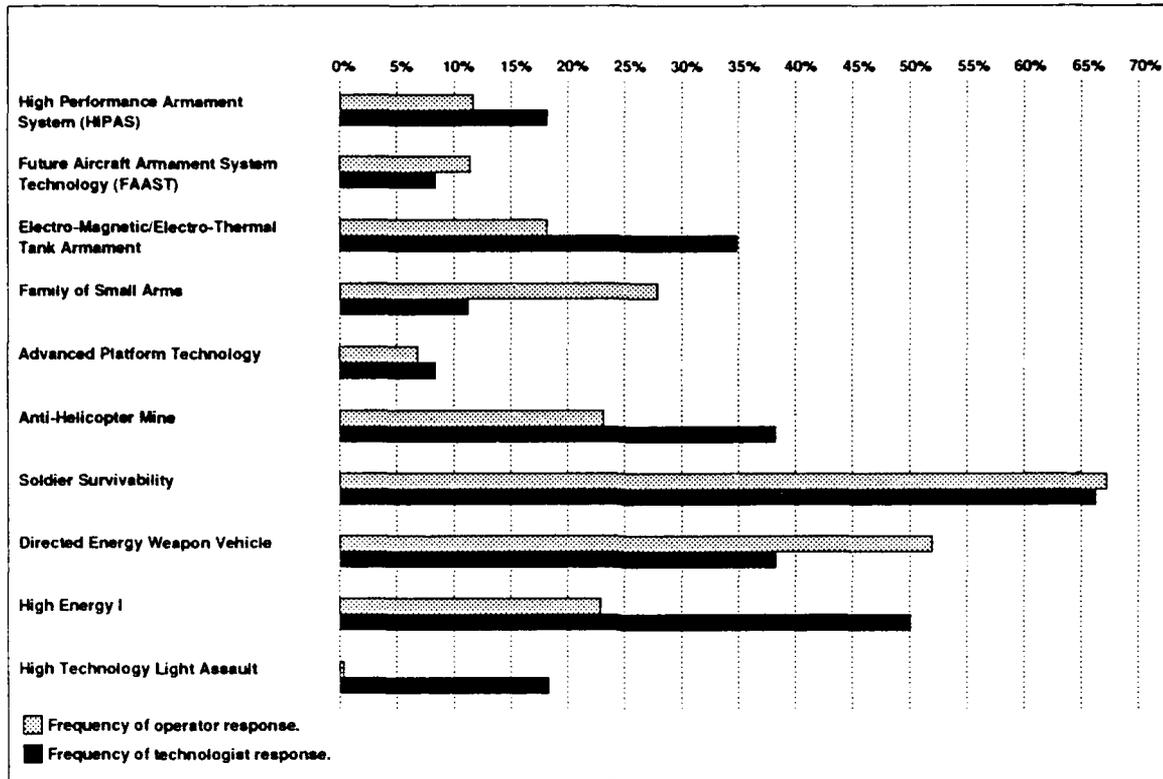


FIGURE S-D.2: Combat Service Support ATTD Assessments

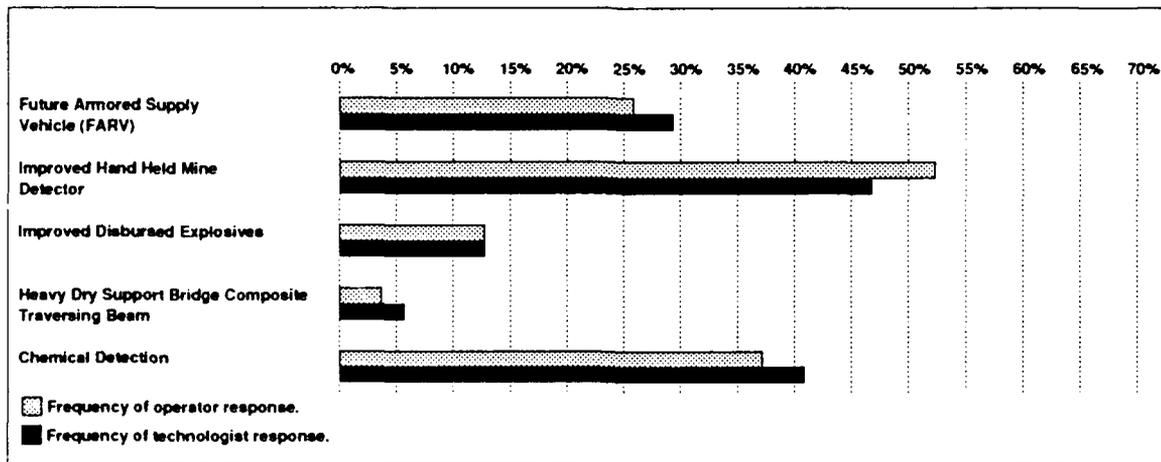


FIGURE S-D.3: RSTA ATTD Assessments

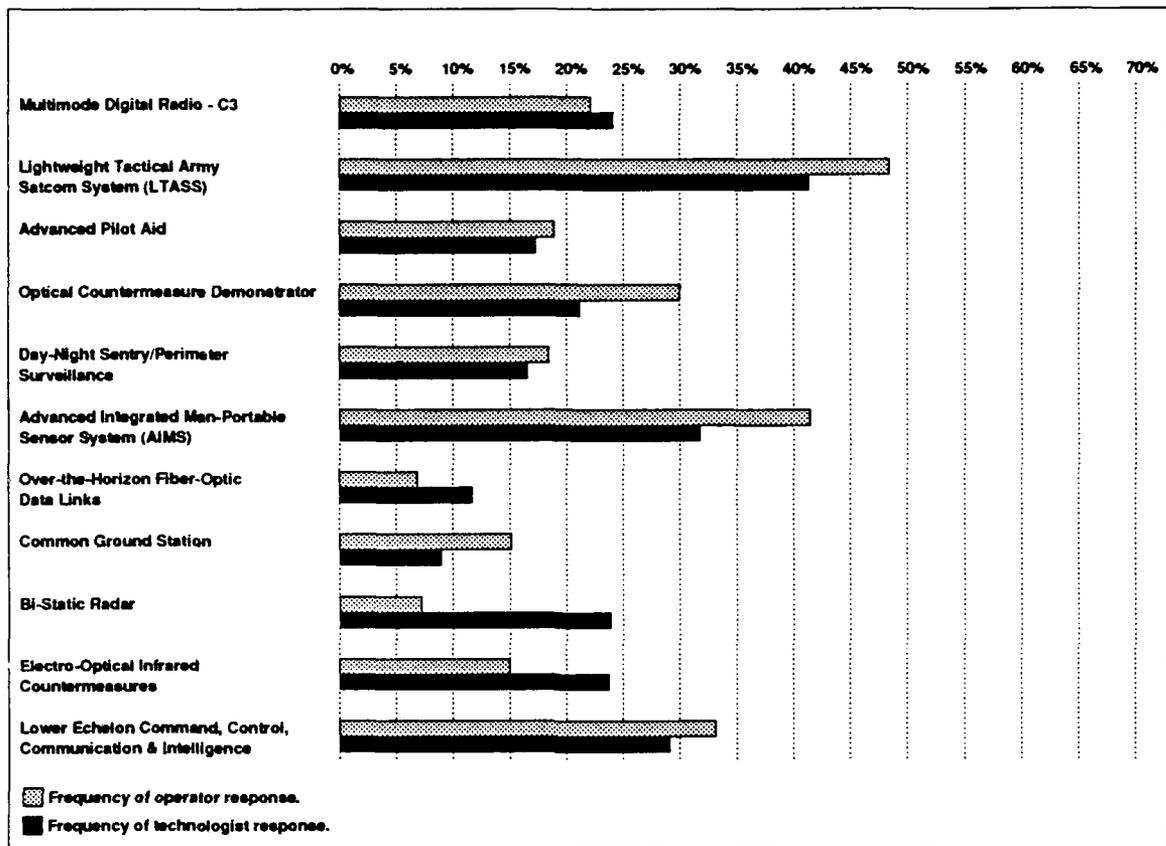


FIGURE S-D.4: Fire ATTD Assessments

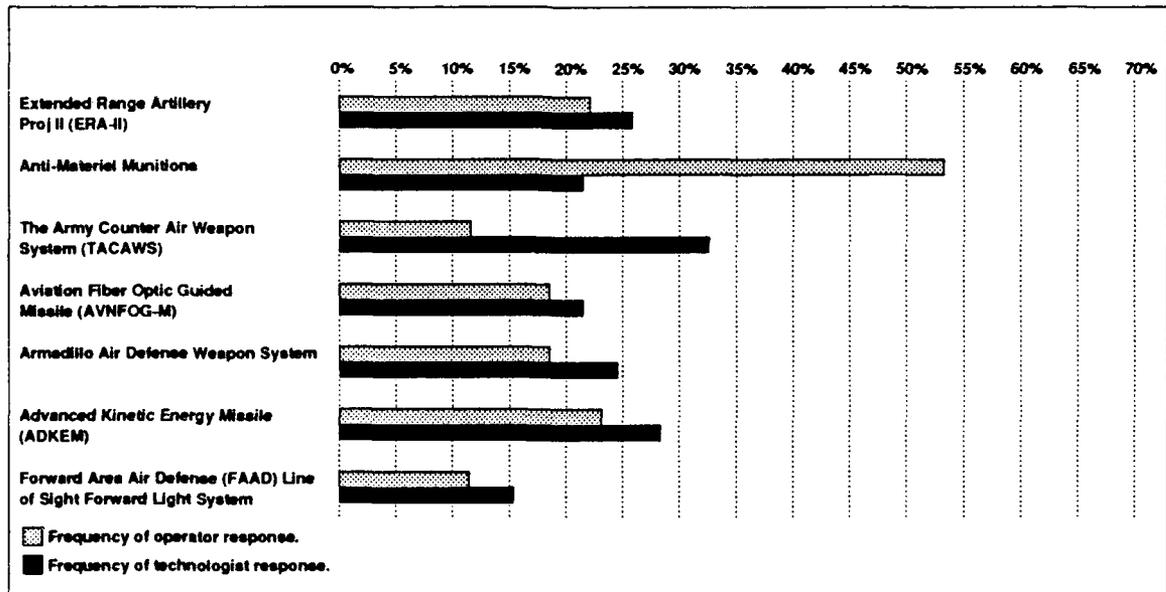


FIGURE S-E.2.a: I received the read-ahead materials in time to read them.

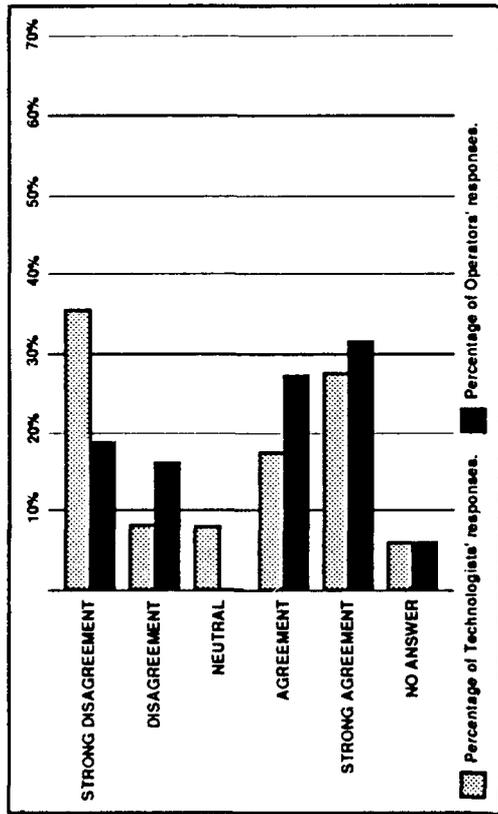


FIGURE S-E.2.b: The read-ahead materials were useful.

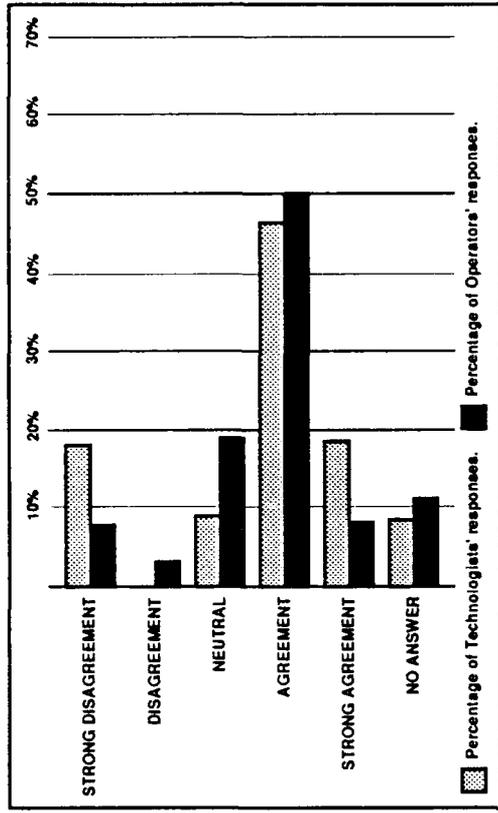


FIGURE S-E.2.c: I understood the purpose for TBSWG II Phase 2 prior to arrival.

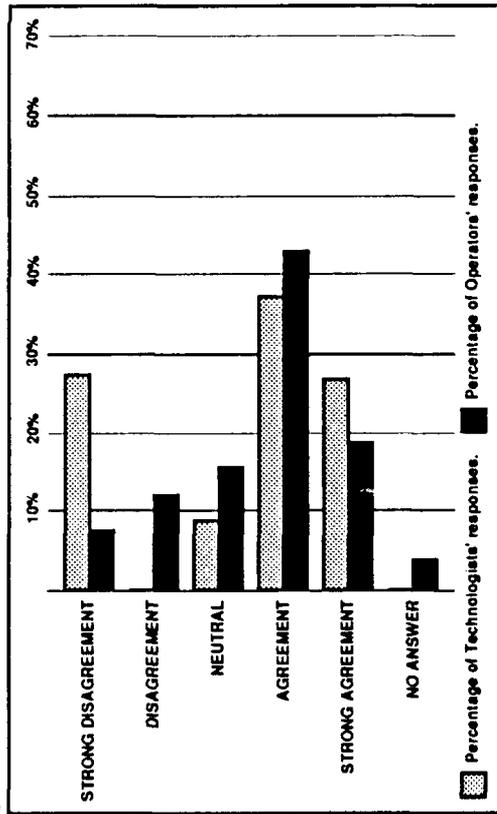


FIGURE S-E.2.d: The materials in the TBSWG II Phase 2 notebook were adequate for my purpose.

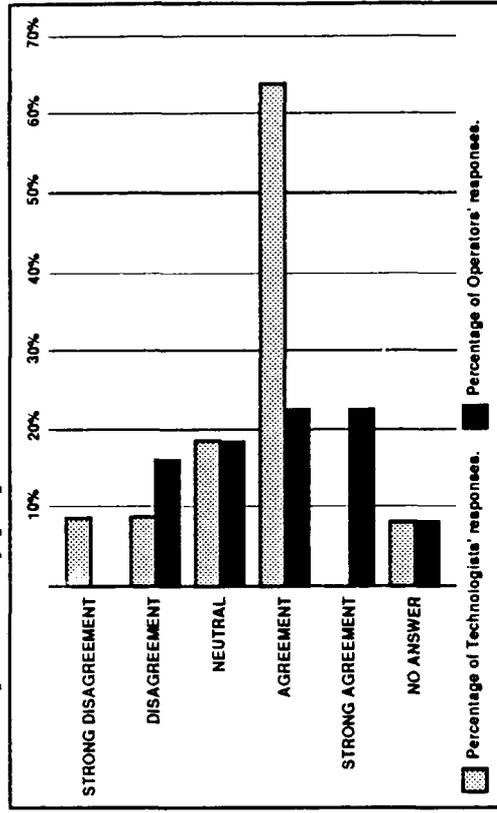


FIGURE S-E.3.a: The 3 days allocated for this seminar were adequate.

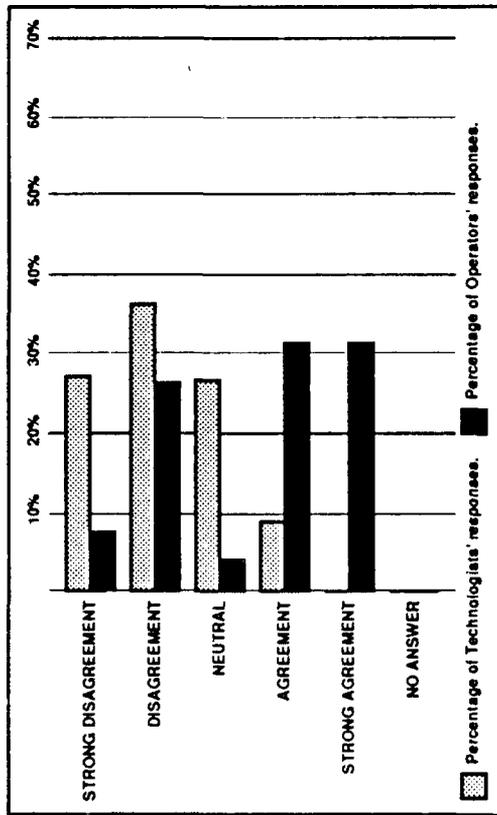


FIGURE S-E.3.b: I would have preferred 5 days for this phase.

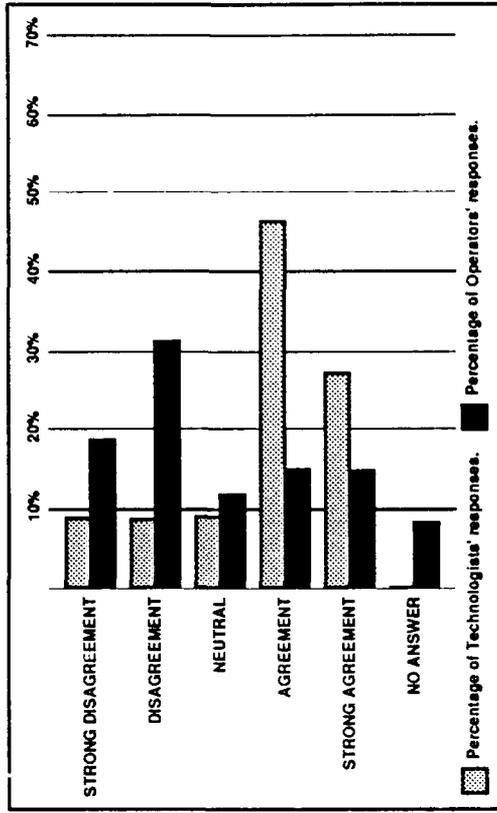


FIGURE S-E.3.c: I would have preferred to play more than one region.

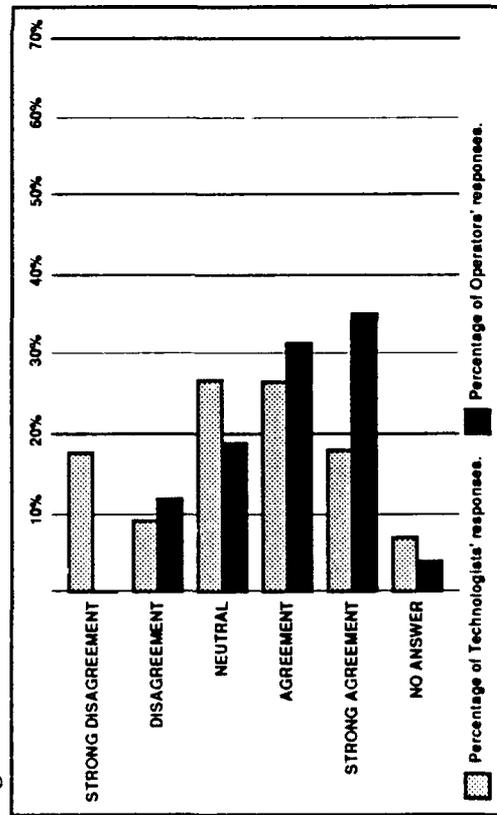


FIGURE S-E.3.d: Phase 2 helped me to understand advanced systems/technologies in relation to ALBF.

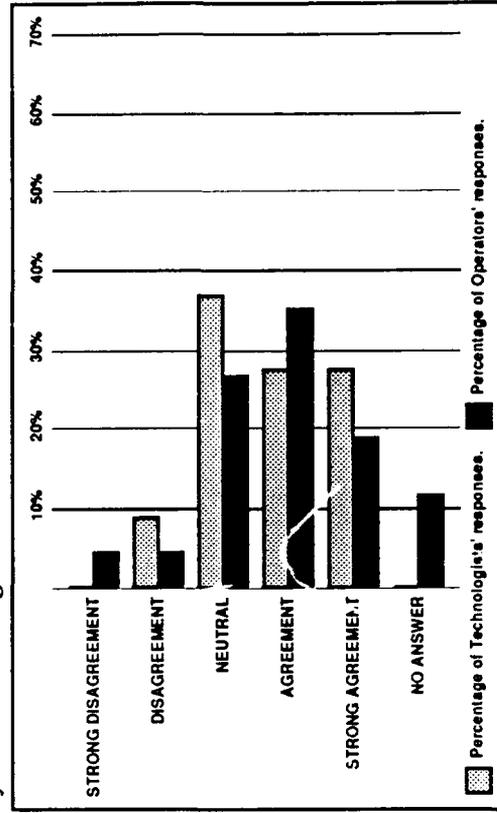


FIGURE S-E.4.a: Billeting arrangements were satisfactory.

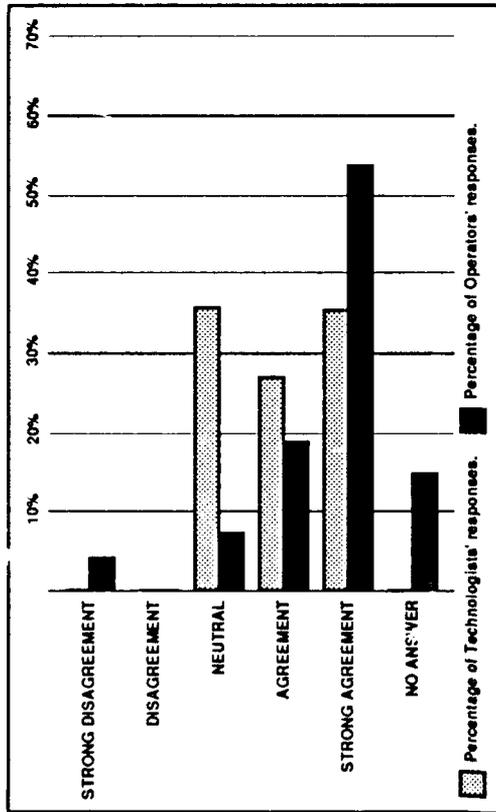


FIGURE S-E.4.c: Food arrangements were adequate.

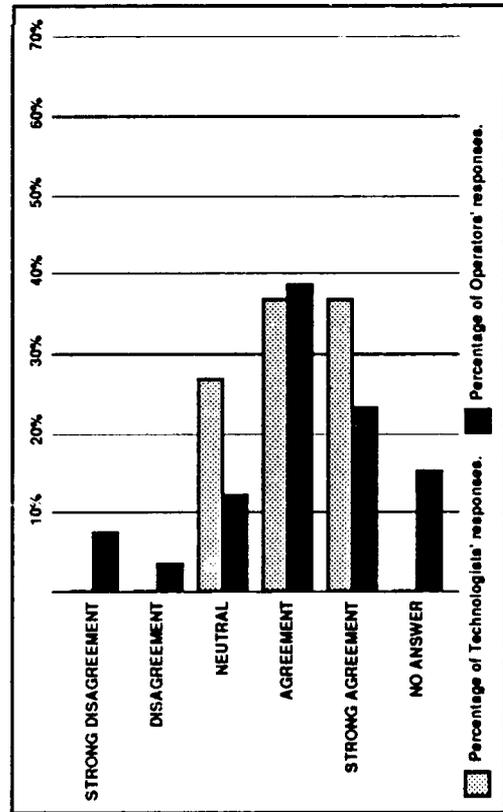


FIGURE S-E.4.b: Social time was adequate.

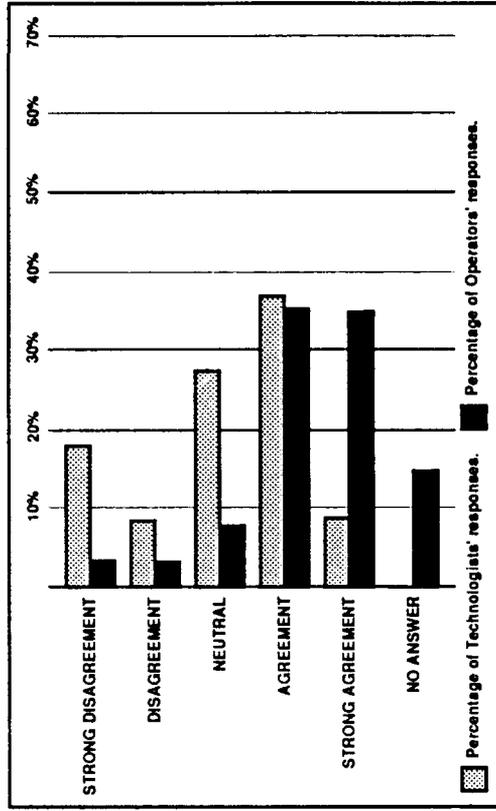
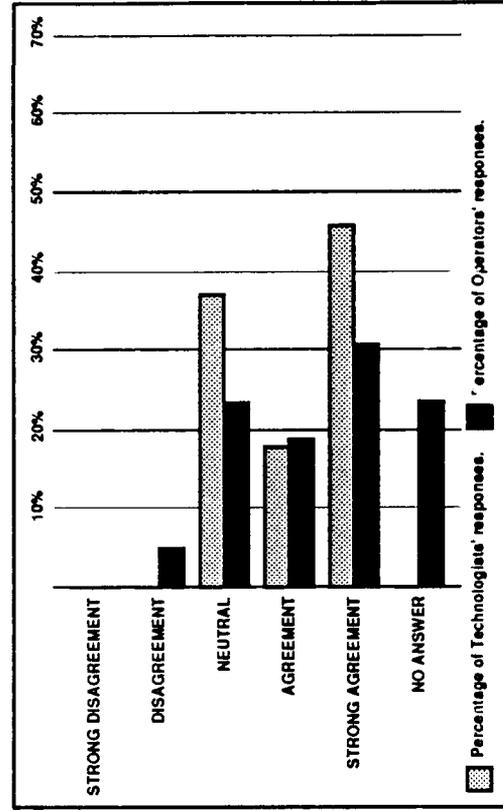


FIGURE S-E.4.d: Transportation was timely and adequate.



**APPENDIX S:
QUESTIONNAIRE RESULTS**

Part 2, Narrative Question Responses

A.

SECTION A. INSIGHTS (SYSTEMS, TECHNOLOGIES, ALBF)

This section contains questions about insights you gained from participation in TBSWG II. Please think about how technology and doctrine converged during the play of the game and describe what you learned.

1. Important Insights. What was the single most important thing you learned from participation in TBSWG II?

ID/co-03

The selected systems are personality driven. The most vocal idea was selected, it wasn't necessarily the best.

ID/co-04

Deception techniques could prove pivotal in any campaign. Despite doctrine and orders, red team consistently did unexpected (i.e. not necessarily preprogrammed).

ID/co-05

- (a) The need to further refine systems data.
- (b) Reqts for further investigations and linkage with PPBES.

ID/co-06

Game must be iterative, with a high degree of personnel continuity to forge results applicable to TBIS changes/direction.

ID/co-07

That logistics systems, eg. fuel and the soldier as a system are the greatest opportunities for tech base advancements in the next 25 years.

ID/co-08

The ability of the US Army to project force in contingency operations world-wide will depend on building a very flexible, highly mobile, light force. Segments of this force must be able to operate in different environmental and combat conditions. Each force must be deployable and extremely agile once on the ground. The technological challenge is formidable, but changing mindsets may be more difficult.

ID/co-09

That if we are able to fight and win in 2015, we must continue to be involved in "games" which predict the future battlefield.

ID/co-10

Tech Directors have no more knowledge of battlefield operations than any other GS-9 who has not been in the service.

ID/co-11

The future battlefield may be very different from "today's" battlefield.

ID/ga-01

How deeply concerned the scientific community is about contributing to the capabilities of the soldier.

ID/ga-02

How to control forces to achieve "Mass" on the future battlefield will be largely done by how/which future weapons/technologies reach mature development within the next 10 years so they will be ready for incorporation into both operational and tactical doctrine which can support the winning of future wars and future battles.

ID/ga-03

That great reliance is placed on the civilian tech base unless well articulated military requirements are stated, with parameters reasonably well defined, which cannot be met by what may be available from that base.

ID/ga-05

If the U.S. Army is to remain a key piece of U.S. military force, it will have to come to grips with how to reorganize and reequip (realistically slowly overtime) to be more capable of rapid deployment to potential areas of conflict with versatile firepower, survivability, and mobility. The USAF and U.S. Navy are inherently more suited for force projection at the periphery of areas of conflict. The Army needs to define its uniqueness (e.g. soldiers on hostile terrain) and take action to strengthen that uniqueness.

ID/ga-06

Army Perspective

- o Logistic focus
- o Individual soldier focus as directed

Game Techniques

ID/oa-01

Too many players and too many other people in each work shop. Poor visual aids. Too many issues to be decided in the time provided. (This is based on observing 2 phases of a similar war game held at the Warfare Analysis Lab of the JHU Applied Physics Lab.)

ID/oa-02

Our Army's ability to think thru "Low Intensity" Conflict Scenarios is limited at best. At a time when we are shifting our thinking from Central Europe this scenario and our ability to design a future force to fight here is of paramount importance. The change is coming but it is going to take some years before we see some tangible results.

ID/oa-03

I learned that there is a tremendous need and opportunity for the "technologists," i.e. laboratories, RD+E centers, etc. to periodically get together with the user and discuss how the Army fights - and how it will fight, in our best judgment in 2015 and beyond. We probably haven't been doing this very well - or often enough - and I believe valuable insights were uncovered on both sides. If I had to narrow it down further, I would say that I learned about specific technologies that are available (mature enough) today to vastly help the Army!

ID/oa-04

Chemical weapons represent a significant threat to US soldiers and yet very little progress has been made in improving soldier chemical protection.

ID/oa-06

The dynamic interaction between the TD's and the soldier-advisors. This interaction resulted in a far better appreciation of operational requirements by the TD's.

ID/oa-07

What the Army should look like in 2015? What it needs to do to get there. Will there still be a Corps as we know them today? A need? Public will to maintain. Will mission change. I think yes. Smaller - lighter more efficient/mobile.

ID/oa-08

The Army is interested in space but it is not an area that the LABS are involved in and is therefore less an item. A SPACE PLAYER should be at the head table along with the current LAB Directors.

ID/oa-09

New operational concepts and how they are employed.

ID/oa-10

Need to enhance soldier performance for high stress environments.
Evidence of growing reliance of our forces on space-based systems and high technology (advanced) sensors.

ID/oa-11

There is a dire need to lighten both strategic lift loads and the soldier's load.

ID/oa-13

There are some very bright dedicated people working on these issues

ID/oa-14

The capability to enhance individual soldier performance.

ID/ob-01

How wargaming in a seminar can produce useful insights.

ID/ob-02

Deployment to SWA is even more difficult than I had believed. Today, I feel that deployment is the most difficult problem facing the Army.

ID/ob-03

The degree to which traditional thinking inhibits innovation. It seems sometimes that technology can be as lock step, as bureaucratic, as ordinary work. But the intuitive insights, when they come, are all the more exciting.

ID/ob-05

Soldier enhancement possibilities: chemical, biochemical, technical.

ID/ob-06

How advanced tech can enhance our capability if properly fielded/trained.

ID/po-02

As a non-technologist I got an insight into the technological possibilities for the future of war. I also realized that the process of selecting the appropriate technologies & resourcing them is not simple or easy.

ID/po-03

Revolutionary role a component based hierarchy of soldier enhancements will play.

ID/po-04

That technology is interactive with doctrine, training, and logistics. Every technological advance requires changes in these other areas. We don't give enough consideration to the implications of technological advancements to these other areas.

ID/pt-01

The opportunities to enhance soldier effectiveness through medical (physiological) means, and the opportunities to enhance soldier effectiveness through application of sensor, fusion, and allied technologies.

ID/pt-02

A better understanding of ALBF and how various proposed new systems can be used to advantage in future conflicts.

ID/pt-03

That perhaps the biggest selling point for smart weapons is their advantage in deployability. One smart indirect round is worth 10 dumb rounds in kill effectiveness. Since the deployment weight & cube of the rounds are nearly equal, the dumb rounds have little virtue even if less than 1/10 the cost of the smart round.

ID/pt-04

Focus on soldiers (outnumbered & have more to do); technology to enhance their performance medically, pos-nav & communication receiver & computer for operations, and through training.

ID/pt-05

The importance of the individual soldier and the decentralization of command and control in all military operations.

ID/pt-06

The different viewpoints of the various technology directors, military participants, and advisors.

ID/pt-07

The importance of the soldier system and the fact that consensus now has it that it is important in all scenarios.

ID/pt-08

Need for flexibility in systems, and operations.

ID/pt-09

Soldier as a system: His needs in jungle environment.

ID/pt-10

The soldier physiological enhancements program benefits & abilities.

ID/pt-11

Critical to examine proposed future systems within future doctrine. Scenarios - should go to computer gaming for more comprehensive evaluation of "value" of each new technology.

ID/pt-12

That the deployability problem is not seriously diminished through introduction of light combat vehicles in lieu of heavy forces. I had assumed that our planned 50% reduction in gross of heavy armor division would have large impact on deployability.

ID/pt-13

A more rational approach to LATAM is that objectives were scaled down toward realism, that mind-bending games (of the local population) had been set aside. An important second was the National Simulation Center tour.

ID/pt-14

That the future army needs to be flexible/adaptive, mobil and modular to respond to a wide range of situations to the degree required for winning.

ID/pt-15

Mobility problems and detection of enemy units in a jungle environment.

ID/pt-16

Data information in a real time mode.

ID/pt-17

The scenario for SWA was changed from TBSWG II & also the players were different. As a result we come to different conclusions as to which technologies/systems were more important or had more impact. I'm not sure if this was good or bad. I think the recognition of the need for continuous knowledge of the enemy units & their location finally came to the level of importance it deserved.

ID/pt-18

Difficulty of operating in a jungle environment.

ID/pt-19

The most important thing is the interaction of tactics and strategy that equates to power. Power then can be enhanced by technology. Tactics and strategy may not be effected by technology.

ID/pt-20

Players gravitated to revolutionary (or not yet available capabilities). Assumed current weapon systems will remain effective in 2015, e.g., did not question lethality or survivability of system in 2015. Focused on doing new things - principally sensing, discriminating and C2.

ID/pt-22

The SWA Vignette on deployment. There is no way we can deploy an effective military force at Battalion or greater strength without radical force lightening and increased lift capacity, if the force must be deployed in a few days - or even a few weeks.

ID/pt-23

The criticality of resupply/logistics and the need to "lighten" the force no matter which region you are dealing with.

ID/pt-24

Commonality of individual soldier needs between all scenarios. Need for sensors at all levels. Lack of definition of how to use space.

ID/pt-25

Need for real time space locate/Ident/Tgt. From national asset, to the fire battery. Political and technical requirement.

ID/pt-26

The enemy has the same functional technical capability available from the world market as the U.S. and no moral or treaty restraints in using it. This raises serious questions about ALB-F doctrine applied to contingency operations.

ID/pt-27

The value of trained leaders and facilitators to keep things focused and moving quickly. Our effort could have been more efficient.

ID/pt-28

We can enhance the soldier in 2015 with shots, pills, etc. to make him 2 or 3 times as effective as a present soldier after 3-10 days in the field.

ID/pt-29

That deploying a Corps sized unit to SWA in a timely manner will still be impossible in 2015!

ID/pt-30

Knowledge of the ALBF key issues.

ID/ra-01

Some of the Army's most technically oriented people did not think we could do something by 2015 which we almost are doing today! (in black world) (e.g. able to know in desert environment where virtually all the enemy is).

ID/ra-02

Very large number of high Tech items being developed which have implications that they will negate each other in use - but at least some developers didn't seem to be aware of this prior to game. Too little attention being paid in Army to revolutionary new Soviet Operational Concepts for use of high tech.

ID/ra-03

That the technological guru's need to have 1st hand or direct contact with the systems they are ultimately supporting - the individual soldier. He/she/it are the weakest link in the system and any improvement in their capability/efficiency is multiplied throughout whichever system they are part of.

ID/ra-04

The importance of combining the efforts of military at various levels and personnel at military laboratories to solve today's shortfall and to provide solutions to the future system requirements.

ID/ra-05

Need to look further out in threat technology forecasting.

ID/ra-07

Technologists were very optimistic regarding when technologies could be available. Development and testing does not equal initial operational capability.

ID/st-01

The need to bring technologists and tacticians together and plan the future.

ID/st-02

Vulnerability of US Soldier to fairly high tech weaponry in the possession of 3rd world country.

ID/st-03

The importance of satellites as an asset for comm and target identification. All scenarios made use of sat, but controversy developed over their immunity from attack based on tactics or national political strategy.

ID/st-04

That technologies are emerging that will be able to significantly enhance individual soldier performance both in biomedicine and in computer-sensor applications.

2. Unexpected Results. What did you learn from TBSWG II that you found particularly surprising or unexpected?

ID/co-03

Despite of short comings with the game, the quality of the participants provided useful and thoughtful conclusions.

ID/co-04

Individual soldier enhancement played key role. Battles were limited or altered due to human limitations. (sleep, dehydration, MOPP status, etc.)

ID/co-05

Nothing.

ID/co-06

Some groups of participants participate, while some contribute not at all. We need to work group dynamics issue better.

ID/co-07

That space has so many different elements to consider, from satellite support for recon, to GPS, to political implications to SDI, etc.

ID/co-08

If certain technology concepts can in fact be delivered to the forces by the turn of the century, heavy mechanized forces become obsolete.
For long deployment scenario they are currently obsolete, simply because we'll never get them there, in time, to do the job.

ID/co-09

The extent to which we must change and adapt.

ID/co-10

The Tech Directors tend to be more honest than their subordinates when discussing the capabilities of these future systems.

ID/co-11

Some of the most dramatic improvement/change may come from technological enhancement of the individual soldier.

ID/ga-01

I learned that some of the technologies I've dreamed about are here. Also I found a higher degree of willingness to listen, contribute, help, and cooperate than I expected.

ID/ga-02

The range, lethality, and command and control requirements of the future battlefield will place a natural and increasing emphasis on Joint Operations - even at levels well below the Corps.

ID/ga-03

That state of the art technology was not applied to the methodology employed for the conduct of TBSWG II.

Question 3 is extremely thought provoking and merits consideration a beyond the reasoned response that might be provided on an extemporaneous basis.

ID/ga-05

Two things.

I was surprised at how naive some Army civilians are about military history, the nature of war, and the U.S. Army. I was also a bit surprised at the anticipated dirth of airlift and sealift projected for 2015.

ID/ga-06

Patience of the professional soldier in dealing with technologists

ID/oa-01

Potential for improving soldier is an appropriate R&D medical & otherwise. I had bet on it in the Lab 21 deliberating without having much confidence that progress was really possible.

ID/oa-02

The technical directors of AMC understand the tactical Army issues better than I expected.

ID/oa-03

Probably, the degree of interest and "support" for the exoskeleton suit or system. I use the term "support" somewhat cautiously, in that most participants had little idea as to what it was or how it was to be employed. Lots of healthy interest, however, and that surprised me, somewhat.

ID/oa-04

Individual soldier survivability is a key force multiplier but an area that is not the most significant subject in non-technology wargames.

ID/oa-05

That there was such a multitude of technologies under investigation to improve warfighting.

ID/oa-06

The honest appraisal of the importance of technologies outside of their areas of responsibility, and their willingness to admit the shortcomings of the systems in their own areas.

ID/oa-07

We still are thinking Tank divisions vs Tank divisions. I just don't see it anymore. We have better ways to approach the problem. Why invest in equipment and put soldiers in harms way if there are alternatives?

ID/oa-09

- Soldier enhancements - medical.
- Soldier carrying capability - we will lighten the load, but the soldier will carry same weight.

ID/oa-10

The slow rate of movement in the "hostile" jungle or mountainous terrain. (Emphasizes the need to enhance soldier capability and carefully monitor the soldier's exertion).

ID/oa-11

The lack of understanding by many players as to the realities of moving an Army from home station to contact.

ID/oa-13

Nothing particularly

ID/oa-14

The level of development expected in lightweight, high power batteries.

ID/ob-01

That outcome was more than simple restatement of input materials.

ID/ob-02

Deployment to SWA is even more difficult than I had believed. Today, I feel that deployment is the most difficult problem facing the Army.

I was surprised at how common are the following two beliefs:

1.) Satellite-based sensors will be able to do anything required.

2.) Anti-Satellite systems will be able to do anything required.

Soldier enhanced systems more important and more feasible than I had thought.

ID/ob-03

That there is enormous value in getting peers together, giving them tough, realistic problems and letting them duke it out.

ID/ob-06

No mention of training.

High tech systems.

ID/po-02

That the technologists see future war as a bloodless, non-violent clash of opposing technologies with little or no human impact at the point(s) of execution. In my view the human side of the struggle is not adequately taken into account.

ID/po-03

Receptive nature of the tech directors. Very, little lab salesmanship. Co-op efforts are way of future. This the SOF approach to tech base teaming.

ID/po-04

Human enhancement systems and capabilities are closer at hand than I thought.

ID/pt-01

See 1 above, I was totally unprepared for what I learned from two standpoints.

1.) What the soldier faces, and

2.) The opportunities to help.

ID/pt-03

Being reminded again of the long times required to deploy heavy divisions.

ID/pt-04

It is possible to get consensus on key insights & technologies among technologists & operators in a short time.

ID/pt-05

The problematic status of remote sensing.

ID/pt-06

The non-desire to engage in combat, and the total reliance on very long range missiles to fight. In one scenario both red and blue armored & mechanized forces disobeyed orders and did not attack. The total reliance on satellite technology was surprising.

ID/pt-07

The extreme leverage you can get (in area such as tropical jungle) from proper medical monitoring/feedback/prevention, etc. i.e. a significant (33%) enhancement.

ID/pt-08

Great opportunity for deception systems.

ID/pt-09

How slowly units move in jungle; how difficult to maintain contact/see.

ID/pt-10

The realization of how difficult it will be to fight on the hi-tech battlefield relative to soldier fatigue & need for around the clock operations awareness & durability.

ID/pt-11

- Logistics will be key to sustaining very intense battle, more so than new weapons technologies.
- We may be depending much too much on sophistication with reliability penalties built in.

ID/pt-12

That the deployability problem is not seriously diminished through introduction of light combat vehicles in lieu of heavy forces. I had assumed that our planned 50% reduction in gross of heavy armor division would have large impact on deployability.

ID/pt-13

I was amazed (and disappointed) to experience Phase II without any computer simulation routines. Even a subset vignette--automated--would have been instructive to participants and analysts alike.

ID/pt-14

The uncertainty of the future air battle and that we don't have the solutions/systems that are needed to succeed. We still propose to fight with tanks and artillery. Need to change the force structure.

ID/pt-15

None.

ID/pt-16

Soldier vulnerabilities (fatigue, etc.)

ID/pt-17

The will of the SWA red side to escalate to anti-satellite & nuclear war so readily. Also, the players were too willing to deviate from the mission constraints.

ID/pt-18

The highest payoff is enhancing the individual soldier's capabilities. The benefits derived from a GPSS.

ID/pt-19

It is surprising how much some operational people know about technology. They, however, may not understand how long it takes and how much it costs to develop, then field. Laboratories work hundreds of technologies at a time, not 1 or 2 specific ones.

ID/pt-20

No way to evaluate the, say 80%, of tech base expenditures devoted to evolutionary improvements - and no trade offs were required. Hence, it was exercise in imagining new capabilities, which went unchallenged.

ID/pt-22

Critical dependence on very limited lift capability.

ID/pt-23

The fact that if all long, approx. 10k and greater, range systems in the inventory work as touted, then face to face combat may seldom occur. Don't believe this is real but that is the way it appeared in the game.

ID/pt-25

Need for real time space locate/Ident/Tgt. From national asset, to the fire battery. Political and technical requirement.

ID/pt-26

The technical interest and capability of the ARDEC and Lab Directors is a well-kept secret outside the Army.

ID/pt-27

How difficult it is to get people, equipment and supplies needed to fight to the country involved.

ID/pt-28

That we did not play any of this on a computer. i.e. JANUS or something like it.

ID/pt-29

Nothing

ID/pt-30

Weaknesses in U.S. equipment to chemical attack & deception technology.

ID/ra-01

Extreme focus on "Army only" solution without regard to joint technology or capability.

ID/ra-02

Some chemicals agents - medical items.

ID/ra-03

The ability of these same tech base guru's to understand what the soldier system is and how efficient it can be.

ID/ra-04

That it takes a concerted effort to think about individual soldier enhancements. We learned through the LATAM scenario that most of our tech researchers have been concentrating on SWA & Europe, neglecting low intensity conflict. Now with the drastic threat changes in the world, it is time to put more money into individual soldier research to make the few soldiers we have more efficient and with less attrition on the battlefield.

ID/ra-05

Certain technologies that exist/will be mature shortly that will have a major effect on combat performance.

ID/ra-07

ALBF-C is centered on a microportion of the future combat challenges. Extrapolation to the whole is dangerous.

ID/st-01

The lack of appreciation for space in the Army.

ID/st-03

Conus deployment issues regarding speed and mobility over semiglobal distances are incredible, and seem unsolvable by simple strategies (such as by improving ship propulsion techniques). Needs special logistics preparedness and readiness methodologies.

3. **Systems and Technologies.** On the next pages, in order of importance, list the five (5) systems that you believe most belong in the inventory of the Army of 2015. Consider systems that were actually played as well as systems that now occur to you as being useful even if they were not actually played in the game. For each system:

- List the key enabling technology(ies) that you believe are most critical to development of that system.
- Circle in which of the three (3) gamed regions you believe the system will be most useful.
- Tell us why you think the system will be effective.
- Describe the most likely hostile counter measures to the system and the US counter-counter measures.

a. **System 1**

ID/co-02

System 1
Range Extension System

Technology(ies)
In book

Region(s)
Europe, LATAM, SWA

Why is this important/effective?
Low density and large AO and real-time target acquisition for long shooters and synchronization require long range comms.

What are CM's & CCM's?
CM: Jamming airborne and space relays.
CCM: Meteor burst. Signal processing to extract signals with negative signal/noise ratios.

ID/co-03

System 1
Soldier enhancements.

Region(s)
LATAM.

Why is this important/effective?

Individual soldier enhancements will permit the forces to operate more effectively and permit better survivability.

ID/co-04

System 1

Future Soldier System.

Technology(ies)

Robotics, medical R&D, displays, power supplies, protection, light weight weapons, stealth.

Region(s)

EUROPE, LATAM, SWA.

Why is this important/effective?

Human limitations are driving factors on any battle or operation that is sustained over a period of time.

What are CM's & CCM's?

CM: Expendable robotic lethal devices
(i.e. mines, brilliant bullets, other)

CCM: Methods of detecting more lethal countermeasures prior to engagement.
(i.e. mine detection)

ID/co-05

System 1

Electric vehicle.

Technology(ies)

Propulsion(power), expert system.

Region(s)

EUROPE.

Why is this important/effective?

Reduction of log burden, decreased weight.

What are CM's & CCM's?

CM: EMP, Deception

CCM: Cage/Anti spoofing

ID/co-06

System 1
Satellite RISTA.

Region(s)
EUROPE, LATAM, SWA.

Why is this important/effective?
ALBF-C essential to locate enemy.

ID/co-07

System 1
Future Soldier System.

Technology(ies)
Soldier survivability and individual light weight weaponry.

Region(s)
Europe, LATAM, SWA.

Why is this important/effective?
It is the thing that will be necessary to enable the soldier to fight in the future; dispersed battlefield, SOF and LIC, police actions, etc.

What are CM's & CCM's?
Enemy being able to detect and destroy due to some ingredient in the outfit.
Personnel mines.

ID/co-08

System 1
Real time Command and Control.

Technology(ies)
Sensor fusion, comms, symbolic processing.

Region(s)
Europe, LATAM, SWA.

Why is this important/effective?
We must be able to link highly accurate intelligence into fire and maneuver decision making in seconds.

ID/co-10

System 1
Future Soldier System.

Region(s)
LATAM.

Why is this important/effective?
The scenario is particularly stressful of the individual.

What are CM's & CCM's?
None.

ID/co-11

System 1
Future Soldier System.

Technology(ies)
Protective clothing, processing, fire control, Comm,
composites, device technology, energy system.

Region(s)
Europe, LATAM, SWA.

Why is this important/effective?
So little has been done for the soldier that a quantum
advance should be achievable and, in the end, the soldier has to
do the job!

What are CM's & CCM's?
CM: More advanced chem/bio-agents; otherwise few .
CCM: State of the art immunization.

ID/ga-01

System 1
Laser Weapons, Designators

Region(s)
Europe, LATAM, SWA

Why is this important/effective?
Applicable in all scenarios, light weight, man-portable
lethal or blinding or target designating

What are CM's & CCM's?
Monitors, dug-in troops, eye protection, camouflage.

ID/ga-02

System 1

Sensor integration/information synthesis

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Sensor integration/synthesis is critical to make use of projected sensor technologies and those which currently exist. To have information from these sensors is one thing; intelligence is another question.

What are CM's & CCM's?

Enemies can be expected to use similar technologies - this will make our operations harder, placing ever increasing emphasis on deception measures. Those countries without this capability will be at a serious strategic disadvantage.

ID/ga-05

System 1

Future Soldier System

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Potential High payoff

The Key Army Resource

ID/oa-01

System 1

Future soldier system (as described by Frazier).

Region(s)

LATAM, SWA.

Why is this important/effective?

The Army will be smaller and so cannot be so selective in assigning people to tasks. No evidence that higher quality will be entering the Army; much evidence that Army is making tasks more complicated in jobs.

What are CM's & CCM's?

CM: Capture of data on unit to which soldier is assigned.

CCM: NSA can perhaps work this.

ID/oa-02

System 1
Soldier Computer

Technology(ies)
Miniaturization maybe?

Region(s)
LATAM

Why is this important/effective?
It is the center-piece for all the soldier enhancement capabilities i.e. sensors, medical etc

ID/oa-03

System 1
"Just-in-time" Automated deployment planning system

Technology(ies)
Artificial intelligence, neural networking, neuroelectronics

Region(s)
Europe, LATAM, SWA

Why is this important/effective?
The "just in time" deployment system would allow for "real time" planning and selection, loading, and delivery of forces to be deployed for any type or level of conflict. By allowing an automated approach to planning and selecting equipment to be deployed, the system would (or could) cut closure time in half! By allowing, at the same time, force tailoring the system could make much better use of our limited assets over the full spectrum of conflict. I don't think we need more or faster aircraft and ships - what we do need is a way to use automation to cut the "slack time" in selecting, composing, and deploying units intra and inter theater.

What are CM's & CCM's?
Various electronic jamming, EMP, etc.

ID/oa-04

System 1

Individual soldier survivability

Technology(ies)

Stealth technology, SAT links, comms, networks, processing, sensing technologies.

Region(s)

LATAM, SWA

Why is this important/effective?

Future warfare will most likely be played out in one of these regions with significant terrain and lines of communications restrictions. The geographic impediments can seriously hamper his effective operations.

What are CM's & CCM's?

Jamming HPM for burnout of processors and power.

ID/oa-06

System 1

Soldier enhancement

Technology(ies)

Biotechnology

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Most leverage for potential cost.

What are CM's & CCM's?

None!

ID/oa-07

System 1

Smart mines

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Cheap - easily deployed/redeployed long term.

What are CM's & CCM's?
Locate destroy and reseed.

ID/oa-08

System 1
Space Strike/Suppression System

Technology(ies)

- a. Methods for de-orbiting in less than 10 minutes.
- b. Methods for identifying hostiles.
- c. Methods for preventing own survival and prevent from hostile take over.

Region(s)
Europe, LATAM, SWA

Why is this important/effective?
Greatly assists deploying Army world-wide. System launched from U.S. Not necessary to move/deploy by air/water/sea transport. Surgical strikes anywhere possible in applications to include DRUGS, Non-Linear Battle, LIC, etc.

What are CM's & CCM's?
Jamming, possible control by RED in such a way as to point the system at BLUE.

ID/oa-09

Region(s)
LATAM

Why is this important/effective?
Soldier enhancements

What are CM's & CCM's?
None

ID/oa-10

System 1
Advanced sensors for UAV's and space platforms.

Region(s)
Europe, LATAM, SWA

Why is this important/effective?
Key to finding the enemy and effectively targeting the threat.

What are CM's & CCM's?

CM:

Jamming information links.

Advanced Camouflage.

Decoys.

CCM:

EHF info links.

Hyperspectral Imaging.

Neural Netting for correlation.

ID/oa-11

System 1

Vertical insertion of resupply

Technology(ies)

Airdrop-Special rocket

Region(s)

LATAM

Why is this important/effective?

Will lighten soldier's load and improve his mobility in jungle terrain.

ID/oa-12

System 1

Soldier Support System

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Enables the primary fighting system to be more effective for a long period.

What are CM's & CCM's?

The system is suspect to ECM or EMP.

ID/oa-13

Region(s)

Europe

What are CM's & CCM's?

Don't have a good enough memory to answer this without my notes.

ID/oa-14

System 1
Directed Energy

Region(s)
Europe, SWA

Why is this important/effective?
Accurate fire system. Limit collateral damage.

ID/ob-02

System 1
Generally, space-based information technologies.

Region(s)
Europe, SWA.

Why is this important/effective?
Most every speculation I observe concludes that information gathering, processing, and distribution will be the key to all high-intensity warfare. I'm not so sure that it is as relevant for low intensity warfare.
Space-basing seems to solve some deployment problems. Yet I'm not sure that is really important considering how many deployment problems remain unsolved.

ID/ob-03

System 1
Soldier enhancement.

Technology(ies)
Biomedical, chemical, psychological.

Region(s)
Europe, LATAM, SWA.

Why is this important/effective?
The soldier is our best, most flexible, responsive, dependable and loyal asset. (Also, to some extent, self-repairing.)

What are CM's & CCM's?
Better trained and prepared soldiers.

ID/ob-05

System 1
Soldier enhancement.

Technology(ies)
Biochemical, physiology.

Region(s)
Europe, LATAM, SWA.

Why is this important/effective?

It offers the highest payoff for low cost and probably is most realistically achievable. Soldiers win battles, not things. We must have competent soldiers at all times on the battlefield.

What are CM's & CCM's?

Need to be explored. Can chemical and biochemicals be used to defeat/modify effects introduced by our chemicals/biochemicals?

ID/ob-06

Why is this important/effective?

Enhances fighting capability.

What are CM's & CCM's?

CM: Areas that counter enemy capabilities or counter-counter his (enemy) capabilities.

ID/po-02

System 1
Long Range Sensor Suite.

Region(s)
Europe, LATAM, SWA, Pacific

Why is this important/effective?

Without adequate intelligence & information no military operation can proceed. The proliferation of intelligence collection systems will produce information overload unless a means of processing it is developed.

What are CM's & CCM's?

EW

ID/po-03

System 1

Soldier Enhancement System.

Technology(ies)

Comm, power, AI, data fusion, sensors.

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Vast improvements in soldier effectiveness.

What are CM's & CCM's?

Leveling/hierarchy approach to system use defeat most.

ID/po-04

System 1

Future Soldier Enhancement System.

Region(s)

LATAM

What are CM's & CCM's?

Loss/compromise of the equipment/capabilities.

Preventing the capability/equipment from being fielded.

ID/po-05

System 1

Soldier Enhancement

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

There is no current plan to improve the soldiers capability besides a more effective weapon or additional training --- none of these address the deployed, tired, hungry, cold/hot soldier in an operational environment.

What are CM's & CCM's?

Electro countermeasures - Devices that do not prove themselves operationally fir resulting in low soldier acceptance. Exhaustive testing and candidate selection based on operational requirements.

ID/pt-01

System 1

Future Soldier System

Technology(ies)

Sensors, sensor fusion, microcircuits, medical

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Augments individual's capabilities.

What are CM's & CCM's?

Decoys, bullets (or other lethal devices).

ID/pt-02

System 1

Lightweight "high energy" combat vehicles.

Technology(ies)

Composite hull structure, electric drive, LOTA, EM, ET guns or high velocity AT missiles.

Region(s)

Europe.

Why is this important/effective?

Rapid deployability, mobility, effectiveness and survivability.

What are CM's & CCM's?

CM: Improved enemy sensors, surveillance, target acquisition. More severe anti-tank munitions.

CCM: More sophisticated anti-materiel mines.

- Soft kill/antimateriel chemical agents.

ID/pt-03

System 1

Real time, continuous RISTA

Region(s)

Europe, SWA

Why is this important/effective?

Current weapons have range, lethality, and accuracy to engage any army-relevant targets, if and only if, they can be targeted. Most current & projected RISTA will fail to track moving targets.

What are CM's & CCM's?

Jamming of data links & observation denial (smoke, obscurants).

ID/pt-04

System 1

Satellites for Position, Navigation, Terrain, Weather & Communications.

Technology(ies)

Receivers, computers (low tech).

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Know where you are & where the enemy is & to be able to communicate.

What are CM's & CCM's?

CM is very hard. ASAT's are difficult because of high altitude of these satellites. Jamming is hard because of AJ & small pixel effect.

CCM is relatively easy. AJ, hardened sensors.

ID/pt-05

System 1

Soldier computer

Why is this important/effective?

See b, c, + d

What are CM's & CCM's?

Individual soldier enhancement is difficult to counter

ID/pt-06

System 1

Light assault - High Technology

Technology(ies)

Composites, ADKEM, CM's, Active Suspension, Electric Drive, Active Armor.

Region(s)

Europe, SWA

Why is this important/effective?

The current heavy system (M1) are not strategically deployable.

What are CM's & CCM's?

CM: Heavy armor systems, dumb projectiles.

CCM: Stealth, hit avoidance, increased agility.

ID/pt-07

System 1

Future Soldier System

Technology(ies)

Lightweight Power, Materials, Biotechnology

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Gives significant force multiplier.

Gives us high tech soldier.

Enhanced survivability, performance.

Increased mobility, load-carrying capability.

What are CM's & CCM's?

Exoskeletal part is vulnerable to detection and hence acoustically tuned weapons. If non-exoskeletal, no effective countermeasures other than those already there against soldier -- i.e.- there is no counter-measure to the enhancement per se.

ID/pt-08

System 1

Integrated sensor

Technology(ies)

Cross-queuing, ATR, ECCM

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

See deep.

Target acquisition.

What are CM's & CCM's?

CM: AR missiles, Deception.

CCM: Passive sensors, hardening.

ID/pt-09

System 1

Soldier System

Technology(ies)

Bio-conditioning; Bio-Sensors; Pos/Nav.

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

More of them than major system: Get 25% increase in combat effectiveness, -given the reduction in force structure "buys back" a lot of capabilities.

What are CM's & CCM's?

Few - maybe capture of system for exploitation; can "clear" the system and eliminate from comm net by zeroing crypto/transec variables by over-the-air rekeying techniques.

ID/pt-10

System 1

Lethal Unmanned Aerial Vehicles (UAV)

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Provides the most mobility/lethality at the least risk to personnel.

What are CM's & CCM's?

Jamming data links can be countered by increased real time intelligence & preprogrammed UAV's.

ID/pt-11

System 1

Anti-materials munition.

Technology(ies)

Chemicals, long range PGM.

Region(s)

Europe, SWA.

Why is this important/effective?

Ability to neutralize (soft) large numbers of enemy mechanized forces.

What are CM's & CCM's?

New materials resistant to agents.

ID/pt-12

System 1

Soldier Support System

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Because future scenarios will be more varied, lethal and personal. Individual soldier will ultimately engage.

What are CM's & CCM's?

Anti-personnel explosives.
Suppressive fire and stealth.

ID/pt-14

System 1

Mobil fighting units, company size that can be used as modules to build force levels as needed.

Technology(ies)

Soldier survival and enhanced performance. Light agile vehicles that could transport & support fighting units.

Region(s)

SWA

Why is this important/effective?

Provides a modular, responsive, adaptive, fighting capability.

What are CM's & CCM's?

CM: Detection/Destruction (IR/RF/IEO)

CCM: Low observable _____

Low sig. (IR)

Agile

ID/pt-15

System 1

Individual Soldier Enhancement

Region(s)

LATAM

Why is this important/effective?

Because in the environment of LATAM the soldier's performance is most important.

What are CM's & CCM's?

By fighting in small, dispersed units the combat tasks of the individual soldier more difficult.

CCM - Have our units fight in small units well equipped capacity also.

ID/pt-16

System 1

Satellite information on what is happening on battlefield

Region(s)

Europe, SWA

Why is this important/effective?

Massing Firepower on priority targets.

What are CM's & CCM's?

CM: Anti satellite weapons or satellite jamming.

CCM: Anti/anti satellite weapons.

Cheap low cost satellite/launches to replace.

ID/pt-17

System 1

Space based recon and Pos/Nav systems.

Technology(ies)

Multi-sensors - RADAR, IR

Hyperspectral Sensors -

Region(s)

Europe, SWA

Why is this important/effective?

Provides the most current intelligence of the enemy force disposition & provides continuous knowledge of the location of the friendly forces.

What are CM's & CCM's?

CM: Sensors- Ground based lasers, decoys, spoofing.

GPS- Jamming

CCM: Sensors- hardening & agile satellites.

GPS- More satellites

ID/pt-18

Why is this important/effective?

In time allotted no way this question can be answered.

ID/pt-19

System 1

Secure Command and Control.

Technology(ies)

Sensors (IR, RF, Acoustic, UV), Computers, Software.

Region(s)

Europe

Why is this important/effective?

In ALBFC one has to have complete knowledge of the Battlefield and the enemy. Sensors give you that info, computers and software give you the knowledge.

What are CM's & CCM's?

Jamming technologies, electric, chemical, laser, and high power microwaves.

ID/pt-20

System 1

Forward deployed sensor system.

Technology(ies)

Target signatures in battlefield clutter.
Enhancement of spectral performance in winter.

Region(s)

Europe, LATAM

Why is this important/effective?

Locating threat & establishing size of force, avoid surprise.

What are CM's & CCM's?

Decoys, also fwd. deployed in battle.
Sensors have limited response, decoy can key to limited response character.
Discriminates.

ID/pt-21

System 1

Changed particle beam on tracked chassis.

Technology(ies)

Energy storage; Energy switching; Accelerator technology
(light weight).

Region(s)

EUROPE.

Why is this important/effective?

It allows clearing of troops from urban areas without
destroying or rendering inhabitable the buildings they (troops)
are occupying.

What are CM's & CCM's?

CM: Anti Tank weapons - - you can't stop the beam.
CCM: Tactics of employment - - protect the vehicle.

ID/pt-22

System 1

(Not in Army Inventory) Air/Sea Lift Enhanced.

Region(s)

Europe, LATAM, SWA.

Why is this important/effective?

Can't do much if we can't get there with effective force
structure.

What are CM's & CCM's?

CM: Active deployment opposition.
CCM: Better/quicker/protected force insertion technology.

ID/pt-23

System 1

Teleoperated missile systems.

Technology(ies)

MMW wave sensors/dual mode to preclude adverse weather impact. And longer range flyer payout approx. 200km and insensitive munitions.

Region(s)

Europe, SWA

Why is this important/effective?

- Leaves high cost elements on the ground (doesn't expend with each launch).
- Allows fire from behind cover. Keeps operator out of harms way.
- Allows common elements of technology to be applied to a wide class of weapons. i.e, back pack, midrange & long range.

What are CM's & CCM's?

Laser antisensor weapons
Wide band smoke

ID/pt-24

System 1

Smart ground/anti-helicopter mines.

Technology(ies)

Sensor, C3, warheads, soft kill.

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Deter mobility, logistics.

What are CM's & CCM's?

CM: Sensor detection, HPM.
CCM: Multiple sensors/hardening.

ID/pt-25

System 1

Real time intel/comm fusion/processor/decision aid.

Technology(ies)

Ultra high speed/AI/Object-symbolic processing/ATB.

Region(s)

SWA.

Why is this important/effective?

100% ident and instant command action inside of adversary decision cycle.

What are CM's & CCM's?

Equal capability on other side. Potential contamination (virus, misinformation injection by adversary).

ID/pt-26

System 1

Soldier Enhancement System.

Technology(ies)

Training, Simulation, Protection, Automation.

Region(s)

Europe, LATAM, SWA.

Why is this important/effective?

Most needed are improved efficiency, lethality and survivability to reduce significantly the required size of the standing Army and its lift requirements. Soldier performance on the modern battlefield is the key to reaching these objectives.

What are CM's & CCM's?

- For equivalent enemy performance, often a complete restructuring of the society and its customs.
-CCM's relate to continued heavy investment to stay far ahead of the enemy in individual soldier performance.

ID/pt-27

System 1
RISTA.

Region(s)
EUROPE, LATAM, SWA.

Why is this important/effective?
Need it to identify and aim at target.

What are CM's & CCM's?
Jammers.

ID/pt-28

System 1
Enhanced Soldier

Technology(ies)
Medical. i.e. shots, pills.

Region(s)
LATAM.

Why is this important/effective?
Combat multiplier.

What are CM's & CCM's?
CM: Kill
CCM: Stealth Clothing

ID/pt-29

System 1
Light satellites

Region(s)
Europe, SWA

Why is this important/effective?
POS/NAV, weather, intelligence.
-responsive to tactical commander.
-rapid replacement of lost satellites.

What are CM's & CCM's?
Asat weapons

ID/pt-30

System 1
Satellite Family

Technology(ies)
Fused Sensors plus low cost launch cap.

Region(s)
Europe, LATAM, SWA

Why is this important/effective?
Provides key COMSAT & RSTA Support.

What are CM's & CCM's?
ASAT, Charged Particle Beam, Nuclear attack

ID/ra-01

System 1
TACSAT

Technology(ies)
Miniaturization; Full spectrum sensors; Very high speed processing (Teraflops); AI; conformal array antennae.

Region(s)
Europe, LATAM, SWA

Why is this important/effective?
As the US Army moves back to the US but has to deploy elsewhere quickly to fight we must know what the enemy is doing. TACSATS can cover the world before we get there and allow us to fight once we get there without shipping over weight.

What are CM's & CCM's?
The biggest CM is an enemy ASAT. Except for Soviets this will be virtually impossible by 2015 since it takes a worldwide sensor system and a baseline of approx. 10,000 miles to get accurate track. Only US & USSR have that kind of mileage. If enemy has an ASAT, it is easy to defeat by a small station-keeping maneuver.

ID/ra-02

System 1
SPACE STATION USE

Region(s)
Europe, LATAM, SWA

Why is this important/effective?
Control of space and use can't be done only by Robot Systems.

What are CM's & CCM's?
ASAT and anti Space Tech.

ID/ra-03

System 1
Soldier enhancement/conservation.

Technology(ies)
Biomedical data collection/retrieval.

Region(s)
Europe, LATAM, SWA

Why is this important/effective?
It improves effectiveness of the soldier system, the basic building block of any of the systems.

What are CM's & CCM's?
CM: Biomedical attacks, Psychological attacks.
CCM: Continued improvement/conservation of the soldier system's capabilities.

ID/ra-04

System 1
Light Man Portable Generator for command and control.

Region(s)
Europe, LATAM, SWA

Why is this important/effective?
Enhanced power source - lighter unit for diverse command & control situations.

What are CM's & CCM's?
Jamming of radios it supports.

ID/ra-05

System 1
Advanced C3.

Technology(ies)
Microprocessing tech, AI

Region(s)
Europe, SWA

Why is this important/effective?
Lynchpin to all aspects (movement, recon, engagement, log).

What are CM's & CCM's?
CM: Anti-Electronics CCM: Shielding
CM: Virus CCM: Prophylactics

ID/ra-07

System 1
C3CM

Region(s)
Europe, SWA

Why is this important/effective?
C3 countermeasures to deny enemy use of his C3 - jam, deceive, saturate, viral attack, HPM.

What are CM's & CCM's?
Massively parallel, graceful degradation architecture.

ID/ra-08

System 1
Soldier Enhancement.

Technology(ies)
Sensory Enhancement.

Region(s)
Europe, LATAM, SWA

Why is this important/effective?
With a smaller force, survivability is all the more important. Soldier survivability is key.

ID/st-01

System 1

Ground and air sensors

Technology(ies)

ATR, data fusion

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Need to see the enemy

What are CM's & CCM's?

CM: Deception, decoys, jamming, discrimination.

CCM: Broadband, frequency hopping communications.

ID/st-02

System 1

Accurate location and identification of Red assets.

Technology(ies)

Satellite Sensor.

Region(s)

SWA.

Why is this important/effective?

Must locate red team to hurt him by long range fires etc.

What are CM's & CCM's?

Smoke etc. sensor suite.

ID/st-03

System 1

Sensor Systems.

Technology(ies)

Multimode cap.; sat. comm. links, sensor fusion, active, passive ultrasensitive radar, night vision capability.

Region(s)

EUROPE, LATAM, SWA.

Why is this important/effective?

All scenarios required accurate identification of enemy over varying distances.

What are CM's & CCM's?

CM: Space satellites vulnerability.

CCM: Remote piloted vehicles over 1000km range.

ID/st-04

System 1

Long range precision missiles.

Region(s)

EUROPE, LATAM, SWA.

Why is this important/effective?

Long range (up to 500km) reduces log transport requirements and provides significant tactical flexibility.

What are CM's & CCM's?

Reliance on GPS satellite system for very good (10m CEP) accuracy.

b. System 2

ID/co-02

System 2

Distributed C2/Processing

Technology(ies)

In book

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Dispersed, self-recovering C2.

What are CM's & CCM's?

CM: Attack weapons platforms.

CCM: Stealth. Active self defense.

ID/co-03

System 2

"Just-in-time" log delivery.

Region(s)

EUROPE, LATAM, SWA.

Why is this important/effective?

More effective, efficient means of providing resupply to the unit at its current location.

What are CM's & CCM's?

A more distributed supply network is harder to destroy.

ID/co-04

System 2

Decoys.

Technology(ies)

IR, MMW, radar, optical.

Region(s)

EUROPE, LATAM, SWA.

Why is this important/effective?

Permits better use of own forces and helps deplete enemy materiel.

What are CM's & CCM's?

CM: Better target discrimination.

CCM: Better and more decoys.

ID/co-05

System 2

Future Soldier System.

Technology(ies)

Materials.

Region(s)

EUROPE.

Why is this important/effective?

Increased mobility and survivability for the soldiers.

What are CM's & CCM's?

Another soldier, RSTA.

ID/co-06

System 2

Long range artillery.

Region(s)
EUROPE, LATAM, SWA.

Why is this important/effective?
Long range enemy degradation.

ID/co-07

System 2
Power Generation without fossil fuels.

Technology(ies)
Alternative fuel, solar energy, electric power.

Region(s)
Europe, LATAM, SWA.

Why is this important/effective?
The Army must have fuel to operate its equipment. Must be able to provide it without bringing in great bulk.

What are CM's & CCM's?
Taking out power with HPM, etc.

ID/co-08

System 2
Long-range, precision ammunition.

Technology(ies)
Composite materials, link to guidance.

Region(s)
Europe, LATAM, SWA.

Why is this important/effective?
Need ability to kill critical targets, which will be dispersed, at long range.

ID/co-10

System 2
Sensors.

Region(s)
LATAM.

Why is this important/effective?
Need to know where the enemy is.

What are CM's & CCM's?
Decoys.

ID/co-11

System 2
Incapacitating agents.

Technology(ies)
Incapacitating agents.

Region(s)
Europe, LATAM, SWA.

Why is this important/effective?
In almost all situations, prevention of collateral damage and harm to non-belligerents (collocated with hostile forces) will be presidential mandates.

What are CM's & CCM's?
CM: Protective clothing and immunization.
CCM: Not sure.

ID/ga-01

System 2
Incapacitating non-lethal agents

Technology(ies)
Delivery systems and chemistry

Region(s)
Europe, LATAM, SWA

Why is this important/effective?
Versatile, humane, lightweight, wide applicability, many delivery systems.

What are CM's & CCM's?
- Decon, Suits & Masks, Robots.
- Backup by bullets, mix agents eg. w/those that eat plastic or rubber.

ID/ga-02

System 2
Those associated w/ long range precision fires.

Region(s)
Europe, LATAM

Why is this important/effective?

Long range fires, coupled with a sensor system create substantially less of a logistic burden while allowing for rapid, coordinated messing of fire support means.

What are CM's & CCM's?

While ASAT systems may interrupt C3I required to make long range systems effective. The only real answer is to possess weapons of equal capability of those of an adversary.

ID/ga-05

System 2
Lightweight High Energy Combat Vehicle

Region(s)
Europe, SWA

Why is this important/effective?
Could really lighten logistics burden.

ID/oa-01

System 2
Low probability intercept target detect systems.

Region(s)
Europe, LATAM, SWA.

Why is this important/effective?

There is always an inherent advantage in seeing and not being seen. An IRST device designed to map the militarily important space (150 elev x 90-1800 in azimuth) into a suitable format for an operation (e.g. TV screen) is a simple engineering task. Distortion would be immaterial for target acquisition; a flip of a switch would give normal display of a portion containing the possible target of interest.

What are CM's & CCM's?
Optical augmentation? Stingray?

ID/oa-02

System 2
Local Area Commo

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

To be able to execute ALB-F concepts will require split second timing and excellent communication.

What are CM's & CCM's?

Jamming

ID/oa-03

System 2

Liquid Propellant (or Electromag/Electro Thermal) Technology.

Technology(ies)

Power Generation

Region(s)

(In order of priority)

1. Europe
2. SWA
3. LATAM

Why is this important/effective?

We need to eliminate high weight conventional ammunition from the battlefield, a tremendous logistic burden! We need a system that will run and fire using the same source of power; for example, an all-electric tank - or a combat vehicle that will operate on (run) and fire using the same liquid propellant!

What are CM's & CCM's?

Liquid propellant - None readily apparent
Electromag - Probably EMP

ID/oa-04

System 2

Chemical Protection

Technology(ies)

Materials, Temperature control, Power.

Region(s)

Europe, SWA

Why is this important/effective?

Wargame with a third world nation will probably involve the use of CW or at least the threat of use will be present. Our fear of CW is significant and current CW protection gear is clumsy and awkward on a battlefield.

What are CM's & CCM's?

Chemicals which dissolve the suits.

ID/oa-06

System 2

Sensors, (Short range)

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Performance enhancement (decrease fear, increase confidence and capability).

What are CM's & CCM's?

Decoys, spoofers

ID/oa-07

System 2

Space

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Real time intelligence. Enables enemy location/fight smart. No surprises.

What are CM's & CCM's?

Destroy sat/decoy sensors - redeploy/replace.

ID/oa-08

System 2

Small Lightweight Inexpensive Tactical Satellites.

Technology(ies)

- a. SHF COMM & Terminals
- b. Sensors & Terminals
- c. Target acquisition

Region(s)
Europe, LATAM, SWA

Why is this important/effective?
Dedicated use by Tactical Commanders.

What are CM's & CCM's?
Jamming

ID/oa-09

Region(s)
SWA

Why is this important/effective?
LOTS improvements

What are CM's & CCM's?
Detection

ID/oa-10

System 2
Soldier enhancement

Region(s)
Europe, LATAM, SWA

Why is this important/effective?
Allows the soldier to be more resistant to battle stresses and to human pathologies.

What are CM's & CCM's?
CM:
Spoofing and decoys.
Incapacitating agents.
CCM:
Advanced protective systems.
Soldier enhancement sensor suites.

ID/oa-11

System 2
Redesign Armor

Technology(ies)
Composites

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Need to lighten the platform and the killing power (AMMO?) it consumes.

ID/oa-12

System 2

Sensor technology, the ability to identify

Why is this important/effective?

The system allows for more accurate fire

What are CM's & CCM's?

The system again is suspect to ECM and EMP

ID/oa-14

System 2

Advanced Propulsion

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Contributes to mobility of forces.

ID/ob-03

System 2

Networked soldier, Pos/Nav.

Technology(ies)

Sensors (individual), GPS, Comm.

Region(s)

Useful in all three, but mostly LATAM and SWA.

Why is this important/effective?

Knowing where you are and where your cohorts are vastly improves a soldier's confidence and ability to complete the mission. Prevents costly and possibly fatal blunders.

What are CM's & CCM's?

CM: Computer virus-degradation due to environmental conditions- jamming.

CCM: They could be throw-away, cheaply replaceable - nulls could be broadcast.

ID/ob-05

System 2

Man - Portable (truly) Sensor System.

Technology(ies)

Miniaturization.

Region(s)

LATAM.

Why is this important/effective?

I believe future involvement of U.S. Army in conflict will be all of the LIC type of events - small forces, group operating independently. Systems that improve survivability and lethality of individual/small groups have priority.

What are CM's & CCM's?

Jamming?

ID/ob-06

Region(s)

Europe, LATAM, SWA.

Why is this important/effective?

Give us direction of where we are growing.

What are CM's & CCM's?

Enemy is also improving his tech capability.

ID/po-02

System 2

Advanced cargo aircraft

Region(s)

Europe, LATAM, SWA, Pacific, CONUS

Why is this important/effective?

Getting to theater is only half the problem. Intra-theater airlift is a war-stopper in almost any scenario.

What are CM's & CCM's?
Air defense

ID/po-03

System 2
Language Translation

Technology(ies)
Comm-Elec

Region(s)
LATAM, SWA

Why is this important/effective?
Improves soldier to foreign soldier and soldier to citizen communication.

What are CM's & CCM's?
None, but dialect problems.

ID/po-04

System 2
Multi-sensor system
Satellite

Region(s)
SWA

What are CM's & CCM's?
Spoofs
Jamming (RF/microwave)
ASAT capabilities
Acoustic/thermal/photographic stealth systems

ID/po-05

System 2
Power sources

Region(s)
Europe, LATAM, SWA

Why is this important/effective?
We need power to operate all of new equipment.

What are CM's & CCM's?

Fuel

Use readily available food sources.

ID/pt-01

System 2

Tactical Sensor/Intelligence System

Technology(ies)

Sensor, Fusion, AI, Decision Aids

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Will allow battlefield commanders to know what they are facing.

What are CM's & CCM's?

Decoys, jammers, etc.

ID/pt-02

System 2

Advanced mines - air-droppable, secure, autonomous.

Technology(ies)

Sensors, LOTA, hardened against EMP, blast, microwave.

Region(s)

Europe, LATAM, SWA.

Why is this important/effective?

Denial of enemy access.

What are CM's & CCM's?

EMP, SLUFAE, - advanced mine-clearing techniques.

ID/pt-03

System 2

Soldier and platform C2I, esp. I! (Includes fire distribution & control).

Region(s)

Europe, SWA

(Question A.3.b.)

Why is this important/effective?

Given RISTA that can identify & track targets, target information must be passed to or assigned to a firing platform. Target-to-fire-to-feedback link must be formed for each target.

What are CM's & CCM's?

Data link vulnerability, software security & reliability.

ID/pt-04

System 2

Soldier System

Technology(ies)

Smart Helmets, Chem Suits/Temp Control. Sleep Helmets.

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Maximize soldier/commander fighting efficiency.

What are CM's & CCM's?

CM: Lasers against eyes & suits.

CCM: Dark sunglasses

ID/pt-05

System 2

GPS integrated with soldier computer with integral topographic display.

Why is this important/effective?

Provide the individual soldier his location and display this on a local topographical map allowing effective land navigation night or day, individually or in groups.

What are CM's & CCM's?

Destroy GPS (unlikely).

ID/pt-06

System 2

Assault System - Electrical Energy.

Technology(ies)

EM Gun, Electric Drive, Improved Armor.

Region(s)

Europe

Why is this important/effective?

Soviet mass armor defeat/capabilities must be countered with like systems & quantities which is not available, therefore, technology must be incorporated.

What are CM's & CCM's?

CM: Cheap armor systems, smart munitions.

CCM: Electronic sensor & reaction systems.

ID/pt-07

System 2

Soldier computer/GPS/Commo.

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

To be able to know where you and your friends are at all times is significant.

What are CM's & CCM's?

CM: Satellite jamming, Commo jamming, obscurants.

CCM: Anti-jamming, secure comms, multiple Sats (cheap Sats).

ID/pt-08

System 2

Deception

Technology(ies)

Signal processing, decoys, holographic.

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Mask intentions.

Delay/confuse enemy.

What are CM's & CCM's?

CM: Deception discrimination.

CCM: Frequency management.

ID/pt-09

System 2
RISTA

Technology(ies)
FLIR's, Acoustics, sigint/comint.

Region(s)
SWA

Why is this important/effective?
ALBF-C dictates knowing where the enemy is at all times.

What are CM's & CCM's?
CM: Decoys/deception devices.
CCM: sophisticated algorithms - HUMINT substantiation.

ID/pt-10

System 2
Enhanced Soldier Physiology

Region(s)
Europe, LATAM, SWA

Why is this important/effective?
This will provide ability to get more out of existing soldiers especially in around the clock operations.

What are CM's & CCM's?
CM: Delaying tactics & multiple phased attacks.
CCM: Robotic augmentation of human soldiers.

ID/pt-11

System 2
Integrated C3I.

Technology(ies)
Comm, VHSIC.

Region(s)
Europe, LATAM, SWA.

Why is this important/effective?
Need for rapid integration of information, synthesis of operations, flexibility in maneuver.

What are CM's & CCM's?

Jamming.

ID/pt-12

System 2

Light Assault Vehicle

Region(s)

LATAM

Why is this important/effective?

A light armored gun system with LAPES capability will be the "bully" of future LIC actions because of its ability to get there first, survive, and satisfy lethality goals.

What are CM's & CCM's?

Anti-armor weapons.

Suppressive fire.

Stealth.

ID/pt-15

System 2

Enemy unit location system.

Technology(ies)

Sensors, sensor fusion.

Region(s)

LATAM

Why is this important/effective?

Because in a jungle, tropical environment enemy detection & target acquisition was most difficult.

What are CM's & CCM's?

Use individual soldier as in a patrol or enemy location action role.

CCM - Fight in even more dispersed small size units.

ID/pt-16

System 2

Low cost high volume precision weapons

Region(s)

Europe, SWA

Why is this important/effective?

Mass fire attacks to neutralize a larger force.

Reduces logistics impact i.e. Higher Pk with less tonnage of ammunition.

What are CM's & CCM's?

CM: Decoys, jammers, HPM.

CCM: Sensor suites, discriminators.

ID/pt-17

System 2

Long range precision missile.

Technology(ies)

Precision guidance, terminal devices.

Region(s)

Europe, SWA

Why is this important/effective?

With sophisticated enemy, need to be able to kill from further distance than he can.

What are CM's & CCM's?

CM: Decoys, deception, anti-missile weapons

CCM: ?

ID/pt-19

System 2

Soldier Monitoring System (Separate from EXOSKELETON).

Technology(ies)

Medical monitoring, positioning, training.

Region(s)

LATAM

Why is this important/effective?

System 2 is most effective to the individual Soldier who can not be replaced by a weapon system. He must be alert, well-rested and knowledgeable on the battlefield.

What are CM's & CCM's?

Noxious and Toxic materials and incapacitating agents.

ID/pt-20

System 2

Sensor fusion & discrimination algorithms.

Technology(ies)

Spectral characteristics of targets, corruption by background, discrimination logics.

Region(s)

Europe, LATAM

Why is this important/effective?

Improve reliability of tgt. detect and classify.

What are CM's & CCM's?

Corruption of system signatures by add-on measures or obscurants.

ID/pt-21

System 2

Soldier Enhancement System.

Technology(ies)

Robotics, Biotechnology.

Region(s)

EUROPE, LATAM, SWA (universal).

Why is this important/effective?

Even a 20-30% enhancement of war fighting capability could make a significant difference in the outcome of battles. If in the future we can get to 100-200% enhancements then even greater benefits would be realized - - but don't "turn your nose up" at 25%.

What are CM's & CCM's?

It depends greatly on the techniques utilized - - I don't feel qualified to address this one in detail. Surely EW has to be considered to attack logic and other electrical systems and we would attempt to hardened the systems.

ID/pt-22

System 2

Lightweight Long Range Precision Missile.

Technology(ies)

Precision guidance/high resolution seekers IR, MMW, composite structures, high efficiency propulsion, data links.

Region(s)

Europe, SWA.

Why is this important/effective?

Must have ability to destroy/negate high value targets from long standoff and to know immediately if engagement successful (e.g., from telemetered data or tele-operated system.)

What are CM's & CCM's?

CM: Active intercept, data link disruption, camouflage, sensor counter measures.

CCM: Stealth, secure links (e.g. fiber optics) multi-spectral seekers.

ID/pt-23

System 2

Advanced kinetic energy missile.

Technology(ies)

Energetic insensitive munitions, small inertial package, booster separation techniques.

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

- Near zero time of flight.
- Counters all current & projected armor.
- Shoot around corner concept i.e. virtual launch.
- Firing Platform is light vehicle or helicopter.
- Fires from behind concealed position. Only MMW or CO2 laser transmitter must have LOS to target.

What are CM's & CCM's?
Broad Spectrum Smoke.

ID/pt-24

System 2
Individual unit/soldier GPS/commo system.

Technology(ies)
C3I

Region(s)
Europe, SWA

Why is this important/effective?
Need for rapid decisions on movement and tactics.

What are CM's & CCM's?
Electronic jamming.

ID/pt-25

System 2
Low cost, highly lethal transportable 250 km range rapid fire smart missile.

Technology(ies)
Low cost, inertial guidance or GPS command guidance. Low cost data links.

Region(s)
Europe, SWA.

Why is this important/effective?
Render tanks obsolete.

What are CM's & CCM's?
Decoys, spoofing.

ID/pt-26

System 2
Automated Systems.

Technology(ies)
Automated target recognition, AI/ES, Autonomous Vehicles, Sensor Fusion.

Region(s)
Europe, SWA.

Why is this important/effective?

Continuous knowledge of enemy position, rapid targeting and weapon delivery, and battlefield survivability are the keys to effective application of survivable fire power.

What are CM's & CCM's?

CM: Decoy, massive fire, weapons of mass destruction.

CCM: More intelligent and discriminating automated systems.

ID/pt-27

System 2
Missiles.

Technology(ies)
Guidance.

Region(s)
EUROPE, LATAM, SWA.

Why is this important/effective?
To suppress enemy attack.

What are CM's & CCM's?
Obscurants/ broad band sensors.

ID/pt-28

System 2
Smart Mines

Technology(ies)
Materials, electronics, A/I.

Region(s)
Europe, LATAM, SWA

Why is this important/effective?
Effective - remotely implace.

What are CM's & CCM's?
Aircraft

ID/pt-29

System 2
Soldier Enhancements

Region(s)
Europe, LATAM, SWA

Why is this important/effective?
Soldier enhancements are a relatively small investment with a large payoff.

What are CM's & CCM's?
Guns, bombs, etc. things which tend to kill soldiers.

ID/pt-30

System 2
Soldier Support

Technology(ies)
Exoskeletal, Microsensors, Improved Weapons (Missiles)

Region(s)
Europe, LATAM

Why is this important/effective?
Provides ability to use the soldier in extreme weather and intense combat operations.

ID/ra-01

System 2
Tactical Missile Defense System

Technology(ies)
Sensors; High Speed data, fusion, (SDI Tech)

Region(s)
Europe, LATAM, SWA

Why is this important/effective?
As the Army deploys & fights in strange places, it is very vulnerable initially as it lands. As the years go by other countries can cheaply get long range missiles. It is essential for us to survive long enough to do our job, to be protected against long range tactical missiles.

What are CM's & CCM's?

CM: Maneuver, jamming, moving after firing.

CCM: Smarter sensors, faster missiles.

ID/ra-02

System 2

Massive Information Processing Capability

Technology(ies)

Microchips - from 386-1086 etc.

Region(s)

Europe, SWA

Why is this important/effective?

Ability to process massive data and present info to commander will enable essential C3 vital to enable dispersion - which is crucial in high lethality situation.

What are CM's & CCM's?

Electronic warfare will be continual battle of counter-counter - but still data processing is heart of it all.

ID/ra-03

System 2

Power source enhancement.

Technology(ies)

Miniaturization, high storage/discharge potential.

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

To power the devices needed to improve efficiency of our systems.

What are CM's & CCM's?

CM: None.

CCM: N/A

ID/ra-04

System 2

Light weight powerful, long lasting battery.

Technology(ies)

Power Source.

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Required by the force to reduce critical sustainment times.

What are CM's & CCM's?

Heat weapons to discharge batteries.

ID/ra-05

System 2

Long range fire system.

Region(s)

Europe, SWA

Why is this important/effective?

Engage enemy at greatest possible range to preclude same.

ID/ra-07

System 2

Target ID, location system.

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

RISTA to enable long range fires.

What are CM's & CCM's?

HPM, Decoy/deception

ID/ra-08

System 2
Adv. Commo System.

Region(s)
Europe, LATAM, SWA

Why is this important/effective?
The need for lighter more reliable Commo systems (i.e. Man packed Radios) will always exist. LPI/LPD

ID/st-01

System 2
Long range cannon/missiles.

Technology(ies)
Propulsion, power generation, smart munitions.

Region(s)
Europe, SWA

Why is this important/effective?
Attrit enemy at long range with precision.

What are CM's & CCM's?
CM: Movement, Stealth, Decoys.
CCM: Fast response, Brilliant munitions.

ID/st-02

System 2
Incapacitating Agents.

Technology(ies)
Biotechnology.

Region(s)
LATAM, SWA.

Why is this important/effective?
Difficult to determine friend from foe.

What are CM's & CCM's?
CB Clothing; penetrating agents.

ID/st-03

System 2

Brilliant missiles.

Technology(ies)

Precision electronics, short/long range, sensor, electronics, lethality (energy methods).

Region(s)

EUROPE, SWA.

Why is this important/effective?

Precise deep attack was essence of issue for this scenario once target were identified.

What are CM's & CCM's?

CM: Decoys.

CCM: ATR.

ID/st-04

System 2

Soldier enhancement.

Technology(ies)

Bio med, sensors, computers.

Region(s)

EUROPE, LATAM, SWA.

Why is this important/effective?

Enhances the cornerstone of the US Army its soldiers.

What are CM's & CCM's?

Possible compromise of specific tactical knowledge when soldier with computer is captured.

c. System 3

ID/co-02

System 3

Intelligence fusion.

Technology(ies)

High speed parallel processing, AI.

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Long range wide area RISTA.

What are CM's & CCM's?

CM: Jam comm links. Deceive sensors.

CCM: Anti-jam techniques. Multi-discipline correlation.

ID/co-03

System 3

Incap agents.

Region(s)

EUROPE, LATAM, SWA.

Why is this important/effective?

Useful in urban areas and for SOF operations.

ID/co-04

System 3

Sensor Fusion System.

Technology(ies)

IR, MMW, acoustic, radar, AI, displays, power supplies, data processing.

Region(s)

EUROPE, LATAM, SWA.

Why is this important/effective?

Proliferation of sensor requires some way to digest and display data for quick decisions.

What are CM's & CCM's?

CM: Disabling sensors or commo link to Sensor Fusion System.

CCM: Redundant sensors and alternate commo.

ID/co-05

System 3
Sensor Fusion.

Technology(ies)
Sensor, information processing.

Region(s)
EUROPE.

What are CM's & CCM's?
CM: Spoofing, Jamming;
CCM: Secure data line, frequency hopping.

ID/co-06

System 3
Soldier enhancement.

Region(s)
EUROPE, LATAM, SWA.

Why is this important/effective?
Suite of soldier enhancement. Certainly low tech.

ID/co-07

System 3
Incapacitating Agents.

Technology(ies)
Biotechnology, Medical Research.

Region(s)
Europe, LATAM, SWA.

Why is this important/effective?
The threat of terrorist action and other war operations where civilians are present is not avoidable. The image of U.S. in many countries could be improved. If we can win wars without civilian casualties (or military) would improve our posture in world power scheme.

What are CM's & CCM's?
Lethal chemicals, Nuclear warfare.

ID/co-08

System 3

Any of soldier enhancements.

Technology(ies)

Various.

Region(s)

Europe, LATAM, SWA.

Why is this important/effective?

One way to lighten the force is to make the soldier more capable. The soldier weighs more fully equipped but the overall force gets lighter.

What are CM's & CCM's?

Caution - This sounds good but there are many pitfalls. A true systems approach should be taken. Concentrations should be on what are reasonable missions for such a soldier, what equipment is needed for those missions, how can they be packaged, how can they be supported? Otherwise, expect problems.

ID/co-10

System 3

Stealth.

Region(s)

LATAM.

Why is this important/effective?

If the enemy doesn't know where you are, you can survive.

What are CM's & CCM's?

Improved sensors.

ID/co-11

System 3

Smart robotic mines.

Technology(ies)

Processing, tgt class & ID, sensor, electric-chain, power supply, robotics, secure comm.

Region(s)

Europe, LATAM, SWA.

Why is this important/effective?

"Brilliant" mines can fill a wide spectrum of "blocking" missions-to channel enemy where you want him. Analogy to Navy use of mines - great leverage at low cost (in terms of getting inside the enemy's head and attrition as well).

What are CM's & CCM's?

Few - counter mine systems are expensive and slow.

ID/ga-01

System 3

One and two-person people movers

Technology(ies)

Air cushioned and wheeled

Region(s)

LATAM

Why is this important/effective?

Allows rapid massing from dispersed locations.

What are CM's & CCM's?

Mines, sensors

Mine detectors

ID/ga-02

System 3

Soldier Support Systems

Technology(ies)

Soldier enhancement technologies

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Allows for better management of soldier resources

What are CM's & CCM's?

None

ID/ga-05

System 3

Tactical Satellite System

Region(s)

Europe, SWA

Why is this important/effective?

Responsive RSTA

ID/oa-01

System 3

Holographic displays of 3-D data in real time.

Region(s)

Europe, LATAM, SWA.

Why is this important/effective?

For any air defense system, and possibly others (aircraft?), 3-D visualization of a complex target environment reduces spoofing and effects of noise.

ID/oa-02

System 3
Long Range Surveillance System

Region(s)
Europe, LATAM, SWA

Why is this important/effective?
Ability to see the enemy early and 100% will require an increase in our sensor capability.

What are CM's & CCM's?
Deception
Offensive attack of delivery platform
Directed Energy

ID/oa-03

System 3
Robotic Rearm/Refuel/Resupply System

Technology(ies)
Robotics

Region(s)
Europe, LATAM, SWA

Why is this important/effective?
Logistic support on the non-linear Air-Land Battle-Future (ALBF) battlefield cannot be executed without responsive, agile resupply at least as capable and mobile as the maneuver units.

What are CM's & CCM's?
CM: EMP
CCM: EMP Hardening/Shielding

ID/oa-04

System 3

Better use of space

Technology(ies)

Cheap sats, cheap launch vehicles, cheap boosters

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

The advantages in communications and reconnaissance that space offers are significant and should be exploited. Sensor technologies should improve to make recce sats more effective for tactical information and encrypting will have to improve to make communications secure.

What are CM's & CCM's?

Jamming, High energy lasers, HPM.

ID/oa-06

System 3

Power systems

Technology(ies)

Batteries, Fuel

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Enabling technology for many other systems.

What are CM's & CCM's?

None

ID/oa-07

System 3

Lasers

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Enables soldier to go undetected/lethal - hopefully lightweight and easily powered. Easy reload.

ID/oa-10

System 3
Advanced Comms (EHF)

Why is this important/effective?
Provided greater A/J anti-scintillation capability.

What are CM's & CCM's?

CM:

Intercept.
Disinformation.

CCM:

Advanced secure (Frequency hop spread spectrum burst transmissions).
Advanced codes and message discrimination.

ID/oa-14

System 3
Power generator and storage

Region(s)
Europe, LATAM, SWA

Why is this important/effective?
Makes the force more independent. i.e. less dependent on logistics tail for fuel.

ID/ob-03

System 3
Robotic barrier remover/surmounter/scout.

Technology(ies)
Nav/sensors (IR-laser-etc.)

Region(s)
Europe, LATAM, SWA.

Why is this important/effective?
Especially useful in MOUT situations, this could increase soldier survival in extreme threat.

What are CM's & CCM's?
Mines/Anti-robot robots.
Jammers.
Chemical sprays.

ID/ob-05

System 3

Anti-materiel munitions.

Technology(ies)

Miniaturization.

Region(s)

Europe, LATAM, SWA.

Why is this important/effective?

I believe future involvement of U.S. Army in conflict will be all of the LIC type of events - small forces, group operating independently. Systems that improve survivability and lethality of individual/small groups have priority.

What are CM's & CCM's?

Proofing enemy material (costly?)

ID/po-02

System 3

Hand held anti-tank weapon.

Region(s)

Europe, LATAM, SWA, Pacific

Why is this important/effective?

The human dimension will not go away in war. It will still be the individual soldier who will make the difference on the battlefield. A hand-held anti-tank/anti-machine weapon will even the odds.

ID/po-03

System 3

Portable Power Sources

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

1. Lightens load for soldier & log support.
2. Reduced size & weight, while increasing battery life.
3. Reducing the # of different batteries.
4. Small, lightweight, quiet generators.

What are CM's & CCM's?

None

ID/po-04

System 3

Long range multiple missile launch system.

Region(s)

Europe

What are CM's & CCM's?

Knockout C3I nodes.

ID/po-05

System 3

Operational rations

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Food remains a constant problem - currently the soldier's ration is not specially designed for the operational environment.

What are CM's & CCM's?

May need special preparation, which may not be available.
Each ration is totally complete to include preparation.

ID/pt-01

System 3

Anti-Armor

Technology(ies)

Guns, bullets, missiles, warheads, fire control, (detection, discrimination)

Region(s)

Europe, SWA

Why is this important/effective?

Must be capable of engaging and defeating heavy armor - preferably without tanks.

What are CM's & CCM's?

Heavy protection, - good infantry

ID/pt-02

System 3

Soft kill, Anti-materiel chemical agents.

Technology(ies)

Anti-material agent technology, delivery systems, corrosion, cracking, deterioration of structural and EO materials.

Region(s)

Europe, LATAM, SWA.

Why is this important/effective?

Disablement of enemy systems.

What are CM's & CCM's?

Barrier coatings, deterioration-resistant materials.

ID/pt-03

System 3

Soldier & platform NBC protection without performance penalty.

Region(s)

Europe, SWA

Why is this important/effective?

Chemical or biological agents will be used in SWA again. This threat will grow. Current performance penalty probably denies us the advantage of our weapon technology advantage.

ID/pt-04

System 3

Deception System

Technology(ies)

Camouflage, Decoys, (multispectral DC to UV)

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Stealthy Soldier, Stealthy equipment.

What are CM's & CCM's?

CM: Data & Sensor Fusion to find discriminants.

CMM: Computer Virus

ID/pt-05

System 3

Local area comms & data links integrated with soldier computer.

Why is this important/effective?

Provide individual soldier with knowledge of location and intentions of comrades even when dispersed beyond visual range. Integrated with topographic display as in (b).

What are CM's & CCM's?

Local intense jamming (unlikely).

ID/pt-06

System 3

Armored Combat Service Support System

Technology(ies)

Aerial or Tracked System, robotic handling, palletized computerized loads.

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

All systems required resupply/repair parts.

ID/pt-07

System 3

Jungle Mobility

Technology(ies)

Materials, propulsion, power.

Region(s)

LATAM

Why is this important/effective?

To be able to move rapidly in jungle enables invasion, etc. to occur.

What are CM's & CCM's?

Sensors - visual, IR, acoustic.

ID/pt-08

System 3

Hand held AT missile

Technology(ies)

Microelectronics

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Deployability.

Fight outnumbered.

What are CM's & CCM's?

Same as conventional AT missiles.

ID/pt-09

System 3

Long Range Comm.

Technology(ies)

Low probability of detection/intercept.

Region(s)

SWA

Why is this important/effective?

SOF requirement for long range, low vulnerability, comm system; signal is indistinguishable from noise.

What are CM's & CCM's?

CM: Very sophisticated signal processing techniques for detection.

CCM: Faster/shorter bursts.

ID/pt-10

System 3
Advanced Aircraft Platforms

Region(s)
Europe, LATAM, SWA

Why is this important/effective?
Mobility & rapid deployment are proven to be the most effective force multiplier. Advanced aircraft would also be self-deployable.

What are CM's & CCM's?
CM: Air Defense.
CCM: UAV's to expose air defense & stealth platforms.

ID/pt-11

System 3
Long Range Fire (accurate).

Technology(ies)
Propulsion, Pos/Nav, Guidance.

Region(s)
Europe, SWA.

Why is this important/effective?
Execution of ALB-F, engage enemy rear echelons, engage enemy beyond their fire capability.

What are CM's & CCM's?
Deception, decoys.

ID/pt-12

System 3
Heavy assault vehicle (HEATTD)

Region(s)
Europe, SWA

Why is this important/effective?
A vehicle that can dominate close-in battles has been and will continue to be the centerpiece of the ground forces. This one will weigh half as much and consume half as much as current systems. - supportable.

What are CM's & CCM's?

Anti-armor weapons.

Stealth

ID/pt-15

System 3

Mobility device for jungle environment.

Technology(ies)

Exoskeletal, small vehicle.

Region(s)

LATAM

Why is this important/effective?

Traveling thru thick jungle environment is slow and exhausting.

What are CM's & CCM's?

Provide increased mobility devices.

CCM: Increase use of anti-personnel mines.

ID/pt-16

Technology(ies)

Exoskeletal suits.

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Reduces soldier vulnerability.

Increases soldier capability.

What are CM's & CCM's?

CM: Could reduce mobility or susceptible to HPM.

CCM: Stealth suits.

ID/pt-17

System 3

Smart robotic mines.

Technology(ies)

Sensor fusion, high speed processing.

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Most effective in killing and/or disrupting enemy capabilities. Most effective weapon in WWII, Korea, & Vietnam.

What are CM's & CCM's?

CM: mine detector

CCM: longer range sensors, moving mines.

ID/pt-19

System 3

Air Insertion System

Technology(ies)

High Speed Transport, Insertion technologies, Stealth.

Region(s)

SWA

Why is this important/effective?

At a time when power needs to be projected to a foreign land, these technologies will be crucial. The U.S. can not play policeman without this capability.

What are CM's & CCM's?

Counter stealth technologies and detection.

ID/pt-20

System 3

Man portable ATGM

Technology(ies)

Warhead Tech, Sensor Tech.

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

SOF/LIC needs capability to stop armored threats.

What are CM's & CCM's?

Lt. Wt. Armor technol.

Low observables.

Decoys.

ID/pt-21

System 3

Ground Based laser system (SDI) used with space based mirrors in a ground/low altitude attack role.

Technology(ies)

Free electron laser technology, adaptive optic (mirror) technologies, pointing and tracking technologies.

Region(s)

EUROPE, LATAM, SWA.

Why is this important/effective?

It would be the ultimate projection of force from inside our own boundaries. Nothing is deployed except the destructive power (photons) - - could be used for air defense and ground attack - - would required deployable mirrors that could be launched into space.

What are CM's & CCM's?

CM: They would have to attack the mirrors in space.

CCM: Develop means of readily replacing any mirrors destroyed, but realize the mirrors themselves will be able to defend against ASAT'S with the laser beam - - ie self defense.

ID/pt-22

System 3

Enhanced surveillance/target acquisition.

Technology(ies)

Optics, sensor, RPV's, data links.

Region(s)

Europe, LATAM, SWA.

Why is this important/effective?

ALB-F depends on knowing enemy location and composition everywhere almost all the time.

What are CM's & CCM's?

CM: Jamming, intercept, camouflage, stealth, DEW, HPM.

CCM: Stealth, low cost RPV, satellites, rapid Sat. launch system.

ID/pt-23

System 3

Visible laser air defense system (full spectrum to preclude notch filters as cm).

Technology(ies)

Visible laser sources

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Will preclude any mission where pilot must visually look outside to fly, navigate, find targets, deliver fire, or assess damage out to ranges of 10 km or greater. Applies both to fixed wing or rotary wing aircraft.

What are CM's & CCM's?

Weather and obscurants i.e. visible effect smoke.

ID/pt-24

System 3

High energy tank

Technology(ies)

E/ET, Composites, engines

Region(s)

Europe

Why is this important/effective?

Lightweight, high fire power.

Numerical superiority of adversary.

Increased survivability/transportability

What are CM's & CCM's?

Similar systems

ID/pt-25

System 3

Similar to above but short range man portable with programmable rounds.

Region(s)

Europe, LATAM, SWA.

Why is this important/effective?

Tank killer; MOUT attack by individual soldier.

ID/pt-26

System 3

High rate processing systems.

Technology(ies)

Parallel computers, high density micro-electronics, advanced packaging techniques, efficient software.

Region(s)

Europe, SWA.

Why is this important/effective?

High rate processing computers are the engines that make automated systems possible.

What are CM's & CCM's?

CM: Brute force.

CCM: Higher rate, more intelligent system to make brute force approaches impractical.

ID/pt-27

Technology(ies)

Soldier/Equip Protection.

Region(s)

EUROPE, LATAM, SWA.

Why is this important/effective?

Protect against ballistic, chem/bio.

What are CM's & CCM's?

More explosive charge, stealth, penetrant agents, enhanced filters/ generic collective protection.

ID/pt-28

System 3

Hand held mine detector.

Technology(ies)

Chem. detect., neutron back scatt.

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

The enemy will have smart mines too.

ID/pt-29

System 3

Electric Drive

Region(s)

Europe, SWA

Why is this important/effective?

No logistic tail for POL!

Low IR signature - stealthy

What are CM's & CCM's?

Kill the rechargers which are obvious on the battlefield.

ID/pt-30

System 3

Soldier-fired Lt Wt Antitank Missile

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Will provide both Light infantry and Mech infantry with extensive anti-armor capability.

What are CM's & CCM's?

Jamming, decoys, other missiles, tank gun systems

ID/ra-01

System 3

A limited US Ballistic Missile Defense system (treaty compliant)

Technology(ies)

SDI.

Region(s)

SWA, other.

Why is this important/effective?

Defense of the US homeland is priority #1. As we possibly fight in SWA or somewhere else against some madman like Kaddafi who might just try to "nuke" the US if we attack, we must have some limited ballistic missile defense.

What are CM's & CCM's?

CM: A mass attack (rather than just 1 or 2)

Spetznaz-type attack of our defense.

Firing from a barge off Cuba.

CCM: Physical security sensors & people.

Total 360 degree coverage of US.

ID/ra-02

System 3

Ability to convert local resources to energy for all kinds of power.

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Critical to enable operations independent of vulnerable logistic tail.

What are CM's & CCM's?

Deny use of resources or attack energy converters

ID/ra-03

System 3

Artificial intelligence/data fusion/processing.

Technology(ies)

AI, power.

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

To enable large amounts of data to be processed/fused to present the commander(s) at all levels - to include individual soldier system - to make decisions on the most informed basis. Also to all robotics, UAV's non-man in loop actions to occur based on "almost-human" decision making processes.

What are CM's & CCM's?

CM: Viruses

Deception

Overload

CCM: Self-doctoring

Better Sensoring inputs

Greater Power

ID/ra-04

System 3
Stealthy Soldiers.

Technology(ies)
Counter RISTA.

Region(s)
LATAM

Why is this important/effective?
Needed for SOF forces.

ID/ra-05

System 3
Future soldier system.

Technology(ies)
Bio/Med.

Region(s)
LATAM, SWA

Why is this important/effective?
Combat multiplier of the _____

ID/ra-07

System 3
Tank/APC mission kill munition.

Region(s)
Europe, SWA

ID/ra-08

System 3
Biotechnology.

Region(s)
Europe, LATAM, SWA

Why is this important/effective?
Soldier Survivability

ID/st-01

System 3
DEW

Technology(ies)
Power Generation

Region(s)
Europe, SWA

Why is this important/effective?
Destroy enemy sensors and electronics.

What are CM's & CCM's?
CM: Filters, Goggles for soldiers, Hardening.
CCM: Tunable lasers.

ID/st-02

System 3
Obscurants.

Technology(ies)
Full spectrum sensors/tunable goggles.

Why is this important/effective?
Like fighting at night ("Army owns the night") it must own the battlefield under conditions of smoke as well.

What are CM's & CCM's?
Complete spectrum Smoke.

ID/st-03

System 3
Individual Soldier Enhancements.

Technology(ies)
Neurosource, lethality, survivability, protective clothes; sensitive signatures for stealth; gas/chemical mask; portable power sources.

Region(s)
EUROPE, LATAM, SWA.

Why is this important/effective?
Special individual soldier skills/capabilities made a great difference in advantage relative to all three scenarios.

ID/st-04

System 3

Networked smart mines.

Technology(ies)

Electronics, sensors, comms.

Region(s)

EUROPE, LATAM, SWA.

Why is this important/effective?

Difficult to counter (HPM only real counter proposed other than a 100m to 200m wide mine clearing/search by a lot of soldiers).

What are CM's & CCM's?

Lots of soldiers.

HPM maybe!

d. System 4

ID/co-02

System 4

FUAV with multi-discipline sensor mission payload.

Technology(ies)

Propulsion, light-weight structures, all ETDL signal stuff.

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Mobile, loitering capability to insert field of regard into named areas of interest (detection zones).

What are CM's & CCM's?

CM: Air defense, concealment, false target generation.

CCM: Low cost to allow sufficient numbers of FUAV.

ID/co-03

System 4

Info fusion/distributed C3I.

Region(s)

EUROPE.

Why is this important/effective?

More robust sensor system with national assets providing it tactical data in "real time".

ID/co-04

System 4

Tactical satellite system.

Technology(ies)

Commo, Pos/Nav, target acquisition, ATR, AI, stealth.

Region(s)

EUROPE, LATAM, SWA.

Why is this important/effective?

Knowing enemy location is top priority.

What are CM's & CCM's?

CM: Jamming and physical destruction of satellites.

CCM: Jam resistant commo and hardening of satellites; self protection.

ID/co-05

System 4

Long Range Arty Fire.

Region(s)

EUROPE.

Why is this important/effective?

Required to support ALBF-C/Defeat a numerically superior force.

What are CM's & CCM's?

Deception systems; multiple sensor sources.

ID/co-06

System 4

Compact power supplies.

Region(s)

EUROPE, LATAM, SWA.

Why is this important/effective?

Efficient, high density power supplies key to great number of enhancements.

ID/co-07

System 4

Improved human senses.

Technology(ies)

Biotechnology, physics, night vision, electronics, neuroscience.

Region(s)

Europe, LATAM, SWA.

Why is this important/effective?

To be able to hear what the enemy cannot. To be able to see what he cannot would provide a tremendous advantage to the U.S.

What are CM's & CCM's?

Jamming of enhanced human capabilities.

Sending false information - eg. decoys for sight and radio transmissions.

Enemy obscurants to vision, and white noise.

ID/co-11

System 4

Long range sensor suite and C3 (my addition) system.

Technology(ies)

Information system networks, computer hardware and software, target/image processing and display, pattern recog, sensor fusion, comm, signal processing, etc.

Region(s)

Europe, LATAM, SWA.

Why is this important/effective?

The winner of WW IV (or any 21st century conflict) will be the one who has the "best" vision of the battlefield and who can best orchestrate long range fires. C3 addition orchestrates weapons usage to destroy targets IAW commander's choice of battle philosophy.

What are CM's & CCM's?

CM: Jammers, computer virus.

CCM: Proliferation of comms channels.
counter-computer virus technology.

ID/ga-01

System 4

Portable instant fox hole digger & cover.

Technology(ies)

Probably explosive & meshing materiel for overhead cover.

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Underground is still the best protection against explosives.

What are CM's & CCM's?

Enemy can key on explosion of Fox Hole digger.

ID/ga-05

System 4

Smart Robotic Mines

What are CM's & CCM's?

Economy of Force item
Could really "suppress" enemy movement

ID/oa-01

System 4

Anti-ARM protection for Patriot.

Region(s)

Europe.

Why is this important/effective?

Twenty years ago the requirement was stated by the user; but the developer has failed 3 times. Is it really true that the only effective decoy is another Patriot radar?

ID/oa-02

System 4

Fast Sea Transport

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Our ability to deploy now that the world situation has changed is more important tomorrow than it is today.

What are CM's & CCM's?

Submarine warfare

ID/oa-03

System 4

Advanced water location production and reclamation systems for individual soldiers and units.

Technology(ies)

Biotechnology

Region(s)

(In priority)

1. SWA
2. LATAM
3. Europe

Why is this important/effective?

Water is the most overlooked element on any battlefield. It is more important than food, more important than ammo. Invariably, we will be fighting in areas where we are not conditioned, with respect to water consumption. We need to be able to locate, produce, and reclaim water on the battlefield, any climactic conditions.

What are CM's & CCM's?

CM: contaminants, viruses, etc.

CCM: Anti-toxins

ID/oa-04

System 4

Automatic target recognition.

Technology(ies)

Sensor technologies, artificial intelligence.

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

The ability to effectively ID and then immediately target gives the advantage of time. ATR would be especially effective in a robot.

What are CM's & CCM's?

HPM, lasers, computer viruses

ID/oa-06

System 4

C3

Technology(ies)

LAN

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

While important at the top (strategic and operational) also important at tactical to enhance soldier performance.

What are CM's & CCM's?

Jamming, dis-information

ID/oa-07

System 4

Bio/___

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Anything to enhance soldier survivability and effectiveness on the battlefield is a major force multiplier.

What are CM's & CCM's?

??

ID/oa-10

System 4

Small tactical satellites

Why is this important/effective?

Enables virtually all other functional missions to be assured, supplement, complement; gap-fill.

What are CM's & CCM's?

CM:

Soft-kill ASAT techniques.

CCM:

Proliferation.

On-orbit spares.

Cross-linking.

RAD hardening.

EM hardening.

ID/oa-14

System 4

Advanced computing power combined with signal processing

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Increases ability to process information and reduces the fog of war.

What are CM's & CCM's?

CM: Jamming

CCM: Frequency or media switching

ID/ob-03

System 4

Tunable obscurants thru which our troops could see with special goggles.

Technology(ies)

Dispensers, delivery system.

Region(s)

Europe, LATAM, SWA.

Why is this important/effective?

Again, very useful in MOUT, particularly so if it could contain an incapacitant to which our troops were immune.

What are CM's & CCM's?

Weather conditions could prevent use.

MOPP gear.

Attack the goggles.

ID/ob-05

System 4

Family of small arms.

Technology(ies)

Lightweight, increased hit probability.

Region(s)

LATAM, SWA.

Why is this important/effective?

I believe future involvement of U.S. Army in conflict will be all of the LIC type of events - small forces, group operating independently. Systems that improve survivability and lethality of individual/small groups have priority.

What are CM's & CCM's?

Enemy soldier protection (armor).

ID/po-02

System 4

Changed particle beam.
Directed energy weapon.

Region(s)

Europe, LATAM, SWA, Pacific

Why is this important/effective?

As in system 3 above, the individual soldier must have a counter to the technologies he will face.

ID/po-03

System 4

Optical countermeasure systems

Technology(ies)

MMW, Laser, pulsed-power (explosive or electric)

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Identifies and disrupts enemy sensor systems.

What are CM's & CCM's?

Shielding and high speed switching to protect circuits.

ID/po-04

System 4

Incapacitation agents.

Region(s)

LATAM, SWA

What are CM's & CCM's?

Anti-toxins
Protective mask or other device.

ID/po-05

System 4

Language translation

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

We fail to communicate in foreign language effectively.

What are CM's & CCM's?

Remaining as we are.

ID/pt-01

System 4

Supply

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Must be able to sustain any force we inject.

ID/pt-02

System 4

Robotic vehicles - combat and decoys.

Technology(ies)

Robotics, lightweight materials, sensors, LOTA, target acquisition.

Region(s)

Europe, LATAM, SWA.

Why is this important/effective?

Keep the soldier out of the battle.

Cheaper and effective alternative to heavy manned tanks.

Decoys can be an effective force multiplier.

What are CM's & CCM's?

Advanced sensors, sensor fusion, target discrimination.

ID/pt-03

System 4

Incapacitating & low collateral damage weapons and munitions.

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Low-intensity conflicts or high-intensity but brief or isolated conflicts will often occur in populated area, or in areas where civilian and commercial infrastructure must survive.

ID/pt-04

System 4

Advanced Rocket/Missile System.

Technology(ies)

Hypervelocity round, low cost, MMW/laser Command Guidance

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Low cost, large number of lethal weapon initially 10km; later, longer ranges.

What are CM's & CCM's?

CM: Attack launch platform

CMM: Operate in defilade (see ADKEM, for example).

ID/pt-05

System 4

Individual biomedical monitoring integrated with soldier computer.

Why is this important/effective?

Provides soldier & his commander with his medical status (alertness, workload, hydration quantity & quality of sleep, pulse, body temperature). Allow rotating/or resting soldiers prior to exhaustion.

What are CM's & CCM's?

Intense local EMP (unlikely).

ID/pt-06

System 4

Satellite System: Multipurpose.

Technology(ies)

Adapt commercial technologies to perform Army functions

Region(s)

Europe, LATAM, SWA

Why is this important/effective?
Surveillance, weather.

What are CM's & CCM's?
Anti-satellite system.

ID/pt-07

System 4
Advanced Aerial Insertion System.

Technology(ies)
Check the "book".

Region(s)
Europe, LATAM, SWA

Why is this important/effective?
Need to stealthily land & extract forces/equipment & resupply -- rapidly -- enables SOF activities in LATAM & SWA -- can be used for non-air assault in Europe.

What are CM's & CCM's?
Air defense (if land high).
Mines (if know when landing will occur).

ID/pt-08

System 4
Lower echelon C&C

Technology(ies)
Microelectronics, signal processing, displays.

Region(s)
Europe, LATAM, SWA

Why is this important/effective?
Decentralized fighting, improved CSS reporting.

What are CM's & CCM's?
CM: Same as Conventional.
CCM: LPI communication.

ID/pt-09

System 4

Sensor Systems for Individual/small units.

Technology(ies)

FLIR - I2 - acoustic.

Region(s)

SWA

Why is this important/effective?

Individual soldier needs ability to "see" further than adversary.

What are CM's & CCM's?

CM: Decoys/deception to slow down soldier

CCM: Eyeball verification.

ID/pt-10

System 4

Advanced, secure jam-proof data links.

Technology(ies)

Europe, LATAM, SWA

Region(s)

Secure jam-proof data links will be absolutely necessary for all aspects of robotics & unmanned vehicles as well as satellites.

ID/pt-11

System 4

Deception/Decoy Systems.

Technology(ies)

Materials, integrated with systems/units.

Region(s)

Europe, SWA.

Why is this important/effective?

Attrit. enemy fire, ability to gain maneuver advantage.

What are CM's & CCM's?

CM: Advanced sensors to discriminate decoys.

CCM: Real systems that look like decoys.

ID/pt-12

System 4
AD KEM

Region(s)
Europe, SWA

Why is this important/effective?

The only way to achieve light, lethal, survivable ground combat systems.

ID/pt-15

System 4
Digital burst type comms system.

Technology(ies)
None really other than reduction in size.

Region(s)
LATAM

Why is this important/effective?

When inserting SOF team for recon purpose - needed comms equip. to report back findings.

What are CM's & CCM's?

Jamming - although this would be quite difficult under burst type transmission.

ID/pt-16

System 4
Nonviolent weapons i.e. HPM.

Region(s)
Europe, SWA

Why is this important/effective?

Destroys command and control.
No collateral damage.
Can affect electric drive tanks.

What are CM's & CCM's?

CM: Shielding
CCM: ?

ID/pt-17

System 4

Future Soldier System

Technology(ies)

Various Biotechnologies

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Directly help soldier affectivity - very important in future conflicts where manpower is hard to replace.

What are CM's & CCM's?

CM: Chemical warfare

CCM: Skin coatings + mini gas masks

ID/pt-19

System 4

Directed Energy Weapon

Technology(ies)

Laser, Particle Beam, Charged Particle

Region(s)

Europe

Why is this important/effective?

Directed Energy weapons will give the U.S. a capability to disarm space assets. The Soviets and others have a particular advantage here.

What are CM's & CCM's?

Hardening against lasers; particle beams must be delivered close to the object. Satellites can be in higher orbit then brought down for use. (can't defend much against this). Weapons can be hardened appropriately.

ID/pt-20

System 4

Tank fired anti-tank munition

Technology(ies)

Gun Propulsion, long rod penetrator design, materials, and gun accuracy.

Region(s)

Europe, SWA

What are CM's & CCM's?

Armor Protection.

ID/pt-21

System 4

Neutral particle beam ASAT (Rocket launched).

Technology(ies)

Energy Storage and switching, NPB (SDI) technologies, rocket technology.

Region(s)

EUROPE, LATAM, SWA.

Why is this important/effective?

It would provide a "many shot" ASAT capability from a single rocket launch. In a conflict where the enemy is very dependent on his overhead assets this could provide a significant advantage - - could also protect against ASAT attack on our own assets.

What are CM's & CCM's?

CM: You would have to try to attack the platform.

you can't harden the electronics enough to help.

CCM: The NPB is it own best defense.

ID/pt-22

System 4

Non Line of Sight Target Engagement System.

Technology(ies)

Seeker, IR/MMW, propulsion, navigation, two way secure data links.

Region(s)

Europe, LATAM, SWA.

Why is this important/effective?

Almost all enemy targets survive by staying out of sight of our armament systems - Battlefield line of sight currently limits range of engagement to a few kilometers for battlefield weapons.

What are CM's & CCM's?

CM: Terminal interception, data link disruption, camouflage, movement at night, special armors.

CCM: Secure data links non-jammable, multi-spectral seeker, tandem warheads.

ID/pt-23

System 4

Infantry self defense system.

Technology(ies)

Diverse frequency laser source, compact battery source.

Region(s)

LATAM

Why is this important/effective?

Provides softkill/covert capability in LIC operations. Also may allow single soldier to inflict damage to armor by attacking eyes of personnel on board, i.e. Commander, division, gunner, etc.

Provides extremely large magazine in man-portable weapon. Good for other special operations, sentry, etc.

What are CM's & CCM's?

- Filters if single frequency lasers are used CCM: Diverse Spectrum output.

- smoke

- neutral density filters

- CCM equals more power

ID/pt-24

System 4

Low collateral damage munitions.

Region(s)

Europe, SWA

Why is this important/effective?

Future direction towards urban warfare.

Anti-____, electric power systems.

What are CM's & CCM's?

Difficult - hardening.

ID/pt-25

System 4

High energy portable power system for individual soldier and small platforms.

Technology(ies)

High temperature electro-chemical and super conducting systems.

Region(s)

Europe, LATAM, SWA.

Why is this important/effective?

Directly determines effective mission time in comm applications. Determines Kinetic Energy in electromagnetic guns. HPM jammers, particle beam weapons, electric tanks, etc.

ID/pt-26

System 4

Fuel efficient systems.

Technology(ies)

High energy fuels, improved combustion, high temperature materials, high strength materials.

Region(s)

Europe, SWA.

Why is this important/effective?

A major lift requirement is fuel weight. An M-1 tank consumes 1 ton of fuel in 125 miles. The modest goal of improving fuel efficiency by a factor of 2 should be pursued for all engine driven systems.

What are CM's & CCM's?

N/A.

ID/pt-27

System 4

Logistics Movement.

Technology(ies)

Computer Aided Design.

Region(s)

EUROPE, LATAM, SWA.

Why is this important/effective?

Should be able to simulate any scenario around the world similar to the 3 here and play through all the materiel, people etc you would need and when. Then see how to get it there and try to improve by redesigning or planning new ships, planes etc.

What are CM's & CCM's?

None.

ID/pt-28

System 4

Miniaturization

Technology(ies)

Electronics

Region(s)

LATAM, SWA

Why is this important/effective?

If is small/light the soldier will take it/have it with him.

ID/pt-29

System 4

The "inherent" weather system

Region(s)

Europe, LATAM, SWA

Why is t. s important/effective?

No high-technology sensors will be effective unless the commander knows their limitations in the real atmosphere.

What are CM's & CCM's?
Take out weather satellites

ID/pt-30

System 4
Logistics - automated system (Ammo Fuel)

Technology(ies)
Advanced Vehicle/Chassis, Robotic Loaders, Automated -
prepackaged stores.

Region(s)
Europe, SWA

Why is this important/effective?
It provides very rapid turn around for field resupply.

What are CM's & CCM's?
Air & Artillery attack.

ID/ra-01

System 4
A good communication system - beyond line of sight.

Technology(ies)
Satellite tech, antenna tech, MIMIC, VHSIC, Laser.

Region(s)
Europe, LATAM, SWA

Why is this important/effective?
Current Army doctrine calls for non-linear war. We will be
fighting as small isolated units not connected (beyond line of
sight). Mobile Subscriber Equip. requires a uniform density,
fully populated. It won't work. We need a follow-on to MSE. HF
is a dog. Help!! (Satellite or surrogate satellite Comm?)

What are CM's & CCM's?
CM: EW-Jamming - just like any comm gear - if you can get
in antenna pattern of ground receivers.
CCM: LPI, nulling, spread spectrum.

ID/ra-02

System 4
Enhanced Human via new Training Methods

Region(s)
Europe, SWA

Why is this important/effective?
Current level of training will not be adequate to teach operators and especially leaders how to use the new technology.

What are CM's & CCM's?
If done properly there is none.

ID/ra-04

System 4
Personal Water Recover/Recycle System.

Technology(ies)
Power Source.

Region(s)
Europe, LATAM, SWA

Why is this important/effective?
Reduces log requirements in modern warfare.

What are CM's & CCM's?
Heat weapons.

ID/ra-05

System 4
Multisensor Recon.

Region(s)
Europe, LATAM, SWA

Why is this important/effective?
- Clear picture of situation.
- Sort real/false targets.
- Sort high/low value targets.

ID/ra-07

System 4
Increase soldier fire power. DAZER, LASER, rifle, LAW to kill APC/TANK.

Region(s)
Europe, LATAM, SWA

ID/ra-08

System 4

INFIL/EXFIL platforms.

Region(s)

Europe, LATAM, SWA

ID/st-01

System 4

Soldier

Technology(ies)

C2, biomedical, sensor, POS/NAV.

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Essential element for all forms of combat. Enhanced soldier effectiveness has tremendous payoff.

What are CM's & CCM's?

CM: Jamming, Weapons, Disease.

CCM: Anti-Jam, Protection, Build up immune system.

ID/st-02

System 4

Manportable Sensor System.

Technology(ies)

Full Spectrum Sensors.

Region(s)

LATAM, SWA.

Why is this important/effective?

Detect enemy before enemy detects "blue".

What are CM's & CCM's?

Camouflage; discriminating sensor.

ID/st-03

System 4

Advanced Propulsion.

Technology(ies)

All electric, fuel economic, power recycling; power technology.

Region(s)

EUROPE, SWA.

Why is this important/effective?

All electric, with suitable rechargeable scenarios, can significantly reduce logistic issues; as well vehicles are quiet, more survivable and acoustically stealthy.

e. System 5

ID/co-02

System 5

Long range precision fires (LONGARM)

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Controls terrain by fire.

What are CM's & CCM's?

CM: Counter-RISTA, kill platforms.

CCM: Stealth, active self-defense, counterfire campaign.

ID/co-03

System 5

Deception/Decoy.

Region(s)

EUROPE.

ID/co-04

System 5

Long Range Artillery Missile.

Technology(ies)

ATR, AI, sensor fusion, secure comms, stealth.

Region(s)
EUROPE, LATAM, SWA.

Why is this important/effective?
Allows a fire and forget with the possibility of psychological impact on enemy performance after first few hits. (i.e. Israeli Harpy System).

What are CM's & CCM's?
CM: Anti missile devices (missile, D.E.) and decoy.
CCM: AI, ATR, stealth.

ID/co-05

System 5
Robotic mines.

Technology(ies)
Robotics, AI, sensors.

Region(s)
EUROPE.

Why is this important/effective?
Force multiplier.

What are CM's & CCM's?
CM: Deception, countermeasure systems.
CCM: Robustness, proliferation.

ID/co-06

System 5
Logistics/deployability.

Region(s)
EUROPE, LATAM, SWA.

Why is this important/effective?
Strategic/tactical mobility and sustainment key elements in all scenarios.

ID/co-07

System 5
Robotics/AI.

Technology(ies)
Automation.

Region(s)

Europe, LATAM, SWA.

Why is this important/effective?

All scenarios required RPV's, smart systems, moving equipment. To have superior intelligence and superior strength over the enemy are both force multipliers.

What are CM's & CCM's?

Jamming, AI, automated systems, HPM, particle beam.

ID/co-11

System 5

Directed Energy Weapon, vehicle and hand held.

Technology(ies)

DEW.

Region(s)

Europe, LATAM, SWA.

Why is this important/effective?

This may be the "breakthrough" weapon that makes all others obsolete.

What are CM's & CCM's?

None.

ID/ga-01

System 5

Satellites (GPS, COMMO, INTEL)

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Wide application. Increases capability tremendously.

What are CM's & CCM's?

Anti-Satellite

ID/ga-05

System 5

"Wrist Watch" GPS/Imager System

Region(s)

Europe, SWA

Why is this important/effective?

Nifty idea Dr. Thornton came up with.

ID/oa-01

System 5

Composite circuit BIT/BITE design.

Region(s)

Europe, LATAM, SWA.

Why is this important/effective?

Repeatedly the user has asked for and the developer promised capability exceeding 90% detection to a single card. Results have been less than 50%. Claims have been made based on shorts and open circuits on the cards; in cohost, typical failure modes are drifting out of tolerance. RAM in computers hardware has to be brought to high levels.

ID/oa-02

System 5

Directed Energy

Region(s)

Europe, SWA

Why is this important/effective?

The cost of bullets is going out of sight. The number of stored kills you have in a DE weapon is tremendous and the logistical burden of resupply of bullets is not required.

What are CM's & CCM's?

Hardening

ID/oa-03

System 5

Composite lightweight (less than 15 tons) and robotic tanks or weapon platforms.

Technology(ies)

Advanced materials technologies; composites

Region(s)

(In priority)

1. Europe
2. SWA
3. LATAM

Why is this important/effective?

Single greatest contributor to lightening the force and conserving limited airlift and sealift assets. We need lighter but more lethal weapons that are more deployable and less manpower (crew) intensive.

What are CM's & CCM's?

CM: Various H.E./Heat munitions
EMP

ID/oa-04

System 5

Decoy technology

Technology(ies)

Holography, IR, millimeter wave.

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

The capability to spoof the enemy and hold back your own forces for a surprise attack is another time buyer. The Soviets are much more practical and intelligent in this field. The U.S. should learn from their expertise and devote more energy to developing spoofing agents.

What are CM's & CCM's?

Overhead electro-optics, IR, sat, etc. - Special forces.

ID/oa-06

System 5
Composites

Region(s)
Europe, LATAM, SWA (especially LATAM)

Why is this important/effective?
To lighten and shrink systems

What are CM's & CCM's?
None!

ID/oa-10

System 5
Language Translator.

Region(s)
Europe, LATAM, SWA

Why is this important/effective?
Key to operating effectively in the region. Essential to knowing the enemy; gathering intelligence.

What are CM's & CCM's?
CM:
Natural difficulty of multiple dialects.
Advanced computer with expanded memories.

ID/oa-14

System 5
Robotics

Region(s)
Europe, LATAM, SWA

Why is this important/effective?
Enables many actions to be accomplished without risk to soldiers.

ID/ob-03

System 5

Satellites for Army use.

Technology(ies)

Propulsion, mapping, sensors.

Region(s)

Europe, LATAM, SWA.

Why is this important/effective?

Intel and Pos/Nav.

What are CM's & CCM's?

CM: Anti-satellite weapons.

CCM: Lots and lots of cheap satellites.

ID/ob-05

System 5

Hand held mine detector.

Region(s)

Europe, LATAM, SWA.

Why is this important/effective?

I believe future involvement of U.S. Army in conflict will be all of the LIC type of events - small forces, group operating independently. Systems that improve survivability and lethality of individual/small groups have priority.

What are CM's & CCM's?

Decoys (to cause soldier to expend energy neutralizing - dummies) - same or similar affect as real mines.

ID/po-02

System 5

Anti-helicopter mine.

Region(s)

Europe, LATAM, SWA, Pacific

Why is this important/effective?

With the increased lethality of air defense systems the helicopter will become more important as a fighter & carrier. A system to defeat this threat will enhance the defensive capabilities of the forces.

ID/po-03

System 5
NLOS

Technology(ies)
Fiber-optics, IR, FLIR, other sensors.

Why is this important/effective?
Provides NLOS capability for standoff recce and target destruction to soldier and helicopters.

ID/po-04

System 5
Charged particle beam.

Region(s)
Europe, LATAM, SWA

What are CM's & CCM's?
Attack energy source.
Attack sensors and C2.

ID/pt-01

System 5
Long Range Fires

Technology(ies)
Missiles, Guns, Warheads, Targeting

Region(s)
Europe, LATAM, SWA

Why is this important/effective?
Stand off lethality

What are CM's & CCM's?
Counter Fire, Decoys

ID/pt-02

System 5
Soldier Individual Protection.

Technology(ies)
LOTA, Camouflage, personnel armor, mobility enhancement,
chemical protection.

Region(s)
Europe, LATAM, SWA.

Why is this important/effective?
Improves effectiveness of individual soldier and force.
Increased survivability, mobility, performance.

What are CM's & CCM's?
CM: Anti-personnel weapons.
CCM: Improved night vision devices, sensor systems.

ID/pt-03

System 5
Anti-terrorist "technology"

Region(s)
LATAM, SWA

Why is this important/effective?
We have not yet developed a counter to hostage taking or
critical asset denial (SWA: mining of pumping facilities).

ID/pt-04

System 5
Selective RISTA

Technology(ies)
MMW SAR & MTI; MMW/EO/IR

Region(s)
Europe, LATAM, SWA

Why is this important/effective?
Low cost, environmentally appropriate RISTA. Not universal,
multispectral RISTA (not feasible, practical, affordable).

ID/pt-06

System 5
Advanced Close-Air Support.

Technology(ies)
Missiles, all weather operations.

Region(s)
Europe, LATAM, SWA

Why is this important/effective?
Close-Air Support more efficient than long range missiles from supply, size, transport, etc.

What are CM's & CCM's?
Anti-air

ID/pt-07

System 5
Sensor Fusion System

Region(s)
Europe, LATAM, SWA

Why is this important/effective?
Must be able to integrate all info/intell on location - ALBF-C calls for total knowledge. Can't have it w/o this.

What are CM's & CCM's?
Don't know

ID/pt-08

System 5
UAV

Technology(ies)
Communication/RISTA and EW

Region(s)
Europe, LATAM, SWA

Why is this important/effective?
Integrated comm & RISTA, survivability, see deep, communicate deep.

What are CM's & CCM's?

CM: Fires, Jamming.

CCM: Stealth, harden, LPI comm.

ID/pt-09

System 5

Incapacitating agents.

Technology(ies)

Chemical

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Humane way of dealing with good/bad guys in same urban setting.

What are CM's & CCM's?

MOP gear.

Defeat mechanism for masks.

ID/pt-10

System 5

Stealth directed energy weapons

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

DEW's that are no/low signature will be useful by all elements & will allow for completely silent operations.

ID/pt-11

System 5

Mesoscale Weather/Terrain Intelligence and Forecasting.

Technology(ies)

Sensors, data fusion, Comm.

Region(s)

Europe, LATAM, SWA.

Why is this important/effective?

Sophisticated systems will be more sensitive to operational environment and changing conditions. Must be able to forecast "windows of advantage" and effective performance for blue and red OPS.

ID/pt-12

System 5

Advanced Platform Technology

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

The ground forces and ground systems listed above will be ineffective without helo support.

ID/pt-15

System 5

Language transcriber.

Technology(ies)

None really - early versions already on the shelf.

Region(s)

LATAM

Why is this important/effective?

To communicate quickly with allies in combat.

ID/pt-16

System 5

Deep attack fire with smart munitions.

Region(s)

Europe, SWA

Why is this important/effective?

Can attack enemy in staging areas prior to maneuvering. Can neutralize counter battery fire.

What are CM's & CCM's?

Decoys/jamming

Sensor suites//discriminators

ID/pt-17

System 5

Light weight super bike (2, 3, or 4 wheel) for individual soldier.

Technology(ies)

New quiet power units.

Region(s)

Europe. LATAM, SWA

Why is this important/effective?

Tanks are becoming more & more obsolete. Need quick single soldier vehicle that can also carry munitions he can use in LIC environments.

What are CM's & CCM's?

CM: Anti personnel munitions.

CCM: Stealth, mobility, deception devices.

ID/pt-19

System 5

High Energy/more compact power supplies.

Technology(ies)

Batteries, power generators, etc.

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Power is a pervasive technology. The more power that can be packaged in a small, lightweight container has enormous "power". It's what gets things done.

What are CM's & CCM's?

none.

ID/pt-20

System 5

Long Range Fires (Arty).

Technology(ies)

Gun Propulsion, Projectile flight monitor, Improved Hit Probability thru ballistics and C&C or smarts.

Region(s)

Europe, SWA

Why is this important/effective?

Deliver (economically) antipersonnel munitions, mines, chem agents, anti-armor munit, and sensors.

What are CM's & CCM's?

CM: Counter battery sensors (e.g., radar).

CCM: Stealth munitions and trajectory shaping.

ID/pt-22

System 5

Lightweight (10 ton) "Tank" or Tank Killer.

Technology(ies)

Kinetic energy missiles, composite armored vehicle structure, high power/agility, ability to fire from full defilade.

Region(s)

Europe, SWA.

Why is this important/effective?

Need a deployable tank-killing vehicle to fight where enemy has heavy armor. No way to get current and future 70+ ton tanks into the battle.

What are CM's & CCM's?

CM: Light "tanks" (vehicles) are defeated by heavy armor if they can be hit.

CCM: Avoid exposure by defilade, smoke/obscurants, rapid lethal counter fire.

ID/pt-23

System 5

Ultra wide band radio frequency self protection system.

Technology(ies)

Transmitters & antennas desired for specific system being protected. i.e. aircraft, vehicle, etc.

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

May protect against SAM's and other types of missiles.

ID/pt-24

System 5

High energy density individual soldier weapon.

Technology(ies)

Directed energy, power supplies.

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Need to enhance capability of individual soldiers.

What are CM's & CCM's?

none

ID/pt-25

System 5

Robust, interoperative, wide band, jam proof, comm transport systems.

Technology(ies)

Ultra high speed micro-electronics, electro-optics. All digital radio terminals.

Region(s)

Europe, LATAM, SWA.

Why is this important/effective?

C2 is the prime controlling factor in battle management and effective operation of all types.

ID/pt-26

System 5

Enhanced lethality systems.

Technology(ies)

Smart mines, anti-material chemicals, precision guidance, HPM, HEL.

Region(s)

Europe, LATAM, SWA.

Why is this important/effective?

Need to render enemy systems inoperable and ineffective, not physically kill them.

What are CM's & CCM's?

CM: Redesign and hardened enemy systems.

CCM: Continue to design for the "soft under belly" of enemy systems.

ID/pt-27

Technology(ies)

MOUT Weapons, Incap Smoke.

Region(s)

EUROPE, LATAM, SWA.

Why is this important/effective?

Chemicals not banned by treaty which incapacitate everyone for 2-6 hours and which environmentally degrade.

What are CM's & CCM's?

Individual/collective protection - requires prior planning & limited protection and limits mobility.

CM: Combine with sound/light/concussion etc.

ID/pt-28

System 5

AVNFOG-M

Region(s)

Europe, SWA

Why is this important/effective?

You can hit the target from a moving platform.

ID/pt-29

System 5

Long range indirect fire - SMART munitions.

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

MASS can be achieved by fires rather than by tanks and infantry - same lines and in a high volume effective killer.

What are CM's & CCM's?

Counterfire sensors and weapons.

ID/pt-30

System 5

Air Cushion Lt Wt Tank with Missiles

Technology(ies)

Aeropropulsion, Weapons R&D

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Capable of operating across snow, mud, water, etc.

What are CM's & CCM's?

Weapons attack by enemy ground forces & aircraft.

ID/ra-01

System 5

Long Range Precision Fire Support System.

Technology(ies)

Sensors; composites; high density propellants.

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

Our doctrine calls for engaging enemy at long ranges by fire so we don't have to go gun tube to gun tube. We need a very accurate long range (approx. 499 km) weapon which will allow a smaller US Army to effectively fight anywhere.

What are CM's & CCM's?

CM: An enemy tactical ballistic missile (TBM) system.

CCM: Joint warfare (AF, Navy) using National Sensors to be smarter.

ID/ra-04

System 5

Jungle Medicine, Anti-Bug germ, Skin Protection.

Technology(ies)

MAN/FIX

Region(s)

LATAM

Why is this important/effective?

Single most effective cause of soldier attrition in LATAM jungle environment.

What are CM's & CCM's?

Anti (Anti-Bug Germs) introduced by enemy.

ID/ra-05

System 5

Non-nuke Space based weapons.

Technology(ies)

Microelectronics, sensors.

Region(s)

Europe

Why is this important/effective?

Practically invaluable systems.

ID/ra-07

System 5

CBR survivability

ID/ra-08

System 5

Non-Lethal force.

Technology(ies)

Sound, Light, Chem/Bio.

Region(s)

Europe, LATAM, SWA

ID/st-01

System 5

Army Space Capability

Technology(ies)

Sensors, Weapons, Commlinks

Region(s)

Europe, LATAM, SWA

Why is this important/effective?

To provide information when needed

What are CM's & CCM's?

CM: Destroy, Jamm.

CCM: Small, inexpensive for rapid replacement, anti-jam.

ID/st-02

System 5
Tactical Missile and ATM's.

Technology(ies)
Energetic Materials/Sensor Technology.

Region(s)
EUROPE, LATAM, SWA.

Why is this important/effective?
Deep fires and defense against Red retaliation from up to 200km away.

What are CM's & CCM's?
CM: Decoys
CCM: Identify decoys.

ID/st-03

System 5
Air Vehicles.

Technology(ies)
Rotocraft light weight materials, stealthy, armed vehicle lift cap. troop carrier, EW/RSTA/INTEL.

Region(s)
EUROPE, LATAM, SWA.

Why is this important/effective?
Very useful in all three scenarios; multi-purpose.

4. **Technology Availability.** Were there any assumptions made about the availability of technology or the performance of a system that you think was not reasonable given the time frame?

ID/co-02

Reasonable - but not supported.

ID/co-03

No.

ID/co-04

No.

ID/co-05

Only somewhat debateable was the time frame for electric vehicles (depending upon actual attributes, future soldier system (similar rationale as in above.) and robotic vehicles (air/ground).

ID/co-06

Future systems were not detailed enough (spec sheets) or technology forecasted (no "accurate" dates). Enabling technologies weakly defined.

ID/co-07

Ships being able to go 50-90 knots is incredible. There aren't that many new ships being bought each year. Basically, the Army in 2015 will have what is in the commercial industry today, i.e. 30 knot ships.

ID/co-08

Air cushion vehicle may be possible but seems not very useful for operations in dusty, rocky terrain.

ID/co-10

No.

ID/co-11

No-if anything we are probably too timid.

ID/ga-01

I Don't Know

ID/ga-02

High energy density, power sources will not be available for electric drive/gun/particle beams weapons/systems. We may not be able to get past some physics which will mean that some of these systems will not be mobile or multiple shot.

ID/ga-03

Yes: 1. In combat troops will reduce their combat load below the 1/3 of body weight studies say may be reasonable.
2. Expectations of what may be possible with "light" systems and limited in number may well result in lack of success against "heavy" formations in large numbers, even if those "heavy" systems are products of technology 10 or more years earlier than the newer ones opposing them.

ID/ga-05

Certainly.

I believe that some of the technologies we discussed will not be funded by the U.S. Congress (e.g., "Secret" National ID system).

Technologists have a propensity to minimize the likelihood of significant problems when "selling" a technology (but you want them to be optimists); hence, the time is usually underestimated for "maturing" a technology.

ID/ga-06

There seems to be a lot of linear technology forecasting on the part of the technologists. Not necessarily warranted, but it is not possible to predict the revolutions (or the cop-outs).

ID/oa-02

In the soldier enhancement techs, of which a lot of labs are working, will not come together until one individual call him "PM-Soldier" is appointed to do so. Natick, like it or nor, is too parochial to pull it all together. It will take central management - PM.

ID/oa-03

I do not think that the 2020+ estimate for delivery of a workable exoskeletal suit is reasonable. Seems far too long, given advances in robotics, cybernetics, AI, etc. that are being made today. Key point, however, is to better define our requirements for such a system; otherwise, we will not come up with a workable, affordable system!

ID/oa-04

There were many assumptions that were unreasonable but are all necessary to create new solutions.

ID/oa-05

That all new systems will be "all weather". Examples: RPVs can fly through cloudy areas with a high potential for icing. Clouds won't degrade intel data collection sensors.

ID/oa-06

Only exoskeletons - all other assumptions were questioned.

ID/oa-07

Deployment (strat).

ID/oa-08

NO

ID/oa-10

NO. LATAM folks were very balanced. NO hesitation to challenge assertions. Where competence was lacking appropriate caveats were made.

ID/oa-11

No

ID/oa-12

Available technology now will be the system in being in five to ten years. Therefore, for the year 2015 will the technology be available in the year 2000? This takes into account acquisition and production process, assumes non off-the-shelf.

ID/oa-13

I doubt much of these will be funded - especially for combat service support.

ID/oa-14

Mass airdrop of 110,000 lbs. at 400 knots from low altitude.

ID/ob-01

Availability of non-lethal incapacitating agents which could be employed with pin point accuracy and no lasting side-effects.

ID/ob-02

Space system performance unreasonably high in SWA play.
ASAT performance also unreasonably high; space survival not addressed.

ID/ob-03

Philosophically, any technology we can conceptualize, we can do - given money, people, and equipment. In some games, one side or the other changed the rules or the system characteristics with an eye only on winning - not whether the change made sense or was doable.

ID/ob-05

Lighter, smaller major weapons e.g., transportable TOW. No thought given to non-armor protection systems (kill anti-tank projectile before it strikes the tank).

ID/ob-06

Exoskeletal.

ID/po-01

Near 100% detection/acquisition of enemy forces w/ space based overhead system.

- May be viable pre-hostility.
- Cannot assume once hostilities start.
- "Uncertainty" in war will remain.
- Systems vulnerability to deception.

ID/po-02

That the technology will always result in a positive outcome, ie, it will not only hit the target, but kill it as well.

That we will possess perfect knowledge before & after we apply the technology.

ID/po-03

NO

ID/po-04

No

ID/po-05
Microwave

ID/pt-01
I was unconvinced that the "Do-All" Exoskeleton was plausible from design, efficiency, and utility standpoints.

ID/pt-02
Yes - Can't do them all - inadequate resources.

ID/pt-03
Yes: Existence of smart and robotic weapons was often offered as a battlefield-wide solution to a threat problem. I doubt such weapons will be built in sufficient quantities to have such sweeping effectiveness.

ID/pt-04
Funding limited. Not technology limited.

ID/pt-05
I don't think we will know the location of enemy forces assets in triple canopy jungle (LATAM) based on sensors & sensor fusion. We will need soldiers on the ground to do this.

ID/pt-06
Exoskeletal system not reasonable.
Electric storage devices for vehicles with short recharge times.
Electric recharge vehicle (super conductive storage of electric power).
Flying jeep mobility.

ID/pt-07
Exoskeletal - full up, robotic, "mini M1" - It's more a matter of doing it - but technology has to be here in 10 yrs if it is to be fielded in 25 yrs.

ID/pt-08
No. In fact we may have been conservative.

ID/pt-09
Exoskeleton

ID/pt-10
Not technology but the national will to pay for & fund R&D
for technology without a clear national threat.

ID/pt-11
- Spectral smoke.
- Exoskeleton.
- HPM weapon.

ID/pt-12
Nuclear power supplies on the battlefield will be
impractical during that time frame. Solar powered trucks will
also be impractical. Neither issue is important.

ID/pt-14
YES.

ID/pt-15
Many predictions about when required technologies will be
available are made "off the top of the head," without careful
analysis of subtechnologies involved.

ID/pt-16
High energy particle beam weapons in 2015 time frame that
would be mobile on the battlefield.

ID/pt-17
Yes - many estimated systems would not be available in the
field by 2015. It still takes 15 + years to buy hardware where
the technology already exists. Some of the systems proposed
would take 5-10 years minimum to get to demo stages - eg.
Exoskeleton system, directed energy weapons non-airbreathing
transporter, etc. You need to take a hard look here.

ID/pt-18

Yes - Extrapolating from progress made in the past, the long time it takes because of the bureaucracy to field a system and the dwindling resources, many of the advanced systems will not be available by 2015.

ID/pt-19

Technology is not always a predictive game. Assumptions are a "best guess", not law, one thing that can not be accounted for is a scientific breakthrough. They just happen; we must capitalize on them. Most of the technology discussed were reasonable given the 10-30 years development cycle of some technologies.

ID/pt-20

Yes e.g., Elec. tank.
Fiber optic commo syst.
Indirect fire effectiveness against armor.
Lack of chem decontamination.
Fighting effectiveness in MOPP.

ID/pt-21

Not if each is considered as a separate effort. Each was reasonable technical feasibility based on current knowledge. In reality however we will only have the funds to pursue a few. This makes the selection of which one most critical. Look for significant advantages over the enemy that are difficult to counter measure or offset.

ID/pt-22

Many - Knowing location/composition of enemy "all the time" not reasonable. "Loitering" cannon-fired smart munition (can't loiter more than a few seconds).

ID/pt-23

HPM weapons were played against tanks for mobility kill. There is no evidence that this represents a robust kill mechanism against armor if the critical component being affected is buried inside a tank.

ID/pt-24

no

ID/pt-25

Possibly, particle beam or full up exoskeleton.

ID/pt-26

I-Yes.

II-No.

ID/pt-28

Yes. I think the non linear battlefield is 1870 cavalry doctrine. Get supplies at the Ft. - ride out until you are 1/2 empty and return. Logistics is going to be the killer.

ID/pt-29

Electric drive and exoskeleton soldiers are probably beyond 2015.

ID/pt-30

Not all technologies are equal. Some are in their infancy like HPM, ET... Some are very well developed (rocket motors, guidance & control...) All were assumed to come to fruition by 2015. They will not.

ID/ra-01

That a 3rd world country, even if very rich, could shoot down US satellites. The country could have a missile or a directed energy weapon but could not have the space surveillance network to allow it to track and discriminate the right satellite. It requires a worldwide network which only the US & USSR have or are likely to have. China because of its geography could have. It's more a function of spanning 12,000 miles than technology.

ID/ra-02

Only in aggregate, that is I doubt budget will pay for more than a fraction of it all.

ID/ra-03

No.

ID/ra-04

The Exoskeletal system does not appear to be practical for low intensity environments/jungle warfare. Weight and bulk size must be the limiting factors.

ID/ra-05

Yes. Conversion of what can be done in the lab to what we are willing to pay for - give the soldier.

ID/ra-07

Over and Over.

ID/ra-08

Funding of needed technology.

ID/st-01

NO

ID/st-02

No.

ID/st-03

Versatile HPM weapons.
Portable pulse power technology in megawatt region.
Cheap satellite launch capability.

5. Inherent Capabilities. Similarly, were there any assumptions about the "inherent capabilities," i.e., those capabilities of the US force not associated with a particular system that you believe were not warranted?

ID/co-02

Space sensors

ID/co-03

Some of these capabilities are probably more than 25 yrs off, but they are reasonable.

ID/co-04

No.

ID/co-05
No.

ID/co-06
Ok.

ID/co-07
Our willingness to know other languages and customs when fighting in SWA. Yes, we cannot change our looks to be able to blend in that much - but there should be more concentration on changing attitude to learn more languages and be able to do some of our own humint collection. Language transcriber may be o.k. technically, but will still be a big insult to others. I think, that we don't care enough to learn their own tongue when on their soil.

ID/co-10
No.

ID/co-11
No.

ID/ga-01
NO

ID/ga-02
The ability to synthesize intelligence information from sensor in "real time" is not good with our current systems. As the number of battlefield sensors increases, the problem becomes geometrically harder.

ID/ga-03
The ability to establish sufficient force in the area of operations given the topographic and climatic conditions and the existing political-military situation.

ID/ga-05

Yup!
Perfect communications.
100% knowledge of where the enemy is.

ID/oa-01

Air and sea lift of hardware overstated. The fast timing in the European scenario was probably unrealistic; historical evidence on movement rates simply does not appear to support.

ID/oa-03

Probably our ability to deploy was over-rated vis-a-vi our ability to employ. We seemed to "assume away" deployability and focus on our employment plans. This is a particularly germane issue as we move toward a lighter, more flexible force that must be rapidly deployable for any type or level of conflict.

ID/oa-04

NO

D/oa-06

NO

ID/oa-08

I do not think the technologists present were aware of the inherent capabilities of space sensors and weapons to support tactical missions. Just a feeling. They were not antagonists.

ID/oa-10

NO. However, much discussion centered on sensor capability and reliability. I believe the consensus was that we couldn't depend on having "perfect" sensor suites. Needed a person in the loop.

ID/oa-11

That we could easily generate a winning force in SWA. Our ability to lift a heavy force and move it to contact on a reasonable time line is in question.

ID/oa-13

No

ID/oa-14
No

ID/ob-03
Not really.

ID/po-01
Force ratio's - SWA scenario.
Enemy forces consisted of 8+ div. modern, capable, heavy force.
Attacking this size force, half-way around the world with only two U.S. Div is not realistic. Depending on missiles/TGTM systems to close this gap is a no go!!

ID/po-03
NO

ID/po-04
1. We seem to be over optimistic about the potential intelligence to be gained from sensors.
2. We seem to be over optimistic about our ability to kill enemy soldiers with technology and avoid expending human lives.

ID/po-05
NO

ID/pt-01
1. Sensor/Intelligence Capability
2. Some of the abilities to inject force and sustain it.

ID/pt-02
No - Approximate parity of enemy forces was assumed.

ID/pt-03
Yes: Will to be ready to deploy large, other-than-light forces. REFORGERS take many months of planning. Panama, - just cause - took 6-9 months, US ability and will to make such deployments evidenced by frequent practice towards random (not just Germany & Korea) is not evident.

ID/pt-04

Don't think so

ID/pt-06

Ability to deliver mass quantities of long range
missiles/artillery.

Resupply ability of long range munitions.

ID/pt-07

Still, too many assumptions made about availability of food,
water & ammo.

ID/pt-08

Long term technical superiority.

ID/pt-10

No

ID/pt-11

Not enough realism on role of logistics and how fast we
would run out of bullets in intense sustained fight with
numerically superior force.

ID/pt-15

We always over estimate our capabilities - especially re-
supply.

ID/pt-16

NO

ID/pt-17

NO.

ID/pt-18

No

ID/pt-19

There is always a discussion about inherent capabilities. The once assumption I disagree with is that more sophisticated is better. The human operator can only handle so much, so many decisions. As the weapon systems develop, we must always include the operator and the training and operating capability.

ID/pt-20

no

ID/pt-21

?

ID/pt-24

no

ID/pt-25

National will-to-fight a protracted (multi-month) conflict.

ID/pt-26

I-Yes.

II-No.

ID/pt-27

Chem/Bio Detection and Warning - we aren't there yet. People expect to be hit with CBW but don't appreciate how many and what type of sensors they need.

ID/pt-28

NO!

ID/pt-29

NO

ID/pt-30

Weather prediction will still plague us.

ID/ra-01

Exoskeletons? I think its farther out.

ID/ra-02

I question ability to use unless great strides made in training.

ID/ra-03

No.

ID/ra-04

No, it appears that the LATAM group used as much practicality and realism as possible in the play of the wargames.

ID/ra-05

No.

ID/ra-07

Somewhat over optimistic in terms of kill capability and sustainability.

ID/st-01

NO

ID/st-02

No.

6. Air Land Battle Future Concept. As a result of TBSWG II, have you developed any new insights about the evolving ALBF? For example, do you believe that the required technology will be available to execute the concept?

Or that the concept could be changed in any way to take better advantage of available technology?

ID/co-02

Not as a result of TBSWG II.

ID/co-03

I don't think the tech will be there to implement the concept as it is currently envisioned. Sensor systems are vulnerable and human input is needed to confirm the sensors.

ID/co-05

Still some question concerning RSTA (knowing where the enemy is) and deployment.

ID/co-06

We don't have or can't afford the concepts and logistics to execute first cut of ALBF-C. We have to work with increased maneuver.

ID/co-07

Players still cling to many of the old concepts about battle - but in TBSWGII they were changing more to see the non-linear battle.

ID/co-08

The concept should be further evaluated to consider its application when a variety of conditions exist, eg. MOUT, and extremely long ranges such as SWA, enclave in U.S.

ID/co-10

Not particularly applicable to SOF.

ID/co-11

Need to be more aggressive about:

1.) Range of fires.

2.) Ability to "dial in" lethality (to minimize collateral damage).

3.) Other features to give commander very high degree of control over collateral damage.

4.) Ability to "orchestrate" fires in context with robust picture of the battle and commander's battle philosophy.

ID/ga-01

Two things can prevent:

1) money

2) Doctrine/organizations evolved from older ones instead of developed anew.

ID/ga-02
NO

ID/ga-03

The concept of forward positioning of "fires" without adequate protection invites disaster. As a minimum, some balance of the combined arms may be a pre-requisite to success, wherein maneuver units are held back pending attack of the enemy by fire. The multiplicity of targets for "long range" fires may subject our own long range fires to totally unacceptable risk and equally disastrous results for reserved positioned maneuver units. Examine this proposed concept in the light of the principles of war.

ID/ga-05

I am concerned that ALBF is being built on some weak assumption (e.g. 100% RSTA) and with a heavy bias to heavy force combat.

ID/oa-01

Scenario for Europe needs revisiting. I felt I was hearing that both Europe and SWA were chosen to validate ALBF-C without permitting enough realism. In fact, SWA raised serious issue about Blue "telegraphing" his operational plans that I believe will be a problem also in a CFE scenario in Europe.

ID/oa-02

Believe the technology will be there if we are willing to prioritize the tech that supports it and fund it appropriately.

ID/oa-03

YES. My insights have improved greatly. However I do not believe that ALBF can be legitimately or clearly applied over the full spectrum of conflict, particularly in SOF or LIC. My frank opinion is that ALBF is still fighting a European scenario, heavy forces. I do not believe the sensor/sensor fusion technology is yet ready. Maybe five plus years off. I believe ALBF needs to be supported by companion strategies to allow us to more readily adapt to low-mid intensity conflicts and SOF.

ID/oa-04

ALBF does not apply to jungle warfare in LATAM and may not apply to SWA either.

ID/oa-06

The concept is still evolving, but in a more rational direction.

ID/oa-07

Need to integrate the air...land battle. We tend to fight the land battle in a vacuum. Get with air counterparts and try war gaming in 2015 and see if you don't go to a different approach.

ID/oa-09

Knowing the location of the enemy at all times in all locations will not be possible.

ID/oa-10

If we believe in the non-linear battle, need for synchronization and "look deep." "Strike deep" imperatives, then space-borne and UAV systems are essential for success.

ID/oa-11

Concept from a Support/Sustain standpoint is very transportation dependent, and may fail because we are still thinking the WWII Theater layout as we design systems and support methodologies.

ID/oa-12

The premise of knowing where the enemy is has serious doubts.

ID/oa-13

Just heightened concern. Especially about the level of knowledge assumed about the enemy.

ID/ob-01

Sensor technology is critical. Concept will not work at all without detailed knowledge of disposition of enemy forces.

ID/ob-03

If decisions are made and supported by the Army leadership and Congress, I believe the technology will be there. It may get transformed and transmuted during the process, but "it" (or whatever "it" becomes) will get there.

ID/ob-05

Do not believe in universality of ALBF. For future conflict (small, dirty expedition) CAS probably more dangerous than useful - we did not look at fratricide.

ID/ob-06

Yes - Must always consider how we will train these new systems.

ID/po-01

Basic premise of U.S. ability to detect and engage at such ranges may be viable, but, to rely on such capability as the primary defeat mechanism has historically proven flawed and must be viewed in the future with considerable skepticism.

ID/po-02

I have a fear that the ALBF concept will become "technology-based" as opposed to "technology-supported."

ID/po-03

Non-linearity of battle, geo-political aspects, role of psyops and impact of soldier systems will cause revolutionary changes to doctrine.

ID/po-04

1. ALBF depends too heavily on firepower from arty.
2. ALBF will have serious logistical problems.
3. ALBF has too few infantry men.

ID/po-05

Supply the force will continue to be ALBF biggest problem and perhaps unsolvable.

ID/pt-02

Developed better understanding of ALBF. Most proposed systems and technologies could be developed.

ID/pt-03

ALBF success hinges on C2I. ASAS progress does give confidence that this key enabling technology is moving forward at a sufficiently rapid rate.

ID/pt-04

I think concept has weaknesses with respect to:

- Defining perfect knowledge requirement. Not required. Not possible.
- Massing on wrong target to cause exhaustion of our supply of fire.
- "No spare parts" and therefore no way to get back to be reconstituted.
- Excessive demand on human performance because of "agility" requirement.

ID/pt-05

I don't think that you can defeat an enemy in Europe, SWA, LATAM solely with sensors, sensor fusion, & long range fires however precise.

ID/pt-06

The concept of deep strike must be at some point supplemented with a direct fire strategy, and offensive attack strategy and not be adapted or formed into a defensive long range concept only.

ID/pt-07

I don't think perfect knowledge of the battlefield will be there - particularly in jungle - Mentally & physically alert soldier will be a "must".

ID/pt-08

Greater emphases on deception.
Increased autonomy.

ID/pt-09

LOGISTICS is unclear as how it will be done.

ID/pt-10

The concept generally is not far-reaching. It is too limited by conventional/existing technology & hardware limitations. It probably is only valid for the next 8-10 years. There should be a plan that will encourage quantum leap technology.

ID/pt-11

Critical that log resupply can be done in dispersed mode, as needed, not at 48 hr. increments. Resupply must know where units are and have some protection from chem. attack.

ID/pt-12

The only obvious incompatibility is deployability. Solutions are not obvious.

ID/pt-13

I don't believe the concept should ever be frozen; battle evolution won't ever stop, and neither should the concept formulation, technology development or fielding of systems. To do otherwise, leaves the Army at peril of technological surprise or scientific breakthrough (or, worse yet, both).

ID/pt-14

I think the ALBF as it was presented is limiting in regards to the capability of the future.

ID/pt-15

Concept (whatever that may be) is bound to be delayed due to unavailability of technology envisioned and/or declining resources.

ID/pt-16

ALBF will work in Europe and SWA but not as effective in LATAM. It can take advantage of some of technology discussed by 2015. A lot will not be available like an all electric tank.

ID/pt-17

I don't believe ALBF can be applied blindly to all potential future combat situations. I think there needs to be more emphasis on quick deployment - air delivery - roll on/roll off. Can't wait for the ships.

ID/pt-18

No - Assumption that you will know where the enemy is at all lines is unrealistic.

ID/pt-19

I think the concept is fair given the current force projection and the world situation. I, however, within my Air Force "view", think that more emphasis should be given to how the Air Force can help the Army fight a better fight, and win. Much of the wargaming was dedicated (or may well be the best way) to armor and land-land battle and very little on the Air portion. Maybe a combined Air Force/Army TBSW should evolve.

ID/pt-20

Don't believe C3I will be avail to support the distributed forces; ditto logistics.

ID/pt-21

Don't plan on the 100% intel on the enemy. It won't happen and we don't need it. Strive for good intelligence most of the time and excellent intelligence when you need it and then expend the assets to get it - - take a snap shot when you need to.

ID/pt-22

As stated, ALB-F requires dramatic "lightening of the force" - not only the fighting equipment, but the support systems - and a comparable reduction in rate of consumption of fuel and ammo. Required technology is/will be available, but mindsets need revision - e.g., EM-ET. Powder guns are not light, and never will be.

ID/pt-24

Concerned about logistics, to include reconstitution, in the ALB concept. I don't see the mobility, flexibility, and decentralization of the logistics to keep pace with the non-linear fighting tactics.

ID/pt-25

Not enough attention paid to countering adversaries application of same approach i.e. how to attack his dispersed assets.

ID/pt-26

As previously stated, the whole ALBF concept for contingency operations is suspect for 2015.

ID/pt-27

RISTA is most important and yet may be most vulnerable. Speed is still imperative but both smoke and CBW stops everything.

ID/pt-28

We need to spend big \$ on Logistics or get out of the non linear battlefield environment!

ID/pt-29

The concept is not well suited to LATAM or to the taking and holding of real estate; if the enemy force is the objective it's OK...but not for platoon ops in the jungle or retaking an oil field.

ID/pt-30

ALBF is very vulnerable to failure since the sensor technology needed plus command and control are not currently getting the proper levels of RDT&E.

ID/ra-01

I think the weak link is in logistics. ALB-F can be done - for awhile, but I really don't know how we can resupply them, principally with power (fuel) or ammo.

ID/ra-02

Technology will be available but concept can't be executed as stated because both sides will have it. Soviets first wrote about it in 1920's. They have been working toward achieving same concept already for 65 years.

ID/ra-04

Think light, Quick-in & out
Think deployability
Think self-staining
Think as a task organized force
Think automation

ID/ra-05

Yes. I think that the statement that we will have perfect knowledge (100%) about the opponent is specious. There will always be a degree of uncertainty/level of counter measure. Bad assumption.

ID/ra-07

Our development cycle is too slow - Soviets will have fielded 2 incremental improvements to air and land fighting systems by the time (2015) the we will have developed and are ready to test our next incremental improvement. Quantum technological advances in a full spectrum of requirements needs to be pursued.

ID/ra-08

The concept that we will know almost all the time the location of the enemy is unsound. The fog of war will exist in 2015. Reliance on sensors is too heavy.

ID/st-01

It should be available by 2015. If it's needed sooner - and I believe it will be - there will be shortfalls. We can't see as well as we need to, and we don't have the needed mobility and range of our weapons.

ID/st-02

Technology is or will be available. We must prioritize systems and manage the tech insertion intensely to bring about the capability.

ID/st-03

May not be applicable in special forces scenarios - worked acceptable well in European scenarios.

7. The Army as a Contingency Force. What are the major weaknesses you see with the Army operating as a contingency force?

ID/co-02

Forced entry against heavy threat without allowing sufficient time for force generation.

ID/co-03

?

ID/co-05

Deployment and sustainability/reinforcement.

ID/co-06

Deployability and sustainability deficiencies. Also, exploiting new technologies quickly.

ID/co-07

Can't get to where it needs to be fast enough and can't get the equipment there either. Intra-theater transportation as well as strategic mobility and deployment always get deferred until the combat units are structured. Need to concentrate more on the logistics of such operations.

ID/co-08

Forces must be tailored for specific missions. Heavy forces may be untenable for any contingency unless lift problems can be solved.

ID/co-10

Need to have many sets of equipment readily available for use.

ID/co-11

Ability to get there.
Ability to control/minimize collateral damage.

ID/ga-01

Long range support, intrusion, extraction

ID/ga-02
Intelligence & Deployability

ID/ga-03
The primary weakness is the inability to be self-deployable, and the paucity of support from other services and commands to achieve an acceptable power projection capability in the rapid response times required.

ID/ga-05
There seemed to be, on the part of our military advisors, a real disposition to built up a large infrastructure prior to commencing hostile action. This does not appear to be realistic, perhaps we didn't have any LID folks involved.

ID/ga-06

ID/oa-01
No joint processes - commo, SOP's, task distribution - with other services. (Prima donna). Competing with Marines on their territory. Failures in Panama (no Civil Affairs people, or policies for this area).

ID/oa-02
We rely on another Service (AF or Navy) to transport us. Power projection is a joint effort unlike the Navy who can do it all internal.

ID/oa-03
Clearly, our deficiencies in strategic mobility planning and management. Notice I did not say assets, i.e., cargo aircraft and ships. We simply are not getting any more, in my judgement. We need to be able to much more rapidly plan, compose, and deploy our equipment and personnel, using ADP and AI, to make better, more rapid use of the assets we have.

ID/oa-04
The realization that the Army has to be self sufficient in terms of supplies, comm, etc. and can not rely on the host country for anything.

ID/oa-05

1. Insufficient transportation assets
2. Insufficient lethality for light forces

ID/oa-06

Ability to quickly deploy with required force to a major war (SWA/Europe).

ID/oa-07

- Deployment
- Employment
- Force adaptation to environment

ID/oa-08

See question #3

ID/oa-09

Deployment - Getting the right materiel (combat force) on time to have an impact on the outcome of a situation.

ID/oa-10

Deployability and sustainability.

ID/oa-12

In general, it will have to be lighter force than envisioned by most to be rapid and effective.

ID/oa-13

Lack of political/social/economics interface. A small in/out surgical strike is possible - its the follow on that is hard.

ID/ob-01

Deployability. Sea Lift/Air Lift inadequate. Self deploying systems needed. Same for logistical support.

ID/ob-02

Deployment is so time consuming it seems impossible to engage in high-intensity conflict with only short warning times and no prepositioned forces.

ID/ob-03

- 1.) An emphasis on professionalism that somehow loses the idea of the citizen-soldier.
- 2.) It makes an assumption about America's role in the world that has not been thoroughly and publicly discussed.

ID/ob-05

Too heavy. Need soldier enhancement effort now. DMBI problem forces us to load up force to compensate. Look at troop list for Panama. Fire discipline (for benign or partially friendly environment) needs improvement (collateral damage).

ID/ob-06

How to train for various contingencies/missions.

ID/po-01

Strategic mobility.

ID/po-02

We can't get there - insufficient planes & ships - slow political processing.
We can't get there in time.
We can get there in time with enough troops, supplies, support, or structure.

ID/po-03

Training
Equipping for battle under changing rules of engagement.
Command/control

ID/po-04

1. Strategic mobility assets.
2. Logistical support of contingency forces in areas with little to no logistical infra-structure.
3. Much of the army's logistic structure is in the reserves.

ID/po-05

Lack of the military/political machine to want to fight a war of attrition.

ID/pt-01

Deployment, Supply, Flexibility of Doctrine

ID/pt-03

- Lack of air and Sealift responsive to Army time requirements.
- Lack of survivable anti-armor forces
- Inability to deal with terrorist tactics
- Difficulty in conducting MOUT. (This is much more a problem of training technology than of weapons technology).

ID/pt-04

Deployment, Sustainment

ID/pt-05

There are special requirements in each area. Units should be trained and equipped to fight a specific contingency, i.e. units should specialize.

ID/pt-06

Effective soldier operation.
Transport of soldiers to battle, protected, fully capable.
Light assault system possessing tank lethality and survivability.

ID/pt-07

Knowledge of the area, deployment, logistics.

ID/pt-08

Timely acquisition of state-of-the-art systems.

ID/pt-09

No, really a deep strike air/sea lift capability.

ID/pt-10

Ability to provide logistic support. Just Cause demonstrated our mobility to rapidly provide resupply. If the conflict had lasted any length of time with any formidable resistance we would still be trying to get supplies out of supply distributions. Also there needs to be a national will.

ID/pt-12

Deployability, tailoring equipment and training to that role.

ID/pt-13

Political and economic constraints. Beyond those givens and unavoidable, get away from the last war (WW III in Europe) and work on the likely contingencies - Korea, Central Asia, et al.

ID/pt-15

Army units not adapted for fighting in all of the various environments, cultural, etc. areas throughout the world. Probably need more specialized units for specific operations for which they are trained and equipped.

ID/pt-16

Transporting of an effective force to the conflict area.

ID/pt-17

I don't believe ALBF can be applied blindly to all potential future combat situations. I think there needs to be more emphasis on quick deployment - air delivery - roll on/roll off. Can't wait for the ships. We are too slow & require too much LOG.

ID/pt-18

The wide range of different environments that the Army will have to operate in. Optimizing equipment for any one environment may lead to significant degradation in other environments. Trying to satisfy all environment in a single piece of equipment may lead to poor performance in all environments. No good way exists to allocate resources across requirements.

ID/pt-19

Insertion, extraction, and sustainment.

ID/pt-20

Wpn capabilities will become noncompetitive due to lack of congressional spt. Lose leadership edge.

ID/pt-21

Transporting the force required to do the job over the distances we can normally expect. This is where some thing like Ground Based Laser excels - - you transport only the energy not the delivery means. There are other means also that use this concept. The high speed aircraft delivering the sophisticated infantry is another example. Reaction time is often proportional to the amount of force required.

ID/pt-22

Lack of lift capability.

ID/pt-23

Transportation - Air lift - Sea lift.

ID/pt-25

Ability to deploy the existing force. Willingness to make a major change in present heavy force strategy and commit sufficient R&D resources to develop weaponry, more suitable to a deployable force.

ID/pt-26

The Army is not structured to operate as a contingency force against a capable and unscrupulous adversary.

ID/pt-27

The time and transport necessary to move it.

ID/pt-28

Get in! and get out!

ID/pt-29

- Only a limited number of contingencies can happen simultaneously.
- We must have many different packages for the wildly varying possible contingencies.

ID/pt-30

Deployment
Assembly of Forces
Proper Sustainment

ID/ra-01

#1 is deployability. Army is too heavy.

ID/ra-02

Not sure what this means but if it means rapid reaction force I don't see any special weakness. Maybe lack of mental flexibility.

ID/ra-03

- Deployability assets - drives requirement for soldiers to kill tank/helo/air targets from own assets versus being able to bring in other systems to do it.
- Lack of C2 capability - satcom links are few & owned by everyone except the Army.
- Lack of coherent policy on contingency ops.

ID/ra-04

The major weakness is not the Army but the services that support the Army in deployment.
Another weakness is the lack of integral all-weather attack aircraft for close air support. This is a low priority issue of another service, but should be Army high priority to reduce attrition.

ID/ra-05

None.

ID/ra-07

Deploy too late. Entrapment in prolonged, non-winnable wars.

ID/ra-08

Sealift to get the Army to certain locations, i.e. SW Asia.

ID/st-01

- Deployment
- Countermine capability

ID/st-02

In-time transportation complete with required logistics and support.

ID/st-03

Deployment OCONUS.

8. Space. How do you believe the Army can best exploit Space to enhance the capabilities of the tactical force?

ID/co-02

Comms

ID/co-03

Provide the tactical info to the decision maker.

ID/co-04

Have access to both ELINT and weapons platforms in a cheap sat mode (i.e. launch on demand).

ID/co-05

Insure we are actively involved in space technology systems that support our warfighting concept.

ID/co-06

Information Transfer.
Pos/Nav.
Sensor.

ID/co-07

Make friends with everyone who owns any space assets.
Leverage their work towards Army interest by investing in joint agency programs.

ID/co-08
Intel, C2, Pos/Nav.

ID/co-10
Commo links.

ID/co-11
Be able to use data from all space systems in real time.
Needs to be able to put its own systems (affordable ones) in space.
Needs to be able to fight against systems that can attack it from space.
Needs to be able to attack ground targets from space.

ID/ga-01
COMMO, GPS, INTEL

ID/ga-02
Through Joint/National Command Authority.
This will (must) never be an "Army Only" show. All services will depend heavily on Space assets.

ID/ga-05
1) Get the people and equipment in place now to directly utilize national assets during times of hostility.

2) Work with the DoD to develop the capability to flexibly deploy RSTA/Commo/etc satellites when and where needed.

ID/oa-01
Commo Light Sats (which won't be cheap sats).

ID/oa-02
Given a viable concept of employment, the Army could invest in "cheap sats" both surveillance and commo to launch on demand. The concept would have to address force structure issues, costs and orbits/launch vehicles.

ID/oa-03

Without question, I believe we need to exploit space to give us:

1. Battlefield information. Space is the best "sensor platform" we could ever hope for!
2. Factory to foxhole "just in time" satellite-based combat resupply system.
3. "Just in time" satellite-based deployment planning and execution system.

ID/oa-04

Communications and reconnaissance information could significantly enhance ground operations.

ID/oa-05

1. Recon
2. Comm
3. Weather data collection and relay

ID/oa-06

- C3 down to low levels.
- Harden space systems against CM.

ID/oa-07

Real time interface /intelligence for ground force commanders.

ID/oa-08

Col. Jackson ASTRO should be funded for a world-wide mission of physically demonstrating space related capabilities plus beefed with an engineering and analytic/simulation capability to investigate the operational effectiveness of space vs. terrestrial solutions.

ID/oa-09

Communications
Navigation
Intelligence

ID/oa-10

Focus on assured communications.
Develop special purpose small tactical satellites to enhance IPB.
Exploit fullest potential of GPS to enhance navigation for the individual soldier, teams, and tactical level units.

ID/oa-12

Real time relay of information

ID/oa-13

Pos/Nav & COMMS

ID/oa-14

Use it as a means of identifying enemy position and movement.

ID/ob-01

As high ground for:
A.) Seeing.
B.) Relaying communications.
C.) Firing upon enemy deep and close.

ID/ob-02

Really not sure whether it is best to:
1.) Press for TACSATS. or
2.) Press for much-enhanced national capabilities.

ID/ob-03

Satellites/Comm/Intel.
I would like to see soldiers on space platforms as explorers and scientists.

ID/ob-05

Less useful in LIC arena unless quickly launchable to give data for specific area.

ID/ob-06

Ultimate "High ground". Position location.
See the battlefield.

ID/po-01

Redundancy
Short notice reaction to regional requirements.

ID/po-02

Navigational assistance
Anti-satellite warfare
Satellite protection
Intelligence
Communications

ID/po-03

Future battlefield & soldier management very dependent on space.

ID/po-04

1. Geographical positioning systems.
2. Intel gathering assets.
3. Communications.
4. Target ID & designation.

ID/pt-01

Commo, Intelligence

ID/pt-02

- Pos/Nav
- Surveillance
- Develop tactical satellites.
- Ground Base Laser Systems could be valuable if developed.

ID/pt-03

By developing the intel data distribution system to route the imagery and target data to the soldiers who can make use of it (without sending it to everyone!). This intel distribution must be near real time and precisely tailored.

ID/pt-04

High leverage for Army:

- weather - already at division level.
- terrain - beyond SPOT.
- POS/NAV - reduced cost of & prolong battery life of receiver.
- Communications - get more SCOUT, SCAMP terminals to work with FLTSATCOM, MILSTAR.

ID/pt-05

Space can best be used as high ground from which to do data collection - remote sensing etc.

ID/pt-06

By using or adapting commercial comms and weather satellites. The KE Weapon based in space will not possess sufficient mass to defeat systems on the ground assuming a direction system is developed.

ID/pt-07

GPS.

Sensors to gain knowledge of the battlefield.

ID/pt-08

Intelligence - tactical and early warning.
Communication relays.

ID/pt-09

Eliminate high classification - SI - associated with RISTA birds; down link directly to fire control systems.

ID/pt-10

Provide a reliable/constantly available source of data for comms, POS/NAV & intel.

ID/pt-11

- Recon.
- Comm.
- Pos/Nav.
- Weapons platform (if we are willing for others to do same.)

ID/pt-12
C3I exploitation

ID/pt-13
Decidedly. Exploitation isn't just limited to communications and sensing; current initiatives are making space even more affordable, enduring and tactically advantageous. Just as expenditure of fossil fuel reserves won't require returning to the house and buggy, neither should the Army back away from space in an era of declining budgets. Leveraging can always be done.

ID/pt-15
Navigation aid.
Communication (quicker, greater distances, etc.)

ID/pt-16
Knowing what is happening on the battlefield in a real time mode must require the use of National assets. It also must concentrate on cheap launched multi systems for survivability.

ID/pt-17
See item 3 (space-based recon and Pos/Nav systems). Space under all but the most strategic conflict conditions offers a safe (relatively) haven for recon/surveillance, positioning, etc.

ID/pt-18
Positioning of assets, Command and Control.

ID/pt-19
Increase numbers of satellites in space for detecting more things around the world. As we withdraw from certain facets of the world we will need more info on the world (recce/intel) to anticipate the conflicts.

ID/pt-20
Surveill. & Wpn. Platforms.

ID/pt-21
First we have to get involved seriously. We need Army personnel who understand space technologies and then leverage the Army Strategic Defense technologies that are being developed.

ID/pt-22

Use satellites to help know where the enemy is almost all the time - and to enhance communication.

ID/pt-23

Surveillance Satellites under control of the Army (Tactical Satellite System).

ID/pt-24

Series of low cost Army tactical satellites.

ID/pt-25

Obtain direct real time access to national intel assets for real time tactical use.

ID/pt-26

Develop, deploy and operate its own system of proliferated, low cost, light weight, high tech satellites.

ID/pt-27

Make sure it can launch its own cheap sats.

ID/pt-28

1. C3I.
2. Pos/Nav.

ID/pt-29

We must have our own satellites and the ability to launch new ones on demand.

ID/pt-30

Fund its own organic resources and put them under Army control.

ID/ra-01

Tie in better w/ National Systems. Develop a TACSAT which can provide intel (NIRS 4-5 type data) as well as a COMSAT constellation tailored to a theater operation. Use existing receivers & processors.

ID/ra-02

Whole range of needs but location of friend and foe is 1st one. Second is commo, 3rd may be attack of weapons.

ID/ra-03

- Communications satellites
- Use of sensor systems to enhance knowledge at operational level.

ID/ra-04

Increase the tactical commander's capability to communicate & locate but expendable low cost, short-lived satellites. This capability is required at the JTF level.

ID/ra-05

Break out space-based recon. from the "green door." Does anyone really think we're not collecting intell from space?

ID/ra-07

Take the lead.

ID/ra-08

ID/st-01

Use for seeing the tactical and operational levels. Then be able to respond quickly to information. Eventually there will be space delivered weapons.

ID/st-02

Space is a must location and identification of enemy. For this use National Assets. Also must be able to insert "cheap Sat" to replace above if necessary. Can use space for orbital KE weaponry.

ID/st-03

Identification and tracking the enemy with precision at all times.

9. Innovative Concepts. What was the single most innovative system or concept you heard discussed?

ID/co-03

Electric resupply (repower) vehicle.

ID/co-04

Transmission via RF or other means of disabling computer virus.

ID/co-05

Future soldier system, robotic air vehicle for resupply, biotechnology.

ID/co-06

Individual Soldier Enhancements.

ID/co-07

1.) LATAM - Turning jungle growth directly into fuel to power vehicles and equipment.
2.) SWA - Make it a part of future sales contracts to foreign countries that we be able to use their equipment to fight if war is necessary in proximity of their turf rather than having to ship ours.

ID/co-10

Bio/Medical enhancements.

ID/co-11

Individual Soldier Enhancements.

ID/ga-01

GPS

ID/ga-02

Soldier performance/physiological monitoring for both enhancement of capabilities and information on soldier abilities in "real time".

ID/ga-05

The concept of really working with the USAF and U.S. Navy to design an Army force that can rapidly put a Corps - sized unit anywhere in the world.

ID/oa-01

Future Soldier system.

ID/oa-02

Converting cellulose to methane as a fuel.

ID/oa-03

Again, I'd have to say it was the exoskeletal suit, followed by the all-electric vehicle/"charger" fleet. Regarding the exoskeletal suit, I was somewhat concerned about what I perceived was a lack of clarity of our requirements (if any) and a general insufficiency of information on the technologies available today, e.g., robotics, power generation, etc. to develop such a system. No one seemed to be legitimately knowledgeable!

ID/oa-04

Soldier survivability technologies

ID/oa-05

Enhancing capabilities of individual soldier

ID/oa-06

Biotechnology support to individual soldiers.

ID/oa-07

Arnold - If they could be air dropped and satellite controlled... great force multiplier.

ID/oa-08
Exoskeletal soldier!

ID/oa-09
Using robots for urban combat.

ID/oa-10
Soldier Physiological Monitoring System.

ID/oa-13
exoskeleton

ID/ob-01
Individual Soldier Medical Monitor.

ID/ob-02
Tunable obscurants with matching goggles.

ID/ob-03
Exoskeleton.

ID/ob-05
Soldier enhancement (low tech in comparison).

ID/ob-06
Exoskeletal system.

ID/po-02
Anti-helicopter mines.

ID/po-03
Not one specific system or concept, but good discussion to
better define concepts & technology

ID/po-05
None

- ID/pt-01
Future Soldier System (w/o Exoskeleton)
- ID/pt-04
Enhanced soldier system.
- ID/pt-05
The soldier computer integrated with GPS POS/NAV, local area
commo & data link, & biomedical sensors.
- ID/pt-06
High Technology Light Assault Vehicle System.
- ID/pt-07
Flying Jeep
- ID/pt-08
Chemical spectrum obscuration with spectrum programmable
vision.
- ID/pt-09
Soldier System.
- ID/pt-10
Soldier physiological enhancement.
- ID/pt-11
Anti-material weapon.
- ID/pt-12
The use of spectral smoke in combination with tuned thermal
imaging.
- ID/pt-13
Medically enhanced body functions.
- ID/pt-14
Did not hear any real innovative system concepts proposed.

ID/pt-15

Soldier computer system underlies soldier performance enhancement area.

ID/pt-16

The future battlefield will depend on artificial intelligence, high speed computers. A system to induce a virus or false data could counter any of these advantages.

ID/pt-17

Exoskeleton suit. Spray on antichemical agent.

ID/pt-18

Future soldier system combined with Biotechnology sustenance kit.

ID/pt-19

Soldier Sustainment, Exoskeleton.

ID/pt-20

- Personal IFF of other personnel.
- Medical enhancement of personnel performance.
- Sensors, deception, discrimination.

ID/pt-21

The Exoskeleton Soldier Enhancement System.

ID/pt-22

"Tuned obscurants" - smoke - deny enemy his vision, retain vision for us.

ID/pt-23

Family of teleoperated missile systems.

ID/pt-25

Spectral obscurants matched to tunable IR goggles.

(Question A.9.)

ID/pt-26

Proliferated, low cost, light weight, high tech, satellites.

ID/pt-27

Vertical injection under cover of smoke/incap in MOUT.

ID/pt-28

Soldier enhancement!

ID/pt-29

Spray on "scotch guard" for human skin.

ID/pt-30

Computer viruses applied to C3I.

ID/ra-01

Revolution in software development. (Object oriented software).

ID/ra-02

Medical anti-nerve agents etc., can't list (classified).
Most items have been in literature for some time.

ID/ra-04

Light weight Powerful, long lasting Battery.
Flying jeep - innovative but doubtful if practical.

ID/ra-05

Future Soldier System (Exoskeleton Armor).

ID/ra-07

C3CM - viral attack, etc.

ID/st-01

All electric vehicle

ID/st-02

Tunable goggle to deal with full spectrum smoke so that Blue can "own" obscurant environment.

ID/st-03

Spectroscopically tunable gases to render friend invisible to enemy; where special glasses to permit friend to see enemy.

SECTION B. TECHNOLOGY BASE INVESTMENT STRATEGY

This section deals with how you would change the current Army Tech Base Investment Strategy; i.e., what you would do as a result of the insights you gained from TBSWG II.

1. Current Tech Base Investment Strategy. Do you believe the current Tech Base Investment Strategy is generally appropriate to the needs of 2015 as identified in TBSWG II?

ID/co-01

No. Not enough emphasis or money on technologies to enhance the soldier as a system.

ID/co-03

Overall yes.

ID/co-04

Yes, but...

ID/co-05

Yes.

ID/co-06

No. Increase RISTA, Soldier Enhancement, long range fires. Decrease ASM.

ID/co-07

No - too much is concentrated on ASM while in the real world it will not be possible to move the heavy stuff fast enough to make this investment pay off. Spend more on critical technologies and logistics.

ID/co-09

I believe it must adapt to changes in number of armed forces we have in Europe and elsewhere.

ID/co-10

Percentages are o.k. We have no prioritization scheme.

ID/co-11

No.

ID/ga-01

If we are buying more tanks, aircraft, ships at the expense of man portable systems which will make the above obsolete, we're wrong.

ID/ga-02

N/A

ID/ga-05

NO

ID/oa-02

No

ID/oa-03

Not really. The "pie chart" isn't really a strategy at all - just shows how we are spending our money, not why. Further, I saw few SARDA people present at TBSWG II to gain the insights needed to better prepare a good TBIS and Tech Base Master Plan. (ATBMP) Other than Mr. Singley, where are the SARDA folks? The TBIS and Master Plan are too short-sighted! Need to look beyond 2000 to 2015 plus.

ID/oa-04

Generally yes, but not enough emphasis is placed on the individual soldier survivability, i.e. CBW gear, comms, intel, etc.

ID/oa-06
Don't know

ID/oa-08
NO. More money is needed to support space technology.

ID/oa-09
I don't think we have a Tech Base Investment Strategy. We have a distribution of funds for certain problem areas, but no prioritization process or strategy.

ID/oa-10
Space technology integration program is under-funded. A minimum of \$10M/yr. to establish critical mass. Soldier enhancement should have a focused program. Needs a \$20M/yr. for critical funding level.

ID/oa-11
No. Funding in log R&D is very low and will do little to support needed technologies discussed in the War Game.

ID/oa-13
Don't know what the current strategy is.

ID/ob-01
I do not see the linkage. TBSWGII identified some end products but requires further analysis to have impact on TBIS. The rationale for investment in TBIS areas is not changed.

ID/ob-02
Yes, it probably is.

ID/ob-06
Yes - To a degree. We must link TBSWG II to AMM process.

ID/po-01
Generally - YES
See B.2.

ID/po-03

The TB Master Plan is getting close. More \$\$ to integrating 6.2 work into 6.3A ATTD's.

ID/po-04

Generally yes.

ID/po-05

No

ID/pt-01

Yes, but mods are needed here and there with some changes in emphasis.

ID/pt-02

Generally, yes.

ID/pt-03

No.

ID/pt-04

Should be strongly reviewed, including BAST-STAR inputs, and other DOD investments.

ID/pt-05

Needs to explore promising areas and not be strictly requirements driver.

ID/pt-06

Yes, the basic elements and building blocks provide the technology base for systems to build upon for the year 2015, although the majority of funds do, rightfully so, address near term tasks.

ID/pt-08

Yes Army wide - however, adjustments should be made for different mission area.

ID/pt-09

Generally appropriate - needs some more emphasis on soldier

ID/pt-10

Yes

ID/pt-11

Too many new systems oriented toward moving and shooting.
Too little oriented towards logistics and ability to operate in
real world.

ID/pt-12

YES. With the addition of ATTD's to provide an early AMC-
wide focus, the TBIS is valid.

ID/pt-13

No: holding enough information to address; however nothing
from 2 Phases of TBSWG suggests otherwise.

ID/pt-14

It is not appropriate because it is supporting a force
structure that is outdated today, it sure won't work in 2015.

ID/pt-15

No - need to select the 10 +/- most needed capabilities with
their inherent technologies and devote more resources to them.

ID/pt-16

Needs increased attention and priority of individual soldier
needs.

ID/pt-17

No. It needs to be rethought in light of this exercise.

ID/pt-18

yes

ID/pt-19

For these technologies additional resources will be necessary to maturity. More \$\$ in 6.2 to develop these technologies.

ID/pt-20

Yes, generally.

ID/pt-22

No. Not sufficiently oriented on lightening the force, on advanced target Acq. and knowing where the enemy is all the time - if that's really required for ALB-F.

ID/pt-23

Yes

ID/pt-24

Yes, generally.

ID/pt-25

No.

ID/pt-26

No.

ID/pt-27

No. Needs to shift from NG/FS to ET.

ID/pt-28

Don't know!

ID/pt-29

No need to develop our own space assets.
Need to develop electric drive and recharging power source.

ID/pt-30

No. It is 35% short in resources and it is off by 15% variation in project content.

ID/ra-01

I think still too oriented to old world. Need to think lighter - deployable - moving information than steel. Long range sensors, data fusion.

ID/ra-02

Don't know what the "Strategy" is, but we sure need an innovative and highly integrated effort. Need to shoot now for items to field in 2010 and later when threat will again be greater - save money now.

ID/ra-03

No. - Too much emphasis on the hardware to fight Soviet threat.

ID/ra-04

Yes.

ID/st-01

NO. Space and Soldier Systems aren't getting enough emphasis.

ID/st-02

No.

ID/st-03

Yes.

2. Possible Changes to TBIS. If not, what is the single most important change the Army should make in its Tech Base Investment Strategy?

ID/co-01

Change focus from heavy mechanized to light and special ops.

ID/co-02

Joint

ID/co-04

Develop offensive/defensive computer viruses.

ID/co-06

Space.
RISTA.
Soldier Enhancement.
Long Range Fires.

ID/co-07

Put more into logistics because in all the scenarios, even Europe, the things we need will have to be moved to where the battle is. Have each weapon system devote a portion of their budget to logistics also, that is, make it lighter, make sure it fits into a container, etc.

ID/co-11

More investment on soldier enhancement.

ID/ga-01

Develop man portable killing and protecting systems

ID/ga-02

N/A

ID/ga-05

Focus large investments in a few military - unique areas.
Vigorously keep abreast of the commercial technology environment.

Be more decisive in stopping the focused large investments when they either become clearly premature for such investment or when the commercial sector "supercedes" the government work.

ID/oa-02

Investments that pay-off in 2015 will require fewer investments in 6.3A and more investments in 6.2. Need to spend less money on ATTD's i.e., have fewer ATTD's and live with current capabilities while we push hard in 6.2/6.1 multiple fields to pay-off in 2015.

ID/oa-03

IDEA: Using the Tech Base Master Plan (ATBMP) as the "carrier" and the TBIS as the "executor"! We need to use the annual Tech Base Seminar War Game outputs as the planning basis for each year's revision of the TBIS and ATBMP. Is this being done? I doubt it. Capture War Game results and needs in an annex to the ATBMP!

ID/oa-04

Generally yes, but not enough emphasis is placed on the individual soldier survivability, i.e. CBW gear, comms, intel, etc.

ID/oa-06

Enhance soldier capabilities through: Biotechnology, C3, sensors.

ID/oa-07

More generic force - lighter.

ID/oa-09

Develop a prioritization process to develop our most important technologies, project or user needs. Invite SARDA to the TBSWG II. This should help them write the TBMP.

ID/oa-10

Establish a credible space systems development effort.
- TACSAT
- SENSOR (Quick reaction payloads).

ID/oa-11

Increase funding levels for non-weapon system specific R&D. Cull out needed technologies and fund fully.

ID/oa-13

War game this stuff with computer simulation, cost it out, compare it with possible development in civil section, then decide.

ID/ob-03

Maybe the labs should reorganize their programs or maybe the TBIS should be reflective of what is real.

ID/ob-06

Must link to AMM. (Army Modernization Memorandum)

ID/po-01

Need total integration in joint arena. Contingency forces deployed 1/2 way around the world will/must be a total joint package. Integration of Army/Navy/Air Force systems to detect/destroy must be integrated from very start (concept) or they will never come together.

ID/po-02

Recognize that technology will not succeed without the human element. Future war will not be solely remote control, machine-on-machine.

ID/po-05

Realignment of the labs and their responsibilities and expertise.

ID/pt-01

Do Future Soldier System

ID/pt-02

More emphasis on lightweight, mobile vehicle systems. More emphasis on long range precision tactical missiles.

ID/pt-03

Invest more in information technologies; less in munitions (guns, missiles, warheads).

ID/pt-04

Enhanced Soldier system
Deception Technology
Advanced RISTA to CCM deception

ID/pt-05

Focus on individual soldier enhancement, signal processing, sensor fusion, neural networks, AI.

ID/pt-07

More emphasis on the soldier System, less emphasis on heavy force.

ID/pt-08

Yes Army wide - however, adjustments should be made for different mission area.

ID/pt-09

Soldier, RISTA, C3 - Increase in emphasis.

ID/pt-11

More emphasis on logistics.

ID/pt-14

The ALBF needs to be restructured and an appropriate tech-base strategy developed to provide the needed capability.

ID/pt-15

No - need to select the 10 +/- most needed capabilities with their inherent technologies and devote more resources to them.

ID/pt-16

Increased emphasis on low cost smart munitions to increase lightening the force.

ID/pt-17

More effort (\$) on fewer payoff technologies.

ID/pt-19

Also, assure the developmental (6.3B, 6.4) \$\$ and transition mechanism are available.

ID/pt-20

Play detailed exchange games, using performance specified for proposed system. That way, one can eval. the outcome of increasing system X while decreasing system Y; or supplies, or performance levels, etc.

ID/pt-21

Need to invest technology money on CCM technologies to ensure we can make our systems survivable.

ID/pt-23

More concentration on light/lethal system and less on heavy forces.

ID/pt-24

Could be some focus on individual soldier.

ID/pt-25

Strategy to move from heavy force (tank) assets and develop high technology approach to alternate more suitable weapon systems.

ID/pt-26

Low cost, light weight, highly proliferated, high tech satellites.

ID/pt-27

Go against future systems with Emerging Technologies.

ID/pt-28

Put money in logistics!

ID/pt-29

Add either one of above (B.1., your choice).

ID/pt-30

Focus on the Soldier as a System.

ID/ra-01

Initiate a line item for space technology & put some real money in it.

ID/ra-02

Must spend some money on exploiting civil developments.

ID/ra-03

Emphasis on improvement of soldier and power supplies, sensor fusion, command & control, AI.

ID/ra-04

Gear tech towards the soldier & his equipment, and medical needs to reduce attrition.

ID/st-01

Can't say until we analyze where we are after the game.

ID/st-02

Strategy sets predetermined %'s (although approximate) across tech base, ie. NG/FS "X"%, ET's "Y"%, etc. Must be flexible to significantly exceed or not meet these goals for certain technologies, systems if necessary. MUST TAILOR strategy to meet national need.

3. Armored System Modernization. Do you believe the Army's current emphasis on Armored System Modernization is consistent with the insight gained from TBSWG II?

ID/co-01

No.

ID/co-02

Yes, it's not related to TBSWG II.

ID/co-03

No.

ID/co-04

No, other weapon systems need more emphasis (individual soldier, cheap sats, etc).

ID/co-05

Yes.

ID/co-06

No. We've got to get away from tank on tank attrition.

ID/co-07

No.

ID/co-10

No.

ID/co-11

No-shift to more deployable forces and on ability to do long range fires effectively while minimizing collateral damage.

ID/ga-01

NO

ID/ga-02

Past emphasis on Heavy/Forward deployed forces will not meet the deployability constraints of 2015. Note, however, that a "lighter" hence more deployable force does not mean heavy, (in a traditional sense) systems will not be used. We must consider technology to define what we mean by the term "deployable" forces.

ID/ga-05

No. ASM is pretty much an orderly evolution from World War II. TBSWGII looks to revolutionary change.

ID/oa-01

No.

ID/oa-02

No - payoff of ASM is Europe which now has limited potential.

ID/oa-03

NO. ASM in my judgment is (or may be) the victim of short-sighted marketing, in a rapidly changing world. Heavy Force (or Armored System) Mod. is simply not going to fly in today's world. It has never been proven to be cost or operationally effective - and these shortcomings are even more noticeable in today's world of CFE and Low-Mid intensity conflict, vs. heavy. We need to focus on the full spectrum!

ID/oa-04

I don't know enough about the Armed system modernization to comment.

ID/oa-06

Maybe not. I don't believe more armor is the answer. More survivability, yes!

ID/oa-07

Yes, but I doubt the TBSWG II's premise is correct.

ID/oa-09

NO. Our most probable areas of conflict are SWA and LATAM - Don't need large emphasis on ASM.

ID/oa-10

It appears that our focus is on a family of vehicles that is too ponderous to square with the realities of a deployable force without the requisite force projection infrastructure--not enough planes or ships.

ID/oa-11

Absolutely NOT!

ID/oa-13

It needs emphasis - probably more in support of light/deployable systems

ID/ob-01

No.

ID/ob-02

If emphasis continues in heavy armor, that seems inappropriate.

ID/ob-03

Not really, because I have a hunch that someone out there is drawing plans for a 100-ton tank (and he may get it).

ID/ob-05

No.

ID/ob-06

No - ASM too heavy.

TBSWG - briefed that must think "light".

ID/po-01

Agree with what little I know about armored system modernization.

Not same warring groups had a full appreciation for eventual requirement to close, with, and destroy enemy. High tech/long range can help considerably, but requirement to eventually maneuver, close with and destroy is unlikely to disappear.

ID/po-02

YES

ID/po-03

NO

ID/po-04

NO

ID/po-05
No

ID/pt-01
NO

ID/pt-02
Common chassis concept ok. Recent interest in light and medium weight systems should be expanded.

ID/pt-03
ASM goals of component commonality will be obtained by market forces without any deliberate program. Note the component and even chassis commonality in the 1960's era platforms.

ID/pt-04
No. In all 3 sceneries, players did not emphasize tanks, esp. heavy tanks.

ID/pt-05
Yes

ID/pt-06
Yes, heavy systems still have a place on the battlefield, and the concept of commonalty should be retained even if the R&D efforts are channeled into something in a lighter class. Heavy armor in the near term must be countered with heavy armor for the next generation, only in 20 years can technology lighten a weapon & still be effective against heavy armor.

ID/pt-07
Only if Europe scenario played. LATAM - it is totally inappropriate. SWA - Maybe, but to extent that ASM claims 50+% of 6.3A \$, then answer is "no", Army's emphasis on ASM is too great!

ID/pt-08
No

ID/pt-09
No

ID/pt-10
No. The ASM will only perpetuate the need for manned vehicles. ASM will still not be highly mobile.

ID/pt-12
No, but it shouldn't be since ASM is focused on late 1990's and TBSWG II is focused on 2015. This question implies a lack of understanding of ASM. If the question is: Do you think ASM will be executed, based on the changing threat of the 1990's, the answer is NO.

ID/pt-13
Can't address.

ID/pt-14
No, the armored system for future operations is outdated. We can't use tanks forever.

ID/pt-15
No - need light forces - very little need for heavy forces in foreseeable future.

ID/pt-16
Yes, but also requires a light system with same fire kill and survivability.

ID/pt-17
No. Armored System Mod. is more of the same tanks, tanks, tanks,... Lighten yes, more lethal yes, but still vulnerable, etc.

ID/pt-18
No
Given the Army will be a Contingency force not clear that heavy forces are not getting a disproportionately large share of dwindling resources. Except for Europe we do not even have adequate resources to deploy heavy forces to other parts of the world where they could be effectively used.

ID/pt-19

Don't know, honestly don't.

ID/pt-20

Not played - this provided no insights.

ID/pt-21

No - - we are building better long bows - - not preparing for future conflict.

ID/pt-22

Revisit the Armored System Modernization Plan. ASM is certainly not focused on dramatic weight reduction. EM/ET guns, besides not working, are obviously heavy.

ID/pt-23

No

ID/pt-24

Yes - Very much so - should be extended to other systems - viz trucks.

ID/pt-25

No.

ID/pt-26

No.

ID/pt-27

If stretched over a longer period at reduced cost.

ID/pt-28

What is the DA's doctrine for fighting in the desert? I think ASM will not survive the desert environment - sand/no water.

ID/pt-29

NO. (Tanks are only an improvement on foxholes), and are not being considered for electric drive.

ID/pt-30

No. The vehicles proposed are too heavy, and too vulnerable.

ID/ra-01

No - This is an albatross. The world has changed. Let's get away from the heavy mentality.

ID/ra-02

I think the tank of today is dead - but a new vehicle mounting some sort of long distance/short range combination and with some protection is needed.

ID/ra-03

No.

ID/ra-04

YES.

ID/ra-05

No - emphasis should shift to fire support & AAA away from the tank.

ID/ra-07

Fits linear battlefield mindset that US can't pursue because of lack of forces, structure and equipments.

ID/st-01

NO

ID/st-02

No.

ID/st-03

Different time scales; question not appropriate.

5. Other Technologies. Are there any other technologies you believe should be added to the list of Army Key Emerging Technologies? Indicate whether the Army should be a principal investor in their development.

5. Technology Army Invest?

ID/co-04
Weather modification. Yes

ID/co-11
Soldier enhancement Yes

ID/ga-01
Explosives YES

ID/ga-01
Incapacitating Agents YES

ID/ga-05
Electromagnetic "Armor" YES

ID/ga-05
Harnessing Gravity No

ID/ga-05
Biomedicine YES

ID/ga-05
Training; YES

ID/oa-01
Simulation -Yes

ID/oa-03
PSYCHOLOGICAL TECHNOLOGIES (applicable to psyops, primarily,
and mind-altering of enemy forces). YES.

(Question B.5.)

- ID/oa-06
Small nuclear power sources. YES.
- ID/oa-11
Lighten each system as it is redesigned. - YES
- ID/ob-01
Don't completely understand this section.
- ID/ob-06
Training enhancement - Yes.
- ID/po-03
Holagraphics-Training-Psyop-Deception YES
- ID/po-03
Incendiary/Flame YES
- ID/po-03
HPM YES
- ID/po-05
Holography YES
- ID/pt-01
Information Fusion YES
- ID/pt-01
Assessment (vulnerability, lethality, system effectiveness,
etc.) YES
- ID/pt-01
Communications YES
- ID/pt-02
Anti-materiel agents - Yes.

ID/pt-03
Unit performance
(training, group dynamics, etc) Yes
Manufacturing Tech Yes
Soldier oriented R&D Yes

ID/pt-04
Simulation for training
Tactics, PPPI (e.g. SIMNET) - Yes

ID/pt-04
ADKEM - Yes

ID/pt-06
Active suppression -Yes

ID/pt-06
Sensor fusion -Y/N

ID/pt-06
Simulation/analytical tools -No

ID/pt-08
Software. Yes

ID/pt-08
Deception. Yes

ID/pt-09
Software Engineering Yes

ID/pt-13
Mobility YES

ID/pt-13
Environmental Science NO

(Question B.5.)

ID/pt-15
Soldier Performance Enhancement YES

ID/pt-17
Remote Sensing YES

ID/pt-21
Super conductivity. Yes.

ID/pt-21
Fuzzy logic. Yes.

ID/pt-24
Low collateral damage munitions.

ID/pt-26
Training, Simulation.

ID/pt-28
Miniaturization - yes

ID/pt-29
Weather Modification, YES

ID/pt-29
Soft kill technology, YES

ID/pt-29
Soldier Enhancement, YES

ID/ra-01
Advanced Kinetic Energy- (As the Army SDC is doing).

ID/ra-04
NO.

ID/st-02
Weather/Atmosphere Science Yes

ID/st-04
Antiarmor kill mechanisms. Yes.

ID/st-04
Armor. Yes.

ID/st-04
Biomedicine, combat related. Yes.

6. Technologies to Delete. Are there any technologies which you believe the Army should delete from the list of Key Emerging Technologies? If so, which technologies and why?

ID/co-02
Space technology. It's the use of the other technologies in the space environment.

ID/co-04
Neuroscience - not clear what the potential or how the potential benefits play in 2015.

ID/co-05
No.

ID/co-06
We need to reemphasize some depending on Army applications.

ID/co-11
No.

ID/oa-01
Anything for which ASM is the sole customer.

ID/oa-02

Protection/Lethality - with the shift to low/med-intensity conflict need to spend less on armor protection and stress more agility and mobility.

ID/oa-03

NO. But I still think we need to better correlate military needs into a single DOD top-down, integrated technology management program, not "lists"! Right now, we're moving in that direction - good work, products, guidance coming down from OSD, e.g. DOD Critical Technologies Plan and DOD Science and Technology Investment Strategy. Let's publicize and use them in the Army!

ID/oa-04

NO

ID/oa-06

NO. (Don't know)

ID/ob-03

No.

ID/po-02

Future soldiers system - An exoskeleton system appears to be more trouble than it is worth. If it is too well integrated one subsystem failure will severely degrade the effectiveness of the system & cause the user to not want to use it. We would be adding a level of technological complexity to the soldier he does not need. I would not want a soldier not available for duty, not only because he has a medical problem, but a technical problem as well. "Sir, we have ten soldiers on sick call & 25 in the shop!"

ID/po-03

NO

ID/pt-01

NO

ID/pt-03

6-A1-Solution technology is too narrow for continued heavy investment.

ID/pt-04

12. Space technology (launchers maybe)
13. Advanced materials (let DARPA, AF do it)
14. Low observables (work on deception only)
6. AI (let DARPA do it)

ID/pt-05

No

ID/pt-06

Microelectronics are developed by commercial industry.

ID/pt-07

I'm tempted to say space technology from the standpoint of operating in space - we clearly must use space but I'm not sure I would look at it in same manner as an Emerging Technology - other agencies will develop space technology - we must use it & control the assets.

ID/pt-08

No

ID/pt-09

Neuro Science

ID/pt-10

Space Technology should be done by one agency w/ requirements coming from each of the services. The space technology frontier is highly specialized & therefore should be consolidated into one agency with the mandate to ensure each service's requirements are considered & satisfied.

ID/pt-13

Possibly neuroscience - in the purple-suited Medical community, the Army won't direct the thrust. I'm not aware of what the present thrust is, in any case.

ID/pt-15

None- but lower priority on those not judged to be of major importance, i.e. heavy forces & technologies associated therewith.

ID/pt-16

NO

ID/pt-17

NO.

ID/pt-19

Biotechnology

ID/pt-21

No.

ID/pt-22

Focused on EM/ET guns, which will never play in ALB-F.

ID/pt-23

No

ID/pt-25

No.

ID/pt-26

- Neuro-Science.
- Adv matls/mtl processing.
- Directed energy.

ID/pt-28

I don't know!

ID/pt-29

Advanced materials/material process will be done by the private sector.

ID/ra-02

No. All are important must be listed and made use of - but that does not mean Army needs to pay for all development - it must take maximum advantage of civil development.

ID/ra-04

Space technology should be Air Force mission. Neuroscience should be civilian, private funding.

ID/st-01

NO

ID/st-02

Protection/Lethality, not a technology.
Low Observable, not a technology.

9. Systemic Issues and Supporting Capabilities. Listed below are the systemic issues and supporting capabilities that are part of the current Army tech base investment strategy. Please provide comments regarding their importance based on TBSWG II.

a. Systemic issues

ID/ga-03

Important

ID/oa-03

Must show products and how "loop" gets closed with actual systems that will draw upon or use these products.

ID/oa-06

YES

ID/po-04

YES

ID/pt-04

All important for ALBF-C

ID/pt-06

Important: dual use of or application of technology and configuration of technology.

ID/pt-10

Very important

ID/pt-19

The (marked) technologies are, I believe, the most important, per the TBSWG II. We must ensure the individual soldier is in good shape, trained, carrying the maximum load that is reliable.

b. Physical/functional survivability

ID/co-01

Very important.

ID/co-05

Very important.

ID/co-07

Very important, build in redundancy.

ID/co-10

Important.

ID/co-11

Important.

ID/ga-03

Important

ID/ga-05

Physical/functional survivability

ID/oa-06
YES

ID/oa-09
Important

ID/ob-01
Important to LATAM.

ID/ob-05
Very important.

ID/po-01
High tech sol. to deception?
- Hide what I am doing.
- Feint what I am not.
- Evaluate reaction to my
deception.
- Not just physical-electronic,
etc.

ID/po-03
High priority

ID/po-04
YES

ID/pt-02
Yes.

ID/pt-05
Very important

ID/pt-06
Important

ID/pt-07
Very

ID/pt-09
Low return on investment.

ID/pt-19
Important

ID/pt-20
Important

ID/pt-21
The most "gee whiz" weapon going isn't worth much if it can't survive until you need it.

ID/pt-23
Important

ID/pt-28
Very important to jungle combat.

ID/pt-29
High payoff.

ID/ra-03
High priority for individual.

ID/ra-04
Reduce attrition by Biotech.

ID/st-04
Extremely important

c. Manufacturing technology

ID/co-02
Mass still wins (killing lots of dispersed targets with long range fires). Must reduce cost as a primary thrust.

ID/co-04
Not played.

ID/co-05
Extremely important.

ID/co-07
Important, especially in theater.

ID/co-11
Others will do it.

ID/ga-03
Important

ID/oa-01
Concurrent with R&D.

ID/oa-03
Not clearly articulated as tech base-related.

ID/oa-06
YES

ID/oa-08
Extremely Important

ID/oa-09
Little importance

ID/oa-11
Very important

ID/ob-01
Not addressed - Critical.

ID/pt-01
Not addressed

ID/pt-02
Yes.

ID/pt-03
Without production in sufficient numbers, high-tech weapons
will be useless.

ID/pt-06
Must be considered during applied research.

ID/pt-07
Didn't play

ID/pt-08
Look to industry

ID/pt-09
Low return on investment.

ID/pt-10
Important

ID/pt-17
No help

ID/pt-20
Not played

ID/pt-21
Did not play - we fought with what we had - could be bought
or manufactured - - not important unless conflict is longer.

ID/pt-22
Key to low cost.

ID/pt-23
Very important

ID/ra-02
Important to exploit

ID/ra-04
With reduced forces - manufacturing processes must be enhanced for timeliness of product.

ID/st-02
Did not play in TBSWGII.

ID/st-04
Important.

d. Lightening the force

ID/co-01
Important.

ID/co-03
Important.

ID/co-04
Required to increase capability.

ID/co-05
Extremely important.

ID/co-07
Very important.

ID/co-08
Link with "Logistics R&D".

ID/co-10
Important.

ID/co-11

Essential.

ID/ga-02

This means lowering deployability requirements (i.e. what you put "in country" not what you use).

ID/ga-03

Important

ID/ga-05

Lightening the force

ID/oa-03

Mostly lip service - Need goals for the type-divisions!!

ID/oa-04

Key

ID/oa-06

YES

ID/oa-07

Works hand in hand with log.

ID/oa-09

Very important (key)

ID/oa-11

Most important issue

ID/oa-13

Important

ID/oa-14

Extremely important for mobility and development.

- ID/ob-01
Important to LATAM.
- ID/ob-05
Extremely important.
- ID/po-02
Important for inter- & intra-theater movement.
- ID/po-03
High priority
- ID/po-04
YES
- ID/pt-01
Critical w.r.t. deployability
- ID/pt-02
Yes.
- ID/pt-03
Key to deployed success.
- ID/pt-05
Important
- ID/pt-06
Only when connected to improved/reduced logistics strategic
deployability.
- ID/pt-07
Very
- ID/pt-09
High return on investment.

ID/pt-11
Important for log.

ID/pt-17
Important

ID/pt-19
Important

ID/pt-20
Important

ID/pt-21
Important for force projection over seas.

ID/pt-22
Paramount for ALB-F.

ID/pt-23
Very important

ID/pt-25
Important

ID/pt-29
Necessary to match strategic lift.

ID/pt-30
Very important

ID/ra-01
Vital!

ID/ra-02
Very important

ID/ra-03

Individually will increase capabilities carried Force-wide -
will increase dependability.

ID/ra-04

One of the most important fundamentals to survivability and
maneuverability.

ID/st-01

Very important.

ID/st-02

Important

ID/st-04

VERY IMPORTANT, probably should be develop a light force!

e. Logistics R&D

ID/co-01

Crucial.

ID/co-03

Important.

ID/co-04

A driver.

ID/co-05

Very important.

ID/co-07

Very important.

ID/co-08

Link with Lightening the force.

ID/co-11
Very important.

ID/ga-03
Important

ID/oa-01
Good.

ID/oa-03
Extremely underrated and victim of "bad press". Let's
either fix it or kill it!

ID/oa-06
YES

ID/oa-07
Need to work smart on getting force deployed if they want
to stay in business.

ID/oa-09
Very important

ID/oa-11
Need to fully fund approx. \$20M.

ID/oa-13
Vital

ID/ob-01
Important to LATAM.

ID/ob-05
Important.

ID/po-03
High priority

ID/po-04
YES

ID/pt-01
Not addressed

ID/pt-02
Yes.

ID/pt-03
Key to deployed success.

ID/pt-06
Not important except CSS applications.

ID/pt-07
Very

ID/pt-09
Med return on investment.

ID/pt-11
Extremely important/much ignored/our achilles heel.

ID/pt-15
More emphasis needed.

ID/pt-17
Don't see much help

ID/pt-20
Important

ID/pt-21
Important for fast moving operations.

ID/pt-23
Very important

ID/pt-28
Key! to non linear battlefield.

ID/pt-29
Important to all scenarios.

ID/pt-30
Needs real help

ID/ra-03
Individually will increase capabilities carried Force-wide -
will increase dependability.

ID/ra-04
Needs more work - lacks integrated technology with JORES
deployment system.

ID/st-01
Log issues in ALB-F need attention.

ID/st-02
Did not play in TBSWGII.

ID/st-04
Important.

f. MANPRINT/human factors/health hazards

ID/co-01
Very important.

ID/co-05
Moderately important.

ID/co-07
Not addressed.

ID/cc-11
Part of soldier enhancement.

ID/ga-02
Fundamental to the use of all future systems esp. C3.

ID/oa-03
Needs more products! Mostly marketing hype.

ID/oa-06
YES

ID/oa-09
Very important

ID/ob-01
Important to LATAM.

ID/ob-05
Important.

ID/pt-01
Very important

ID/pt-03
Maintaining force lethality with smaller deployment requirements was key in SWA.

ID/pt-05
Very important

ID/pt-06
Important - individual soldier & equipment.

(Question B.9.f.)

ID/pt-07
Very

ID/pt-08
Critical

ID/pt-09
High return on investment.

ID/pt-15
Vital

ID/pt-17
Yes

ID/pt-20
Important

ID/pt-21
Important to understand from a command perspective.

ID/pt-23
Important

ID/ra-04
This needs to be done hand-in-hand with any emerging technologies.

ID/st-01
Very important to soldier enhancement.

ID/st-04
Important.

g. Manning and training

ID/co-01
Very important.

ID/co-03
Important.

ID/co-05
Moderately important.

ID/co-07
Not addressed.

ID/co-11
Do Some.

ID/ga-03
Important

ID/oa-03
Big O&S cost driver. Need simulators, distributed training
and better RAM-D (drives down number of maintainers).

ID/oa-08
Extremely Important

ID/oa-09
Important

ID/oa-13
Not much will change no matter what technology offers

ID/ob-01
Important to LATAM.

(Question B.9.g.)

ID/ob-05

Very important.

ID/ob-06

Very important. Embedded training/simulation. Manual training if equipment breaks.

ID/po-02

As a soldier I look in 1990 as I look in 1967, & I will probable look in 2015.

ID/po-04

YES

ID/pt-03

Maintaining force lethality with smaller deployment requirements was key in SWA.

ID/pt-06

Not important

ID/pt-07

Med

ID/pt-09

High return on investment.

ID/pt-19

Important

ID/pt-20

Not Played

ID/pt-21

Need a smart soldier, well trained to fight in this type of conflict - - has to understand mission! each time.

ID/pt-23
Important

ID/ra-02
Critical need

ID/ra-04
Reduce attrition, shorten training time to build mobilization.

ID/st-01
Training will need special emphasis.

ID/st-02
Did not play in TBSWGII .

ID/st-04
Important.

h. Combat casualty care

ID/co-01
Very important.

ID/co-05
Moderately important.

ID/co-07
Not addressed, evacuation and location would be important.

ID/co-11
Important.

ID/ga-05
Combat casualty care

(Question B.9.h.)

ID/oa-09
Important

ID/oa-11
Important

ID/oa-13
To focus on evacuation

ID/ob-01
Important to LATAM.

ID/ob-05
Very important.

ID/po-02
Often neglected

ID/po-04
YES

ID/pt-01
Not addressed

ID/pt-05
Important

ID/pt-06
Not important

ID/pt-09
High return on investment.

ID/pt-17
Important

ID/pt-20
Not played

ID/pt-23
Important

ID/ra-02
Important but medical science is doing.

ID/ra-04
Need quicker healing agents.

ID/st-02
Important

ID/st-04
Extremely important

4. **Environmental effects**

ID/co-04
Weather mod could swing battle or change ops.

ID/co-05
Moderately important.

ID/co-07
Important in extreme climates.

ID/co-10
Important.

ID/co-11
Very important (e.g. SWA, LATAM).

ID/ga-05
Environmental effects

ID/oa-03

Lots of potential - not really discussed in detail at TBSWG II.

ID/oa-09

Important

ID/oa-11

Important

ID/ob-01

Important to LATAM.

ID/ob-05

Must consider (against future costs).

ID/pt-01

Major, important topic in LATAM

ID/pt-02

Yes.

ID/pt-06

Not important except sensor systems.

ID/pt-07

Med

ID/pt-09

Med return on investment.

ID/pt-11

Extremely important, especially for advanced sophisticated systems, ATR.

ID/pt-17
More important w/smart sensors

ID/pt-20
Important

ID/pt-21
Must deal with, affects % of intelligence available.

ID/pt-23
Important

ID/pt-29
Must be known for sensors to work.

ID/ra-03
High priority to overcoming.

ID/ra-04
Has greatest impact on soldier - this area has been
neglected - boots & materials are behind technology of 90's.

ID/st-02
Important

ID/st-04
IMPORTANT.

j. Corrosion & deterioration preventive control

ID/co-05
Moderately important .

ID/co-07
Always plays a role in equipment - especially important if
we really go to RPV's and robots.

(Question B.9.j.)

ID/oa-03
Very important O&S reducer!

ID/oa-09
Important

ID/ob-01
Important to LATAM.

ID/po-04
YES

ID/pt-01
Major problem in LATAM for electronic devices

ID/pt-02
Yes.

ID/pt-06
Not addressed

ID/pt-07
Didn't play

ID/pt-09
Med return on investment.

ID/pt-17
Not for quick battle

ID/pt-19
Important

ID/pt-20
Not Played

ID/pt-21
Not much of a factor.

ID/pt-23
Important

ID/ra-04
This depends on environment.
Not all equipment needs same corrosion capabilities.

ID/st-02
Did not play in TBSWGII.

ID/st-04
IMPORTANT.

k. Supporting capabilities

ID/oa-09
All important to support new technology and future systems assessments.

ID/ob-01
[not germane to TBSWGII] - Required anyway.

ID/pt-04
All important because of reduced budget & need to gain insight on what if questions.

ID/pt-06
CSS only

ID/pt-17
All needed to give the Army world class lab system

ID/st-01
All will be needed to bring the next/future systems into being.

ID/st-02
Did not play in TBSWGII.

1. Facilities

ID/co-05
Very important.

ID/co-07
Need to be able to rapidly construct an infrastructure in theatre.

ID/co-11
The classic case where 20% of \$ can get 80% of benefit i.e., do it smartly.

ID/ga-03
Important

ID/pt-01
Not addressed

ID/pt-02
Yes.

ID/pt-06
Not addressed

ID/pt-07
Didn't play

ID/pt-09
High return on investment.

ID/pt-20
Important

ID/pt-21
?

ID/ra-04
Technology is advancing at good pace here.

ID/st-02
Did not play in TBSWGII.

ID/st-04
IMPORTANT.

m. Assessment technology

ID/co-05
Moderately important.

ID/co-07
Not addressed.

ID/co-10
Important.

ID/co-11
Important.

ID/po-03
High priority

ID/po-04
YES

ID/pt-01
Critical - we did (do) too much hip shooting on judging
benefits/ burdens.

ID/pt-02
Yes.

ID/pt-06
Not addressed

ID/pt-07
Important

ID/pt-09
Med return on investment.

ID/pt-13
How important? How assessed itself?

ID/pt-15
Need to increase this effort significantly.

ID/pt-20
Important

ID/pt-21
Essential if you want survivable systems that work in the
battlefield environment.

ID/ra-02
Very important

ID/st-02
Did not play in TBSWGII.

ID/st-04
IMPORTANT

n. Special purpose equipment/computers

ID/co-05

Moderately important.

ID/co-07

Not addressed.

ID/co-11

Minimize.

ID/ga-03

Important

ID/oa-06

YES

ID/oa-11

Yes, for use in prognostics, inventory control and weapon systems management.

ID/pt-01

Soldier computer a critical item

ID/pt-02

Yes.

ID/pt-06

Important, relied upon

ID/pt-07

Didn't play

ID/pt-09

Med return on investment.

(Question B.9.n.)

ID/pt-19
Important

ID/pt-20
Important

ID/st-02
Did not play in TBSWGII.

o. Laboratory test & evaluation

ID/co-03
Important.

ID/co-05
Moderately important.

ID/co-07
Not addressed.

ID/co-11
Plus up.

ID/ga-03
Important

ID/po-03
High priority

ID/po-04
YES

ID/pt-01
Critical to getting good equipment to the field.

ID/pt-02
Yes.

ID/pt-06

Not addressed

ID/pt-07

Important

ID/pt-09

Med return on investment.

ID/pt-11

More comprehensive attention to wide range of conditions faced in the real world.

ID/pt-13

Why a separate item? As opposed to field T&E?

ID/pt-20

Important

ID/pt-21

Essential to developmental process.

ID/pt-28

Key - it must work.

ID/ra-04

Do more field testing with soldiers.

ID/st-02

Did not play in TBSWGII.

ID/st-04

If it involves users as evaluators, not just subjects this is very important especially for soldier enhancement.

p. Modeling, simulation and wargaming

ID/co-03

Important.

ID/co-05

Extremely important.

ID/co-07

Somewhat important for planning to fight different scenarios in advance and for planning logistic loads to support battle.

ID/co-10

Important.

ID/co-11

Very high payoff-but don't go for high cost solutions, go for low cost, high leverage.

ID/ga-02

This will be a lot harder with greater uncertainty. I fear we will be junking our 15 - 20 yr old models and starting over very soon.

ID/ga-03

Important

ID/ga-05

Modeling, simulation and wargaming

ID/oa-01

Good.

ID/oa-06

YES

ID/oa-08

Extremely Important

ID/oa-09

Very important due to budget.

ID/oa-10

Need to embed space play in to gain insight on systems trades -- space vs. more conventional means of doing business.

ID/ob-05

Need research to improve usefulness and responsiveness.

ID/ob-06

Very important.

ID/po-02

Important for determining the face of future battle

ID/po-04

YES

ID/pt-01

See assessment

ID/pt-05

Important

ID/pt-06

Seemed to direct in a direction not consistent with current doctrine but pointed toward evolving ALB.

ID/pt-07

Important

ID/pt-08

Highly important

ID/pt-09

Med return on investment.

ID/pt-11

War game future technologies systems for hardware investment strategies.

ID/pt-15

Needed especially as funding resources decline.

ID/pt-20

Important

ID/pt-21

Essential - we can't afford to do it any other way.

ID/pt-23

ID/pt-25

Include system design

ID/pt-28

Key - in a peace time environment w/ no \$ how else can the soldier train.

ID/ra-02

Very critical to training and also to develop real combat decision aids.

ID/ra-04

Systems are not user friendly - Software for our word processors are not user friendly. Wargaming technicians don't want user friendly games or they will be out of their job - job survivability.

ID/st-02

Did not play in TBSWGII.

ID/st-04
IMPORTANT.

10. What actions have you taken or do you plan to take to change the tech base program of your Laboratory or RDE Center? (If you are not a laboratory/center director, what advice would you offer?)

ID/co-01
Thoroughly evaluate what programs and priorities are within the organization and reorder to meet changing world threat.

ID/co-02
Market programs with proponents. Look for opportunities to achieve revolutionary increases in force structure productivity based on changes in doctrine and organization which exploit technological opportunities.

ID/co-03
N/A.

ID/co-05
Attempt upon occasion to disengage from parochial interest and push/do what is innovative and key to the Army.

ID/co-06
Push soldier System Plan and program or BS team chief.

ID/co-07
Concentrate on more investments in soldier systems, fuel systems and logistics systems. Insert lightening the force philosophy in every weapon system.

ID/co-11
Each participant should immediately (while it is fresh) review each of his subordinate programs with him and discuss his insights with him.

ID/ga-02
N/A

ID/ga-05

Look at the program.
Are there any endless sinkholes?
Are we missing any good bets?
Can I really change my program?

ID/oa-03

But....I've said this before - we need a "technology clearing house" where the Lab/RDE directors can regularly get together on technology transfer issues. Too much overlap or gaps, right now. TBSWG is good, but not enough! TBAG is good, but oriented toward money issues, not technology exchange.

ID/oa-04

Make funding decisions based on insight.

ID/oa-06

Review programs in light of knowledge gained. Take initiative to interact with users directly and to "green" their key staff.

ID/oa-08

I need to work harder at introducing space capabilities to the field commanders.

ID/oa-09

Prioritize your projects based on the R&D needs to develop the key systems from TBSWG II.

ID/oa-10

Press for increased investment for space technology, e.g., \$1-2 M/yr. over POM for ACTS (Advanced Comm Tech Satellite) ATTD.

ID/oa-13

War game this stuff with computer simulation, cost it out, compare it with possible development in civil section, then decide.

ID/ob-05

Develop cadre of soldiers (warriors) to act as "board of visitors" to assess program annually. Eliminate technological connected review boards.

ID/ob-06

Consider how training could limit your system and make it more trainable.

ID/po-01

Must integrate with AF/Navy efforts.

- Compliment
- Cooperate
- Integrate

ID/po-02

No technologist. Work with human behavioralists in technological development.

ID/po-03

Team now with other labs on high value-added programs.

ID/po-05

None

ID/pt-01

Sustain thrust in assessment methodology.
Look for ways to contribute to Future Soldier System.

ID/pt-02

Currently planning changes in FY91 and out year emphasis.

ID/pt-03

Increase efforts in predicting soldier & unit performance in CONOPS & SUSOPS.

ID/pt-04

Answer the questions (1) given what Army has today, can Army respond to the 2015 threats? No tech base investment question.
(2) Given investment per answer B.4.b, when will Army be able to prevail against 2015 treat? Minimal tech base investment.

ID/pt-05

Pursue personal computer-based biomedical information acquisition & interpretation for soldier computer as part of individual soldier enhancement.

ID/pt-06

To consider results, results highly dependent on leader's opinion & desires not a subjective outcome of game.

ID/pt-07

As integrator of the soldier system, I intended to develop program that will lead to FSS with all the key players on steering committee (e.g, HDL, ARDEC, CECOM, HEL, Medics, etc.) have steering committee oversee efforts, etc. - more to come.

ID/pt-08

Ensure priorities are aligned with changing military environment.

ID/pt-09

Wargame points out some re-shifting of emphasis, i.e. priorities.

ID/pt-10

This effort would be valuable to personnel below the Director level.

ID/pt-11

Tech base research must remain generic enough to serve developers in many scenarios and areas of the world.

ID/pt-13

Don't bet on anything that DMR might remove from your control.

ID/pt-15

Have already changed considerably in the past 2 years. Will increase soldier performance enhancement R&D significantly and start up lead effort on exoskeletal R&D.

ID/pt-16

Concentrate more on individual soldier.

ID/pt-17

I want to carefully review the final report & match against my current program. I think I will make same changes i.e. put more emphasis on some efforts.

ID/pt-19

The Air Force tech base is complimentary to the Army's. No changes are foreseen.

ID/pt-20

Play detailed exchange games, using performance specified for proposed system. That way, one can eval. the outcome of increasing system X while decreasing system Y; or supplies, or performance levels, etc.

ID/pt-21

Try to increase the funding spend on developing technologies.

ID/pt-22

Focus even more on lightening the force.

ID/pt-26

PRIORITIZE. Some things should be stopped.

ID/pt-27

Moving to increase effort in Emerging Technology especially Biotechnology for Chem/Bio detection and decon.

ID/pt-28

In the Corps of Engineers - I am going to try to address the environmental issues of D.A. and get out of the combat role to survive the declining budget.

ID/pt-29

Be careful of this - you could knee jerk and throw out the baby with the bath water i.e. kill a current program to start one of the new ones. Finish what your doing before starting new!

ID/pt-30

- 1) Increase our efforts on microsensors and RSTA systems R&D.
- 2) Expand our HPM work to develop answers to the systems engineering and lethality issues.
- 3) Support a LABCOM Soldier Support Program
- 4) Accelerate R&D Support to Mine Technology

ID/ra-01

Start looking at future not past. Need to look at sensors, space, information processing.

ID/ra-02

Enhance mutual exchange with other labs.

ID/ra-04

Get your brightest out of the Lab - go to the field - take in an exercise to enhance awareness of the needs of our soldiers. Walk the ground.

ID/st-01

Go back and examine your programs in light of what you've learned. Work on issues raised. Answer the unknowns.

ID/st-02

Revisit thoughts, comments etc. to evaluate influence on Tech Base, must begin to implement thoughts by deed!

ID/st-04

Focusing on evaluating emerging concepts applicable to a more deployable force ala ADKEM, precise Long Range Missile, networked mines.

11. What issues were raised that you believe warrant further analysis, in terms of:

ID/oa-10
A.O.K.

ID/pt-01
Out of time, sorry.

a. Technical performance of Next Generation/Future Systems -

ID/co-05
The need to provide better analytical underpinning.

ID/co-06
All FS.

ID/co-10
We have no decent estimates of performance.

ID/co-11
Put teams on all the promising systems to "kick the can down the road" further.

ID/ga-02
Uncertainties in performance/system dynamics limit discussion of utility. This is natural - but does not mean that we must forgo thinking about new technologies.

ID/ga-03
In most cases, with some exceptions, performance may be expected to be less than what might otherwise be desirable or requisite to meet the full range of the threat or the technological or other countermeasures. The principles of war must be used to compensate for this performance.

ID/ga-05
In all cases. Now is the time to move a bit from the hand waving to the program definition and analysis.

ID/oa-03

Need to have technology inserted into operational concepts. Right now, it is the other way around. NG/FS appear to be driving the concepts. Must achieve a better balance between technology "push" and user (concept) "pull".

ID/oa-06

Power requirements, fuel sources.

ID/ob-06

Embedded training.

ID/po-02

Determine % of effectiveness & means to determine redundant capability to accomplish the mission.

ID/po-03

Exoskeleton

ID/po-04

The need for back-up "manual" systems:
Reliability
Maintenance
Size & weight
Redundancy

ID/pt-02

More quantitative estimates of potential performance improvement of proposed system.

ID/pt-06

No performance was ever expressed of the NG/FS.

ID/pt-07

Exoskeletal - Tasks, capabilities, tradeoff analysis, etc.

ID/pt-08

Must focus on seeing deep and long range comm and LECC.

ID/pt-09

Space System - Will they be there?

ID/pt-11

More refined definition of how they might work, most probable capabilities and high risk capabilities.

ID/pt-15

Definitely need to define requirements more precisely.

ID/pt-16

None

ID/pt-17

Need more critical assessment of predicted capabilities.

ID/pt-19

Systems should be analyzed more thoroughly now to determine feasibility and that they don't violate laws of physics and chemistry.

ID/pt-20

Play detailed exchange games, using performance specified for proposed system. That way, one can eval. the outcome of increasing system X while decreasing system Y; or supplies, or performance levels, etc.

ID/pt-21

?

ID/pt-22

Too optimistic, generally.

ID/pt-25

The entire issue of concurrent design and modeling of systems that are affordable and will perform as expected is ignored. Building systems in simulation is far more efficient

ID/pt-28

I think the offensive use of sensors w/o eyeballs on them needs more evaluation.

ID/pt-30

- 1) HPM
- 2) Electrothermal gun

ID/ra-02

Operational use vs. technical potential performance not addressed.

ID/ra-04

All weather attack systems. Networked sensor monitoring. Automated logistics systems. Advanced manufacturing.

ID/ra-07

Need quantum change not incremental change.

ID/st-01

DEW needs work and analysis.

ID/st-02

Must be able to locate red accurately to be effective.

ID/st-04

Technical viability of HPM as a weapon against all targets of whatever class of targets it is to go against.

b. ALBF operations -

ID/co-05

Requirement to marry technologies w/concept in a rigorous analysis.

ID/co-08

Resupply, sustainment, reconstitution. Have only been assumed so far.

ID/co-11

How fast can we make the cycle from observation to action?

ID/ga-01

We need to think smaller, dispersed teams & individuals
(not formations) - How to maneuver, mass, protect, control

ID/ga-02

What does "non-linear" mean at Bn, Bde, Div, Corps level
What are the implications for operations and tactics.

ID/ga-03

Doctrine must correspond to available technology, and
maximize its potential.

ID/ga-05

Is this really a worldwide, all-intensity concept? Does it
violate any of the enduring principles of war? Does it violate
reality?

ID/oa-01

Stillified.

ID/oa-03

Over-reliance on sensors
Inability to apply ALBF clearly to LIC and SOF.

ID/oa-06

RSTA impact on execution of concept. This is the Achilles
heel.

ID/oa-09

Logistics operations or concepts are clearly not understood.

ID/oa-12

Are all items required to achieve the concept going to be
available? (real world i.e. bought).

ID/oa-13

90% ID of enemy locations.

ID/ob-01

Execution in absence of perfect knowledge of battlefield -
Need decision aids.

ID/ob-05

Question universality. Future: LIC - small independent
forces, no air.

ID/po-01

Realize speculative nature of "concept".
Basic assumptions may be fundamentally flawed.

ID/po-02

Work military theory - doctrine - technology, not technology
- doctrine - theory.

ID/po-04

Do the technologies complement ALBF?
If not, how do they impact on ALBF?

ID/pt-04

The alleged weaknesses listed for question B.6.
12. Space technology (launchers maybe)
13. Advanced materials (let DARPA, AF do it)
14. Low observables (work on deception only)
6. AI (let DARPA do it)

ID/pt-06

Need to explore direct fire combat. Need to explore
CSS/rear support. Need to delineate red/blue differences in
technology, not mirror image.

ID/pt-08

Use if deception and greater Autonomy with LECC and ALBM.

ID/pt-09
Distributed C3

ID/pt-11
Logistics.

ID/pt-17
Need more flexibility

ID/pt-19
Complete knowledge on the battlefield.
Concentrate on how the Air Force can help.

ID/pt-21
The concept of have 100% intel all the time - - not feasible
but not necessary.

ID/pt-22
Finding enemy and knowing where he is all the time!

ID/pt-24
Logistics

ID/pt-28
Logistical problems.

ID/pt-29
Can't see 100% of the enemy all the time - change this
assumption and other tenants as necessary.

ID/pt-30
Too much emphasis on fire power without consideration of
logistics.

ID/ra-01

ID/ra-02
Current concept grossly underestimates opponents.

ID/ra-04
Tailored forces - more air mobile.

ID/ra-07
Need to expand thinking - more in-depth modeling and broader scope.

ID/st-02
Enhancing soldier survivability.

ID/st-04
Finding and sorting out small dispersed targets intermingled with local population to allow for their attack when the circumstances are right.

c. Scenario/vignette description -

ID/co-04
Eliminate or greatly modify European scenario. Traditional Fulda gap doesn't appear likely.

ID/co-05
May or may not be most likely. In my opinion they were plausible.

ID/co-10

ID/co-11
Build more - we need a wider spectrum of scenarios and vignettes.

ID/ga-01
These were outstanding.

ID/ga-03

Each contingency encountered or which may be expected to be encountered in the future will have its own set of unique requirements. Therefore, the force must be sufficiently diverse, deployable (in a timely manner), and adequate in numbers and lethality to achieve militarily decisive action.

ID/ga-05

SWA - OK
LATAM - Who are the bad guys?
Are there any good guys to support?
Europe- Seems politically implausible.

OTHER COMMENTS:

Integrated/Standard (albeit flexible) Division/Brigade TOC

ID/oa-03

Very good. Keep playing logistics!

ID/oa-05

Recommend a weather scenario (clouds, precip, wind, visibility, etc) be developed for each vignette. For each part of the world, the weather is different in different months and by time of day. By clearly specifying the weather situation (in 1-3 hour time blocks) for different months of interest, the weather's effects on weapon systems and tactics can be easily deduced. Call (AV 552-4897) for further details, to include having me develop weather scenarios.

ID/oa-12

Force structures for each side need to be adopted prior to start of vignette. Once the force is equipped the TAC operations can occur with a definite probability of was it a good force structure for the scenario and what could be done to improve it.

ID/ob-06

Training application.

ID/po-01

Need to be joint!!! Army cannot do alone!
Need overall campaign plan to properly put in context.

ID/po-02

Work SWA scenario. The absence of a theater campaign plan & time phased deployment data made the scenario rather free form

ID/pt-06

Direct fire combat - heavy armor.

ID/pt-07

More analysis of SOF needed.

ID/pt-08

Realistic possibility of med/high intensity warfare.
Chemical warfare?

ID/pt-17

?

ID/pt-19

More concentration on the ops troops working the vignettes while the tech base participants listen and watch. The requirements are set by these "guys." We should help them. Too much time is taken up learning and discussing tactics and strategies.

ID/pt-21

?

ID/pt-28

Getting in and getting out.

ID/pt-30

Needs to be strengthened along the lines of a 5 paragraph field order.

ID/ra-04

Explore soldier requirements to successfully continue

ID/st-02

Need more time to complete some vignettes and do complete job!
Weather not considered.

ID/st-04

US reaction to an aggressor moving to attack thru a neutral Democratic nation.

ATTD.

PROPOSED NEW ATTD LIST

INSTRUCTIONS

Please circle up to ten proposed new ATTDs that you think are most important. There is room at the end of the list to add ATTDs of your own design or provide comments.

ATTD:

OTHER ADDITIONS/COMMENTS:

ID/co-02

ATTD prioritization should result from the priorities of wedged NG/FS of the AMM. The AMM will consider the required capabilities on the battlefield in high/mid- and low- intensity derived from European, SWA and LATAM scenarios and applied to the eight regions of ALBF-C. The relative importance of these required capabilities, capability shortfalls or enhancement opportunities, and magnitude of capability enhancement afforded by the NG/FS will lead to NG/FS prioritization. Affordability constraints will then be considered. This rationale process will be undertaken by dozens of people.

ID/co-07

Create ATTD's for soldier and logistics systems beyond the SIPE to include electric vehicles, power sources that don't use fossil fuel, e.g. improved solar power operations, quantum changes in battery capability, creating fuel from organic materials.

ID/ga-01

Give a soldier/buddy-team the capability to destroy an enemy squad or platoon no matter how the enemy is transported - armored, mechanized, wheeled, air dropped, air landed, sea landed, or flown in by helicopter or fixed wing aircraft.

Give a soldier/buddy-team a small device which will, at the push of a button, tell him and others of his location, point out the enemy azimuth and distance, adjust fires and help coordinate CAS, helicopter gun ship, artillery, missile, NG/FS all supporting simultaneously.

Give the soldier/buddy team the means to dig-in quickly and protect himself from various threats when discovered. With these capabilities, training, organization and leadership, the soldiers/buddy team will take advantage of disposition, but will be able to surgically mass fires when and where needed.

ID/ga-03

Question 3 is extremely thought provoking and merits consideration far beyond the response that might be provided on

ID/ga-04

(Comment on P1): My participation in the game contextually was too unusual for answer to most questions and my understanding of Army OPS is limited. Only answered the opinion section.

ID/oa-03

Footnote: (pg. 9, question B.4.) I prepared the above thinking "total Army"! If I had to think solely as a logistician, I would emphasize robotics(7); advanced materials(13); biotechnology(1); power generation(3); and micro-electronics(4); (diagnostics etc.) and artificial intelligence(6) as the technologies most critical to logistics.

Comment: (pg. 11, Question B.7.) Lists like this are difficult to prepare in a meaningful manner, particularly if one isn't deeply knowledgeable about each ATTD.

Note: Many comments and responses on this questionnaire are not captured well in this condensed format. In particular, see diagram of "just in time deployment system" on reverse of original questionnaire, p.3.

ID/oa-08

Spaced Based Strike/Suppression System--

OBJECTIVE: To support Tactical Commanders carry out Low Intensity, Mid-Intensity, or High Intensity Conflict Missions....Non-Liner Battle Applications.

CAPABILITY: Engage fixed and moving targets (bunkers, tanks, C2 nodes, etc.).

Engage time including de-orbit 10 minutes or less from request from Tactical Commander.

It should be possible for the weapon to be self-contained, i.e., the sensor, processor and the

ID/oa-10

ACTS (Advanced Communication Technology Satellite).

Objective: Demonstrate feasibility/Utility of ACTS for simultaneous, multi-point transmission of voice, data, video.

ID/oa-11

Design New "Tank" with much less weight and vastly improved mobility, quick rearm and either quick refuel or non fossil fuel propulsion system.

Develop new family of munitions with the primary goals of very low weight and very high accuracy.

Develop easy to use maintainer aids and sound TMDE for new families of equipment.

ID/ob-01

Because of overlap in the groupings, I do not believe this is appropriate. These are not really "technologies", but convenient technological groupings into which many technologies fit.

The 13 encompass in one form or another any number of "technologies" in the narrow sense

ID/pt-05

Individual Soldier Enhancement Including: Soldier computer supporting GPS with topographical display; local area (small unit) comms & data links; Biomedical monitoring of alertness, workload, hydration, quantity & quality of sleep, body temperature, & pulse.

This would give soldier capability to know where they are, where their comrades are and how both they and their comrades are doing both mentally & physically.

ID/pt-13

"Cost reductions in production systems."

"Personnel - can you afford to be without competent,

ID/pt-14

Autocratic target recognition system that provides real time terminal target discrimination for low altitude supersonic targets as a defensive and offensive capability. The operational capability required is to detect, classify, identify and

ID/pt-17

Individual Unit Pos/Nav Capability - Demo. The use of GPS and off-the-shelf dead reckoning hardware (ie. digital maps, compass, odometer, etc) to provide an affordable (cheap) means to continuously locate position and azimuth for individual weapon systems (eg. tanks) and LOG units (eg. Trucks) on both on-road and off-road combat situations.

Demo - sensor fusion - AI near real time target identification system - show how automated target sensors of SAP, IR, photosensor data together with AI algorithms that utilize knowledge of enemy doctrine/tactics can be exploited with highly parallel computer processors to identify & position tactical targets (units of tanks, command posts, etc.) in near real time - using actual weapon and existing sensor systems.

ID/pt-18

(Note to question B.9.): TBSWGII was not played in enough detail to address most of these issues.

ID/pt-26

The most significant threat that has developed and is available throughout the world is the accurate tactical ballistic missile, with conventional, chemical and (soon) nuclear warheads. The U.S. Army has virtually no capability against these threats today, especially in contingency operations. An urgent requirement exists to start an ATTD on an ATM system against long range TBM's.

ID/pt-27

MISSION DEFEAT
ANTIMATERIEL/FLAME/INCAP

ID/pt-28

ID/ra-03

Soldier Enhancement: Using existing Bio/medical & data technology to monitor individual whole body health, allowing pre-emptive/prophylactic measures to be taken to counter physiological and psychological degradation due to dehydration,

ID/st-04

Key military technologies not addressed!
Armor.
Anti-armor kill mechanisms.
Low observables.

(Comment on "FAMILY OF SMALL ARMS"): Not until the results of the current ongoing ACR tests are evaluated and used to structure the program - we don't need more of the same.