U.S. Army Research Institute
for the Behavioral and Social Sciences

Research Report 1592

Unit Training Management System, Strategy, and Program for Simulation Networking (SIMNET)

James L. Madden
BDM International, Inc.

June 1991

U.S. ARMY RESEARCH INSTITUTE FOR THE BEHAVIORAL AND SOCIAL SCIENCES

A Field Operating Agency Under the Jurisdiction of the Deputy Chief of Staff for Personnel

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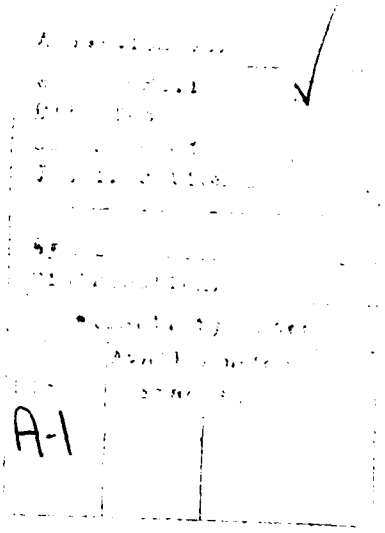

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REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1a. REPORT SECURITY CLASSIFICATION Unclassified	1b. RESTRICTIVE MARKINGS --
2a. SECURITY CLASSIFICATION AUTHORITY --	3. DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release; distribution is unlimited.
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE --	
4. PERFORMING ORGANIZATION REPORT NUMBER(S) BDM/MTY-TR-0028-89	5. MONITORING ORGANIZATION REPORT NUMBER(S) ARI Research Report 1592
6a. NAME OF PERFORMING ORGANIZATION BDM International, Inc. 6b. OFFICE SYMBOL (If applicable) --	7a. NAME OF MONITORING ORGANIZATION U.S. Army Research Institute Field Unit at Fort Knox
6c. ADDRESS (City, State, and ZIP Code) 2600 Garden Road North Building Monterey, CA 93940	7b. ADDRESS (City, State, and ZIP Code) ATTN: PERI-IK Fort Knox, KY 40121-5620
8a. NAME OF FUNDING/SPONSORING ORGANIZATION U.S. Army Research Institute for the Behavioral and Social Sciences 8b. OFFICE SYMBOL (If applicable) PERI-I	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER 9-X58-6Z66R-1
8c. ADDRESS (City, State, and ZIP Code) 5001 Eisenhower Avenue Alexandria, VA 22333-5600	10. SOURCE OF FUNDING NUMBERS PROGRAM ELEMENT NO. 62785A; PROJECT NO. 790; TASK NO. 412; WORK UNIT ACCESSION NO. C6
11. TITLE (Include Security Classification) Unit Training Management System, Strategy, and Program for Simulation Networking (SIMNET)	
12. PERSONAL AUTHOR(S) Madden, James L. (BDM International, Inc.)	
13a. TYPE OF REPORT Final 13b. TIME COVERED FROM 89/02 TO 90/05 14. DATE OF REPORT (Year, Month, Day) 1991, June 15. PAGE COUNT	
16. SUPPLEMENTARY NOTATION --	

17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	Army Research Institute, SIMNET, Training management, Standard Army Training System, Integrated Training Management System

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

This report presents a design for a training management system, strategy, and plan for SIMNET-based training. It addresses the training doctrine prescribed in FM 25-100, Training the Force, and the associated Integrated Training Management System (ITMS) and Standard Army Training System (SATS).

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT ☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT. ☐ DTIC USERS	21. ABSTRACT SECURITY CLASSIFICATION Unclassified
22a. NAME OF RESPONSIBLE INDIVIDUAL Donald F. Haggard	22b. TELEPHONE (Include Area Code) (502) 624-3450 22c. OFFICE SYMBOL PERI-IK

DD Form 1473, JUN 86 Previous editions are obsolete.

Research Report 1592

Unit Training Management System, Strategy, and Program for Simulation Networking (SIMNET)

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Department of the Army

June 1991

Army Project Number
2Q162785A790

Human Performance Effectiveness and Simulation

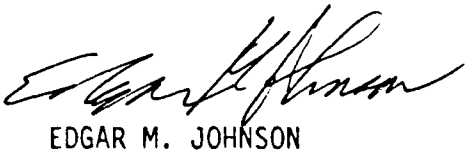
FOREWORD

This Research Report describes a concept for a training management system, strategy, and plan for the Simulation Networking (SIMNET) system. It is based on research conducted for the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) Fort Knox Field Unit. This research effort is the first direct examination of the correspondence between the Army's new training management system prescribed in Field Manual 25-100, Training the Force, and SIMNET. While SIMNET offers an entirely new capability to simulate the modern battlefield in support of collective training, it has some limitations that must be overcome through other types of training.

This research effort is particularly important in view of the high payoff anticipated from SIMNET in terms of additional training opportunities at reduced cost. This capability will only be obtained, however, if SIMNET is incorporated into the Army's training system in a manner that capitalizes on its capabilities and compensates for its limitations.

ARI has traditionally taken the lead in designing unit training management systems, strategies, and programs that transform advanced technologies, such as those found in SIMNET, into effective training. Typical examples include the after action review (AAR) and tactical engagement simulation (TES) training models for the Multiple Integrated Laser Engagement System (MILES), and the trendline analysis model for the National Training Center (NTC) data base.

In recognition of the importance of SIMNET to Army training, ARI's Fort Knox Field Unit has undertaken an ambitious program to ensure that appropriate training management strategies, performance measurement approaches, and performance feedback techniques are available to the Army for SIMNET. This report represents one of the initial steps in that program.



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Technical Director

UNIT TRAINING MANAGEMENT SYSTEM, STRATEGY, AND PROGRAM FOR SIMULATION NETWORKING (SIMNET)

EXECUTIVE SUMMARY

Research Requirement:

The purpose of this research effort was to develop a unit training management system, strategy, and program that could support simulation networking (SIMNET).

Procedure:

The procedure followed was to test the hypothesis that the Army's current training management system, strategy, and concept for development of a training plan could effectively address SIMNET-based training events. As a basis for testing this hypothesis, an on-site investigation of the capabilities and limitations of SIMNET was conducted and a thorough review of the Army's current training management system was undertaken, to include the functionality of its automated Standard Army Training System (SATS).

The hypothesis was then tested based on an analysis of the relationship of SIMNET to the Army's current standard training events, the Army's unit training strategy, and the exercise planning and control system developed within other subtasks of this research effort. Once the hypothesis had been tested, further analyses addressed the programmatic content for SIMNET training, appropriate measures of performance, prescription of training events, user interface requirements, and SATS/SIMNET compatibility.

Findings:

The research effort supported the hypothesis that the Army's current training management system, strategy, and concept for the development of a training plan could effectively encompass SIMNET. The means for achieving this was to view SIMNET-supported training exercises as unique training events

and manage them accordingly. An analysis of all existing training events indicated that this was both feasible and consistent with the concept of a training event.

It was also found that this overall process could be further enhanced through the introduction of a strategy aid to support the formulation of the unit's short-range plan. And finally, it was found that SATS and a conceptual SIMNET exercise planning and control system were fully compatible and that the latter could be effectively integrated into the former.

Utilization of Findings:

This research effort provides a means for managing SIMNET-based training within the provisions of FM 25-100 and the processes incorporated in SATS. This is a particularly important finding as NTC performance results indicate that failure to effectively integrate SIMNET-based training events with other standard Army training events that compensate for SIMNET's shortcomings during short-range planning has left some units ill-prepared for combat.

Equally important, the findings provide a basis for the early incorporation of SIMNET into the Army's automated training management system in a manner that will ensure that SIMNET is being used effectively immediately upon being fielded.

And finally, the strategy aid developed within this research effort should make a substantial contribution to the effective use of all types of training.

UNIT TRAINING MANAGEMENT SYSTEM, STRATEGY, AND PROGRAM FOR SIMULATION NETWORKING (SIMNET)

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UNIT TRAINING MANAGEMENT SYSTEM, STRATEGY, AND PROGRAM FOR SIMULATION NETWORKING (SIMNET)

PURPOSE

The purpose of this report is to present a concept for design of a training management system, strategy and program for SIMNET which is applicable to service schools and both active and reserve units. The research described in this report is part of a larger project entitled Unit Performance Measurement and Training Program Design for Simulation Networking (SIMNET) being undertaken by the U. S. Army Research Institute (ARI).

The goals of this larger project are

(1) Development of a common unit performance measurement and evaluation system for simulator and NTC exercises;

(2) Development of a training strategy and program for SIMNET; and

(3) Development of a total combined arms training concept and management system.

The subtasks established to achieve these goals are listed in Figure 1.

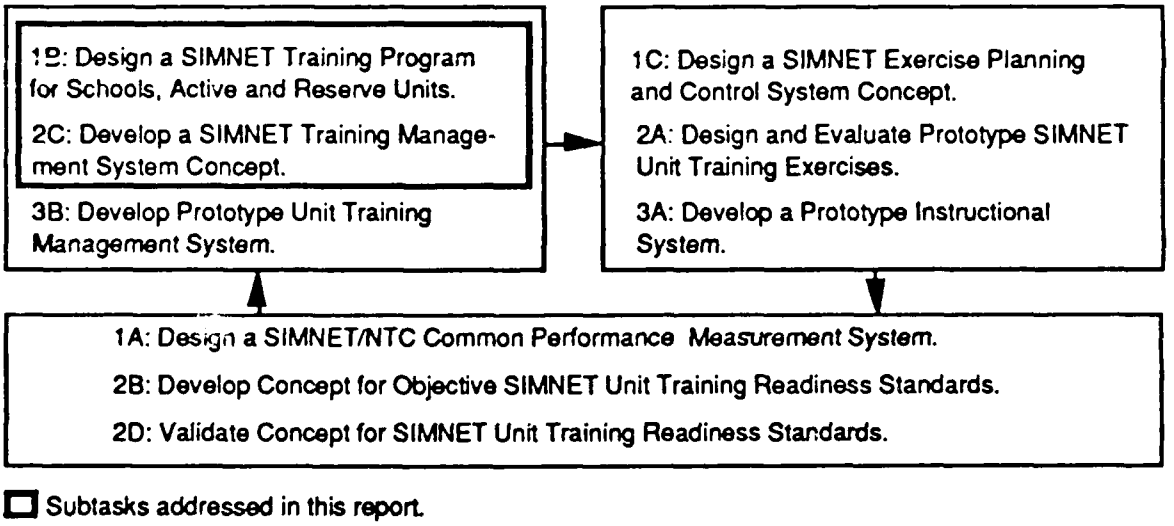


Figure 1. Scope of ARI's research project on unit performance measurement and training program design.

This report addresses subtasks 1b and 2c which partially support the second and third objectives respectively. These subtasks are defined in the Statement of Work as follows:

> Subtask 1b: Design a SIMNET Training Program for Schools, Active and Reserve Units. Analyze potential SIMNET concepts and applications and develop recommendations for: (1) A global training strategy for SIMNET placed within the larger Army training system generally and ITMS in particular; (2) Programmatic content and structure for SIMNET training for TRADOC schools, active units, and reserve units; and (3) Appropriate measures of performance for above training programs.
>
> Subtask 2c: Develop a SIMNET Training Management System Concept. Analyze linkages between ITMS and a SIMNET training management system and identify implications for: (1) Functional requirements for system to prescribe training events; (2) User interface requirements; and (3) ITMS/SIMNET compatibility.

Following the definition of subtask 2c, the version of the Integrated Training Management System (ITMS) which will initially be fielded was designated the Standard Army Training System (SATS). As such, this research effort will focus on the linkages between SATS, rather than ITMS, and SIMNET.

INTRODUCTION

The hypothesis which serves as the basis for this research effort is that the Army's training system, in its current form, can accommodate SIMNET just as it has a wide variety of other training devices and systems. This hypothesis was established to ensure that only the minimum number of changes, if any, would be made to the current system to accommodate SIMNET.

The procedure followed to test this hypothesis is indicated in Figure 2. The research effort is organized accordingly, beginning with a thorough review of SIMNET and the Army's current training management system.

SIMNET

This section addresses SIMNET, its components, and the scope and fidelity of the simulation it provides. Its purpose is to facilitate the analysis, presented later in this report, of the relationship of SIMNET to the Army's current training system.

SIMNET and its Components

SIMNET is a large-scale network of interactive combat vehicle simulators. Its purpose is to enable combat vehicle commanders and crews within platoon-, company-, and battalion-size units to receive effective force-on-force training on a simulated battlefield at far less cost than that associated with field training exercises. When utilized

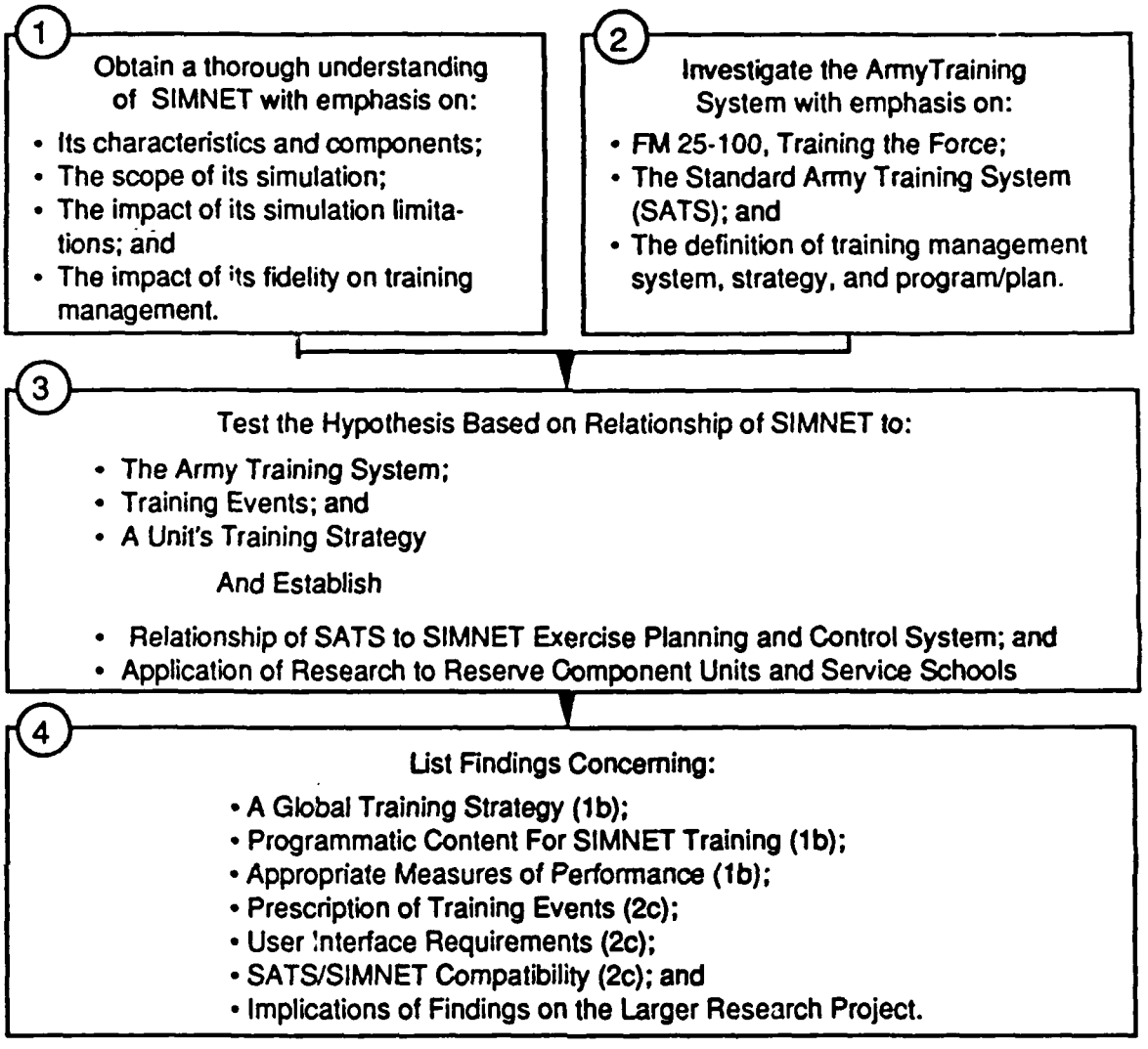


Figure 2. Procedure followed for subtasks 1b and 2c.

at the battalion level, the system also provides mock-ups of command post vehicles and user-friendly computer models to support logistics and fire support operations. While continued development is ongoing to extend SIMNET up through the Corps level, this study focuses on the current use of SIMNET at the battalion level and below.

The term SIMNET specifically applies to the developmental research project sponsored by the Defense Advanced Research Project Agency (DARPA). The Army's production model will be designated the Close Combat Tactical Trainer (CCTT). The following paragraphs address six of SIMNET's major components -- combat vehicle simulators, terrain data base, networks, semi-automated forces, battlemaster station, and plan view display.

SIMNET Combat Vehicle Simulators (CVS). CVSs have been developed by DARPA for tanks, armored personnel carriers, vehicle mounted air defense weapons, and fixed- and rotary-wing aircraft. Each CVS contains a station for each member of the vehicle's crew. The tank crew station configuration depicted in Figure 3 is typical.

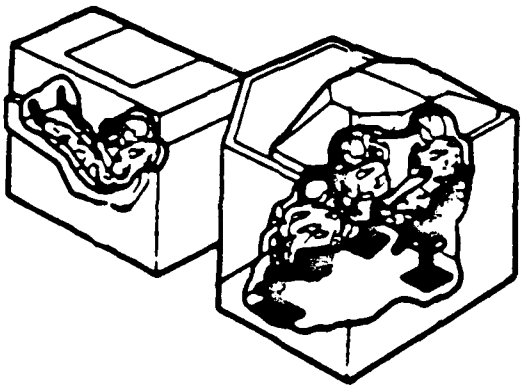


Figure 3. SIMNET CVS configuration for the M1 tank.

A CVS can only be operated in the closed hatch mode. Crew members view the battlefield through CRT monitors which are provided for the vision blocks and weapon sights within ground vehicles, and for the canopy panels of aircraft. Within the M1 tank CVS, for example, the crew members are provided with the following displays:

- Commander: Three 1 power vision block displays mounted in a rotatable cupola and a Gunner's Primary Sight Extension (GPSE) display which is a repeater of the Gunner's GPS display.
- Gunner: GPS display with two magnification options -- 3 power and 10 power.
- Loader: One manually rotatable 1 power vision block.
- Driver: Three 1 power vision blocks.

The view provided through a vision block extends out to 3500 meters and its sector is generally the same, albeit somewhat less, than that provided by the tank's actual vision blocks.

Weapon engagement simulators, to include sights and all key fire control instrumentation, are provided for each of the CVS's heavy direct fire weapons. In the case of the M1 tank, this simulation is currently provided for its 105MM main gun, but not for its coax or cupola mounted machine gun.

An audio system is incorporated in each CVS to provide the sounds associated with the vehicle and the combat environment. Each crew station also contains, at various levels of fidelity, simulators for the performance of each crew member's primary motor-performance and cognitive functions. Each CVS also contains an intercom and radio set

with the same general characteristics as the simulated vehicle's communication system.

Artificiality is held to a minimum consistent with the vehicle's operational requirements. In the case of the M1 tank CVS, one compromise is an Azimuth Indicator which is provided to serve the function of a compass based on the projected location of the vehicle. Without this component, which is not present on the actual tank, the tank commander would not be able to determine location through intersection or resection, or determine a precise observer-target azimuth when adjusting indirect fire.

Terrain Data Base. SIMNET terrain data bases can currently cover an area up to 50 km x 50 km. They allow generally realistic time/distance play within a free-play training scenario. By linking the terrain data base through host computers and software drivers to each CVS, a visual simulation of terrain with vehicles moving and firing is generated which is consistent throughout the complete battlefield simulation. This allows each CVS to maneuver throughout the "battlefield," and each CVS crew member sees the appropriate portion of the "battlefield" from the unique perspective of his location within the CVS. Terrain representation is currently provided by gently rolling terrain, representative wooded areas and low vegetation, isolated buildings and other man-made features, and roads, trails and rivers.

SIMNET Networks. Two types of networks are utilized to connect the individual CVSs and the terrain data base -- local area and long haul (Figure 4).

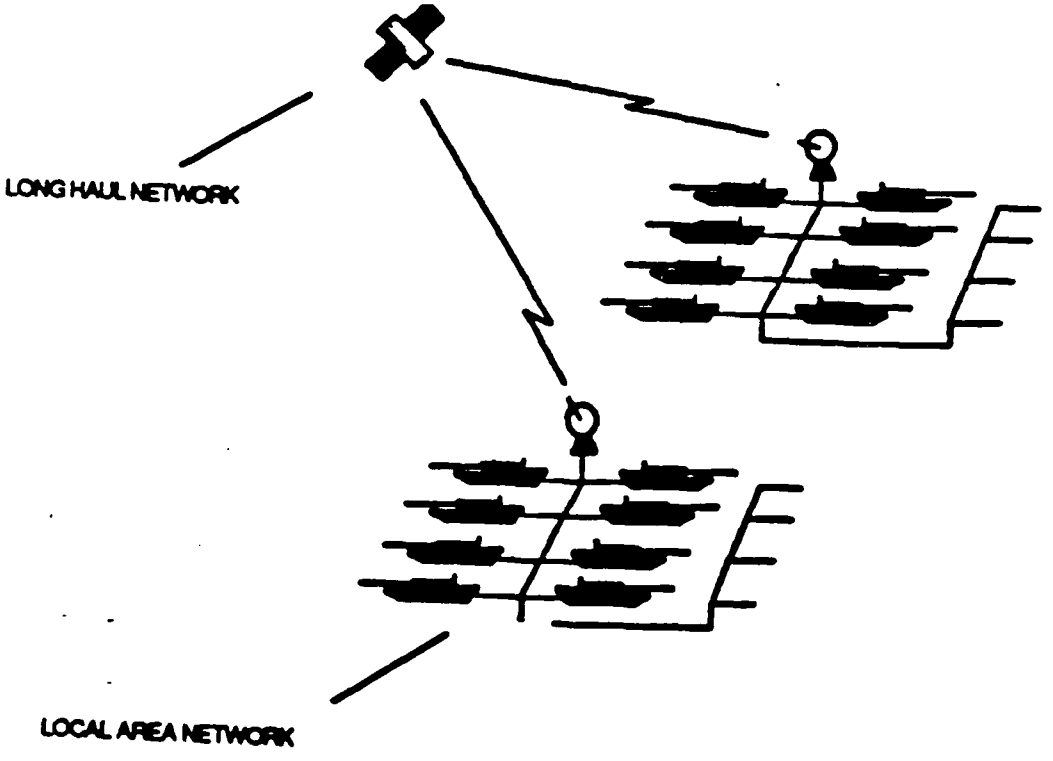


Figure 4. SIMNET networks.

Local area networks are utilized to connect up to a battalion's worth of CVSs within a SIMNET facility. Each of these facilities can then be connected via a long haul network to enable interaction with a battalion-size or larger opposing force or to conduct brigade and higher level SIMNET-based training exercises.

SIMNET Semi-Automated Forces. While SIMNET enables both the blue and red sides to be played by means of CVSs, a capability is also provided for the utilization of semi-automated red forces. This capability enables a relatively small number of red force players to represent all of the individual weapon systems within the red force. A similar semi-automated system is also currently being developed to support those components of the blue force for which CVSs are not provided -- flank units, units being passed, etc.

SIMNET Battlemaster Station. Within each SIMNET facility, a Battlemaster Station is provided from which a "battlemaster" can initiate, monitor, and control each exercise.

Plan View Display. A plan view (or top-down) display (PVD) is provided to enable a commander (in his role as a trainer) to replay the entire battle from an electronic record which is automatically captured during the exercise. This capability is not intended for use during the actual conduct of the exercise, but during the preparation of his After Action Review (AAR).

Scope of SIMNET Simulation

In order to determine the current scope of SIMNET simulation during the period of this research, extensive interviews were conducted with key personnel on the staff of the Fort Knox SIMNET facility during the period June-September 1988. The tasks in the current Heavy Company Team ARTEP Mission Training Plan (MTP) (Headquarters, Department of the Army (HQDA), 1988) were used as a general interview guide. The use of an MTP for this and similar purposes throughout the study is in keeping with a single underlying premise which guided the entire research effort. This premise is that, as long as the Army uses the MTP as its primary means of determining whether successful training has or has not occurred, the ultimate effectiveness of any training system must be measured in terms of its ability to support MTP tasks. Accordingly, questions were asked with regard to each selected task concerning the ability of SIMNET to support its performance. During the discussion of a task involving the reduction of an obstacle, for example, it was determined that engineer obstacles cannot currently be played in SIMNET. At the completion of these interviews, a listing was made of all major MTP essential functions which could not be simulated and this listing was reviewed and confirmed by the facility manager.

The highlights of this survey are depicted in Figures 5 through 7 and a copy of the complete survey is provided at Appendix A. As depicted in Figure 5, vehicles do not have to cope with many of the impediments encountered on an actual battlefield.

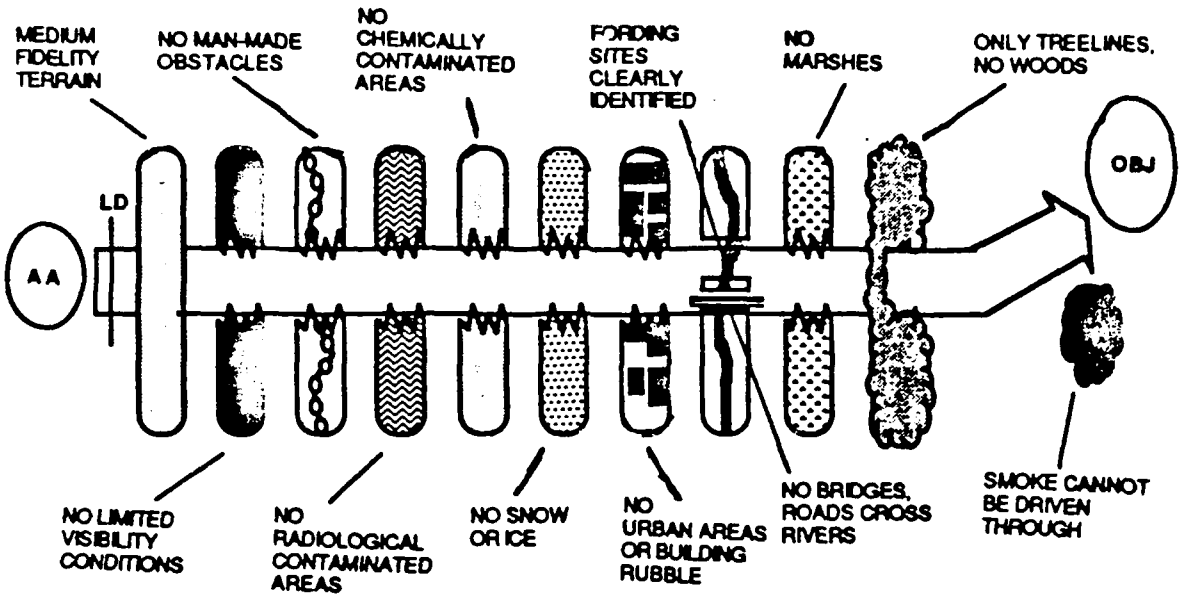


Figure 5. Ease of mounted movement on the SIMNET battlefield.

Nor, as indicated in Figure 6, does SIMNET permit the participation of all of the maneuver and combat support units found on the battlefield.

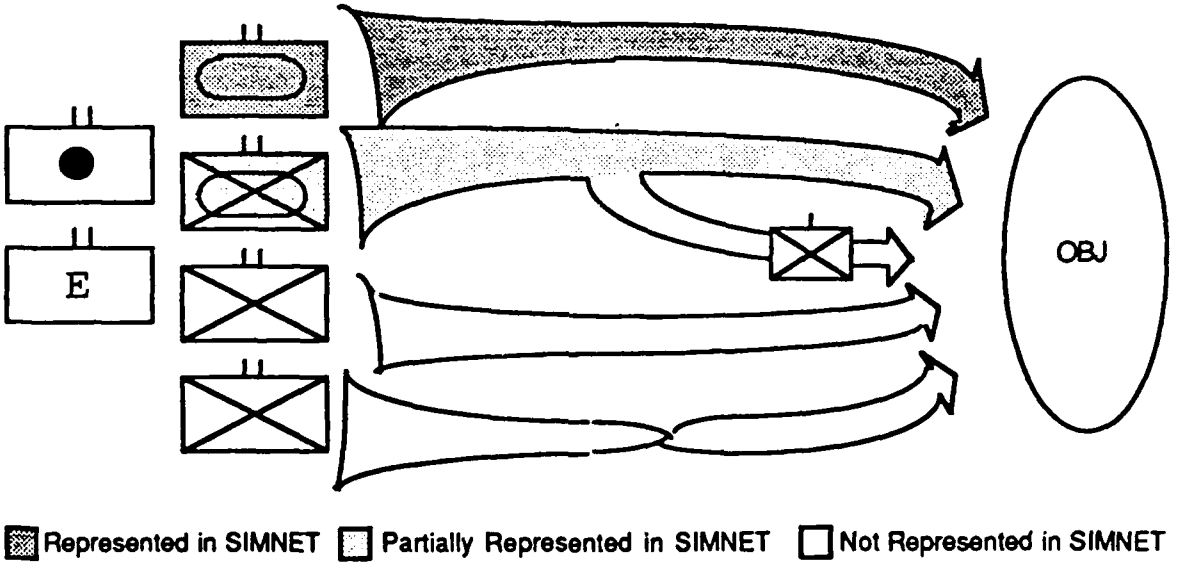


Figure 6. Unit representation on the SIMNET battlefield.

And finally, Figure 7 indicates additional aspects of the battlefield environment which are not represented within SIMNET.

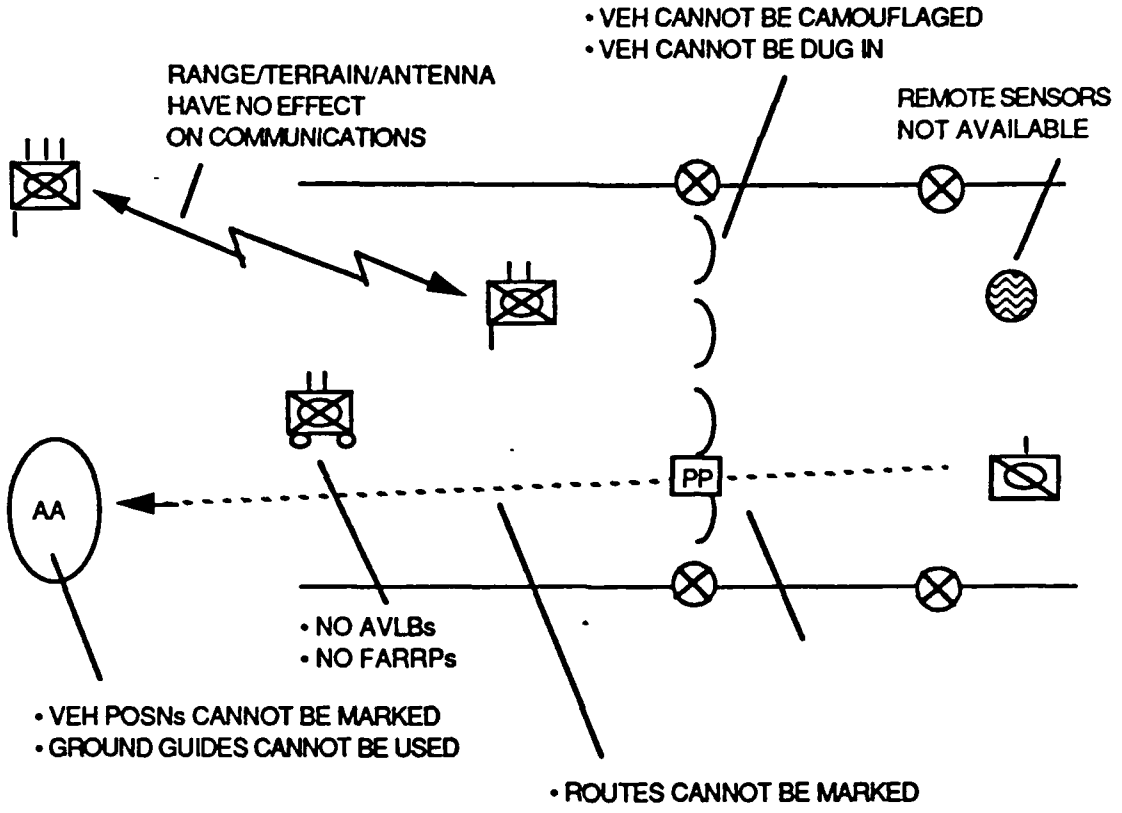


Figure 7. Additional aspects of the SIMNET battlefield environment.

While the shortcomings noted in the above figures are relatively extensive, it is important that they be kept in perspective. A listing of major MTP essential functions currently simulated within SIMNET would be several orders of magnitude longer. What is important about these findings is the recognition that such limitations currently exist. If such limitations have a significant impact on the capability of SIMNET to support MTP-based training, the assessment of a training management system to support SIMNET must address its ability to recognize and compensate for these limitations.

Impact of SIMNET Simulation Limitations

The most thorough investigation of the impact of SIMNET simulation limitations as of the first phase of this study was conducted by the Human Resources Research Organization (HumRRO) (Drucker, Campshure, Campbell, 1988). This study examined thirteen drills and nine missions for an armor platoon. Each individual standard for each drill, and each subtask for each mission, was analyzed individually to determine the capability of SIMNET to support it. This analysis of standards and subtasks considered the following five factors:

(1) Could the activities be performed,

(2) Could all of the subordinate activities be performed,

(3) Was the fidelity of simulation adequate,

(4) Did positive training transfer occur, and

(5) Could the performance of the activity be observed.

The following extract of the report's findings concerning a platoon overwatch mission are typical. It indicates that the ability of SIMNET to support training on the subtasks listed was delimited by the limitations in the simulation provided by SIMNET.

- Subtask: SELECT overwatch position.

  Impact of SIMNET simulation limitations:

  - Inability to observe terrain through open hatch;
  - Restricted horizontal width of vision through vision blocks (tank commander's vision blocks combined provide only 64 degree horizontal width of vision, while actual tank's six vision blocks give 360 degree horizontal width of vision without the need to rotate the cupola);
  - Inability to dismount and walk terrain;
  - Inability to use visual equipment (such as binoculars); and
  - Terrain data base and corresponding terrain maps contain few terrain features, sparse vegetation, and smoothed terrain; making it difficult to identify terrain features that provide adequate cover/concealment.

- Subtask: SELECT/INITIATE movement technique/formation.

  Impact of SIMNET simulation limitations:

  - Vehicle maneuver easier/faster than in real world due to terrain smoothing and absence of physical movement cues;
  - Judging speed of own vehicle/other vehicle difficult;
  - Distinguishing between vehicles can be difficult, vehicles have no distinguishing features;
  - Estimating distance between objects is difficult;
  - Visual, auditory, and physical cues for speed/movement can be confusing;
  - Position of speedometer makes it difficult for driver to monitor speed;

- Azimuth Indicator unique to device, can be used in place of a compass to determine cardinal direction/exact location; and

- Display lacks cues (e.g., shadows) used in real world to determine cardinal direction.

A further indication of the cumulative effects of the SIMNET simulation limitations can be gained from a report prepared by the commander of an Armor battalion. This report, prepared immediately following his return from a National Training Center (NTC) rotation, provides his subjective opinion of the value of the SIMNET training he underwent. Extracts of his observations concerning the use of SIMNET to support each of the seven Battlefield Operating Systems follow. A copy of the entire report is provided at Appendix B.

- "SIMNET assisted us greatly in intelligence planning . . ."

- "SIMNET's biggest shortfall lies in offensive planning and execution. Without dynamic terrain and obstacles, defensive planning steps which mandate precise time and resource management cannot be exercised. (By dynamic terrain I mean gullies, folds and drop-offs, not a gentle rolling plain)."

- "SIMNET provides excellent training in calling for and adjusting indirect fires. The fire support computer terminal is however, too handy. It allows the FSO to directly process and affect calls for fire. This is unrealistic. It makes the FSO the man pulling the lanyard on the howitzer."

- "Command and control at the NTC was strong. SIMNET contributed to this success."

- "SIMNET provides little training on mobility, counter-mobility and survivability. Without dynamic terrain and obstacles the ability to shape the SIMNET battlefield is limited."

- "As with the above, SIMNET offers little benefit in the training of air defense. With no .50 cal capability AFADS cannot be exercised."

- "Through SIMNET we exercised CSS planning and reports. This assisted us at the NTC but was of little value when it came to execution."

Impact of SIMNET Fidelity on Training Management

Anyone who has visited a SIMNET facility while training was going on cannot fail but be impressed. My observations and questioning of participants indicates that training, often excellent training, is clearly occurring. This sensing is also reinforced in reports such as that in Appendix B. The impression gained is that SIMNET is here to stay and will play a growing role in support of Army training. The increasing costs associated with field training exercises alone appears to leave the Army little choice but to fully exploit SIMNET.

On the other hand, there are clear limitations to the simulation SIMNET currently provides and, as indicated above, these limitations have a discernible impact on many aspects of tactical training. An important issue with regard to this research effort is thus if and when these limitations will be corrected. If all critical limitations are corrected by the time CCTT is fielded Army-wide, then they can be ignored during the formulation of a training management system, strategy and program for SIMNET. If they are not, then this research effort must address their impact and compensate for it.

Some of the limitations noted above are already being corrected and others will be addressed during the development of CCTT. There is no guarantee, however, that all critical limitations will be fully corrected. This is particularly true with regard to dismounted infantry play, fully dynamic terrain, operations in built-up areas and precision gunnery. As noted in Figure 8, the greatest success in remedying these limitations is projected to occur with regard to armor engagements, and the slowest progress is projected to occur with regard to dismounted infantry forces. The terrain definition required to fully exercise a tank is simply less complex than that needed to exercise dismounted infantrymen.

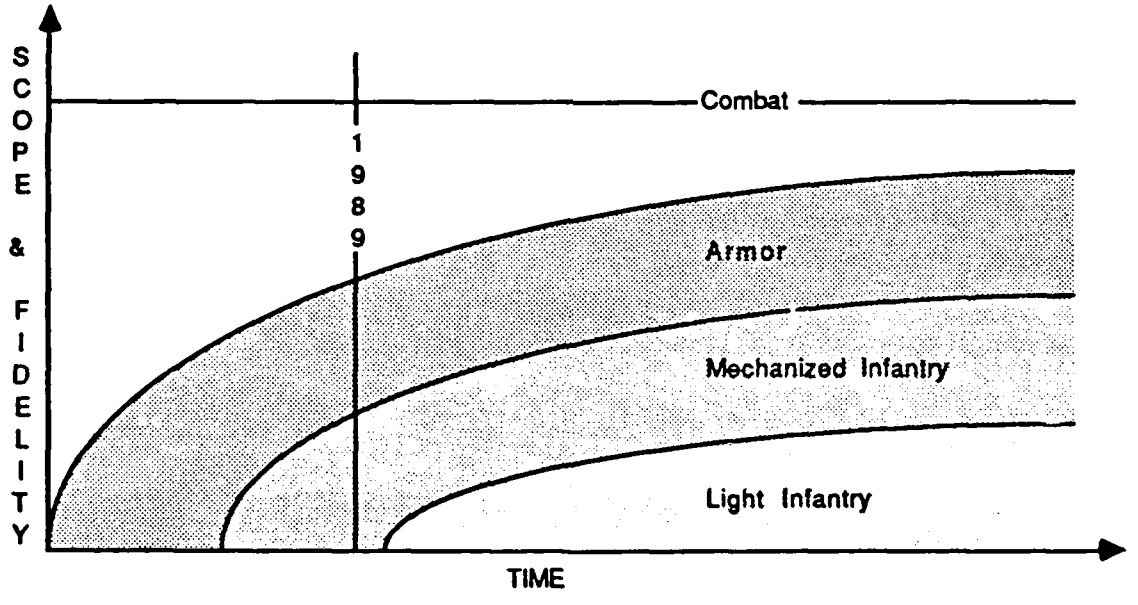


Figure 8. Projected enhancement of SIMNET by type maneuver unit

As indicated in Figure 9, this same set of dynamics portends quicker enhancements at the higher echelons where the need for dynamic terrain is relatively less than at lower echelons.

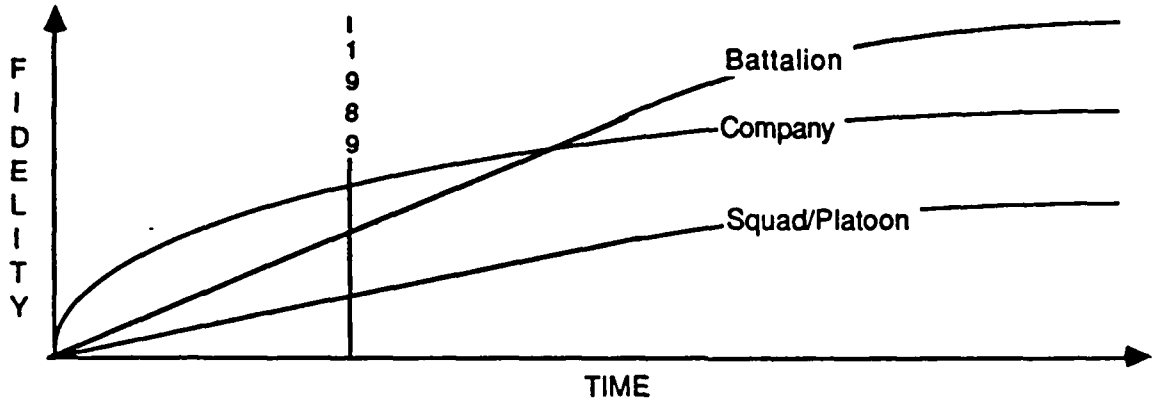


Figure 9. Projected enhancement of SIMNET by echelon.

Simply put, the amount of terrain relief required to exercise a battalion staff is far less than that required to exercise a rifle squad leader or tank commander. The interviews at Fort Knox indicated that the current system best supports company level operations. The introduction of readily available enhanced models to support staff operations at the battalion level, however, is projected to push battalion operations into the forefront in the foreseeable future.

There are two primary reasons why SIMNET may never be capable of fully replicating a field training exercise. First, clear-cut technical solutions do not currently exist to resolve some of its limitations. Individual dismounted movement within small infantry units is an example. And second, even when technical solutions do exist, they may not always be cost-effective.

In summary, there are three factors which influence the impact of SIMNET simulation limitations on training management:

- Current SIMNET simulation limitations delimit its overall training effectiveness;
- Some of these limitations will be remedied in the near- and mid-term;
- There is no way of knowing how many simulation limitations will be resolved or when they will be resolved.

Accordingly, one of the underlying assumptions upon which the research in this report is based is that provisions must be made within the training management system for SIMNET to compensate for its simulation limitations. Moreover, while this requirement may well decrease over time, the provisions for providing it cannot be capriciously phased out until clear and compelling evidence exists that all MTP essential simulation limitations have been resolved.

THE ARMY TRAINING SYSTEM

This section addresses the Army's current training system with emphasis on those aspects which interface with SIMNET. Its purpose is to provide a basis for determining changes which may (or may not) be required for this system to effectively accommodate SIMNET-based training. It investigates both the Army's current training management system and its emerging Standard Army Training System, and concludes with suggested working definitions for the terms "training management system," "strategy" and "program."

The current Army training system for units is defined in the following publications:

- FM 25-100, Training the Force, which prescribes training doctrine for the planning, execution, and assessment of training;
- TRADOC Regulation 310-1 (C1), Design, Development, Preparation and Management of ARTEP Documents (Mission Training Plans (MTPs) and Drill Books), which prescribe the development and publication of standards for tactical collective training;
- DA Circular 350-85, Standards in Weapons Training, which prescribes the training ammunition required for sustained readiness; and
- HQDA Battalion Level Training Model (BLTM), which provides guidelines for the fuel and maintenance costs required for sustained proficiency.

The system is further defined within the SATS application software which will be provided to unit commanders, beginning in August 1989, to assist them to integrate and execute the processes described in the above documents.

Each of these components of the Army's current training system is described in turn in the following paragraphs.

FM 25-100, Training the Force

The Army's training doctrine is defined in Field Manual 25-100, Training The Force, dated 15 November 1988. Its Preface states that:

> "Training prepares soldiers, leaders, and units to fight and win in combat -- the Army's basic mission. 'Training the Force' is the Army's standardized training doctrine applicable throughout the force. It provides the necessary guidelines on how to plan, execute, and assess training at all levels. The manual provides authoritative foundations for individual, leader and unit training."

During the 1988 Army Chief of Staff's Senior Leaders Conference at Fort Leavenworth, Kansas, the Army Chief of Staff, GEN Vuono,

reconfirmed that the training doctrine contained in FM 25-100 applies to both the active and reserve components.

The training system defined in FM 25-100 is summarized in Figure 10.

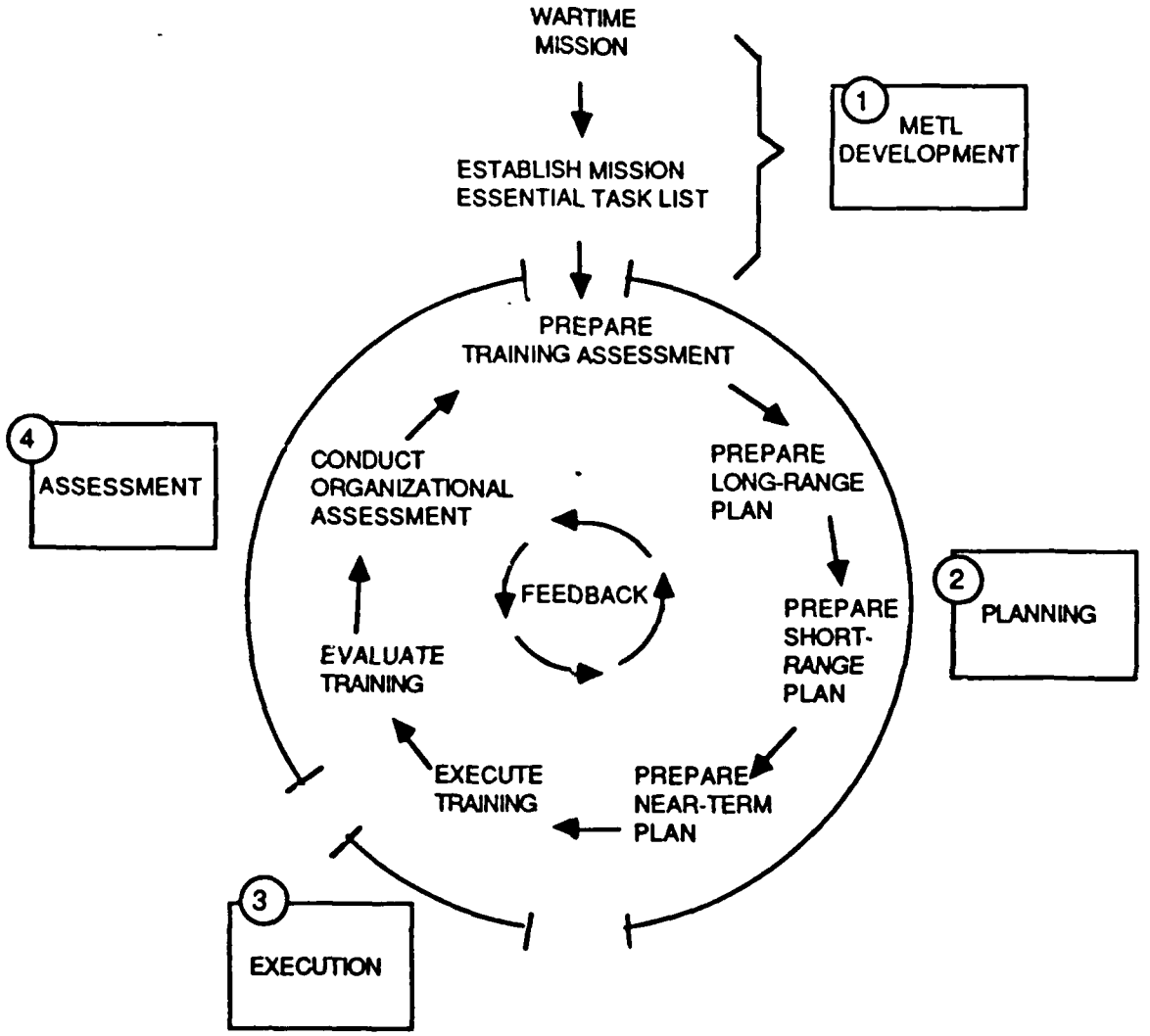


Figure 10. FM 25-100 training management cycle.

It consists of four phases, the final three of which are tied together by means of a training feedback process.

Phase 1, Mission Essential Task List (METL) Development, involves the identification of tasks essential for accomplishing the unit's wartime mission(s). The METL is developed by selecting tasks from the unit's MTP (see description below) and related requirements specified in external directives that the unit must be able to perform in order to accomplish its war plans. Training objectives are then developed for those tasks for which Training and Evaluation Outlines (T&EOs) do not

exist in the MTP. If necessary, the unit commander can also augment the subtasks and standards contained in an existing T&EO if that is required to make them consistent with his war plans. The METL, together with its associated objectives, is then further refined through the designation of tasks within the METL as "Battle Tasks" when they are essential for the accomplishment of the next higher echelon's METL tasks.

Phase 2, Planning, involves the development of three types of training plans -- long-range, short-range, and near-term -- based on a training assessment which compares the unit's current level of tactical proficiency with the desired level, as defined by the METL standards.

The training assessment determines the unit's current proficiency on each METL task through the analysis of all available training evaluation feedback, and projects the unit's future proficiency based on factors such as known personnel turnover and the scheduled fielding of new equipment.

The long-range plan focuses on the allocation of resources over the next 24 months (48 months in reserve component units) with emphasis on the next fiscal year. During this planning process, the training resources which have been allocated to the unit are used as the basis for formulating and scheduling training events in a manner which will best support the sustainment of proficiency over the long term. The guidelines for this allocation are contained in DA Pamphlet 350-38, Standards in Weapons Training (SIWT) and the HQDA Battalion Level Training Model (BLTM) (see descriptions below). It is during this phase that requirements for specific types of training facilities or devices, such as SIMNET, are first directly or indirectly identified based on their relationship to the training events selected. It is important to note that during this planning phase no attempt is made to match METL tasks with the training events which were resourced. To do so would project corrective training out so far into the future that it would be meaningless in view of the fluctuations which will occur in a unit's proficiency during that extended period.

The short-range plan focuses on the refinement of the long-range plan, identifying and allocating short lead time training resources, preparation and publication of the unit's short-range training guidance and plan, and "cross-referencing" each training event with specific training objectives." It normally covers a period of 3 months in active component units and up to 12 months in reserve component units. It is during this planning phase that specific training requirements in terms of the METL tasks selected for training during the training assessment are matched with the resourced training events.

The near-term planning process focuses on the refinement of the short-range plan, the provision of training guidance for trainers, the allocation of training resources to trainers, and the publication of the weekly training schedule. This period normally begins 4-6 weeks prior to the execution of the training. When the commander passes his guidance to the trainers who will prepare a training event, the process transitions from training management to exercise planning.

Phase 3, Execution, involves the planning, preparation, and conduct of each of the training events scheduled on the short-range calendar and weekly training schedule. As such, it falls outside the scope of this research effort and is addressed in subtasks 1c and 2a.

Phase 4, Asessment, involves the evaluation of training feedback from all recent training events to support two forms of assessment. The first, an organizational assessment, assesses the unit's overall status within the larger context of training, force integration, logistics, and personnel. The second, the training assessment, is discussed above as part of the planning process and its accomplishment thus closes the training management cycle.

While a general grasp of all of the elements of the FM 25-100 process is essential for understanding of how to best formulate a training management system, strategy and plan for SIMNET, several are particularly important. Accordingly, the definitions of three specific elements -- training event, ARTEP Mission Training Plan, and events-based resourcing models -- are provided to ensure a common understanding for the analysis of SIMNET in the next section.

Training event. Training events are the currency of the collective training management system within units. The entire system is geared to the selection, scheduling, defining in terms of METL tasks, and resourcing of training events.

Training events have become even more important over the past several years as a result of the Army's transition from its Battalion Training Day-based training resource model to its current Battalion Level Training Model which is training events-based (see description below).

While the number and definition of the Army's standard training events is constantly evolving, the most current listings are contained in FM 25-100 and the 17 February 1989 draft of FM 25-XY, Battle Focused Training Management at the Battalion Level and Below (Figure 11).

Two additional training events -- the Sand Table Exercise and Classroom Instruction -- have been added to this list since they remain in common use in the field. The listing places the events in generally accepted generic categories related to their purpose -- collective training, command and staff training, and individual tactical/weapon training.

A brief description of each event, based on those provided in FM 25-100, follows:

- Joint Training Exercise (JTX): A field training exercise that is jointly conducted by units from more than one nation;
- Combined Training Exercise (CTX): A field training exercise that is jointly conducted by military forces of more than one branch;

FIELD MANUAL		TRAINING EVENT
25-100	25 - XY	
		COLLECTIVE TRAINING
•		Joint Training Exercise (JTX)
•		Combined Training Exercise (CTX)
•	•	Field Training Exercise (FTX)
•	•	Combined Arms Live Fire Exercise (CALFEX)
•	•	Live Fire Exercise (LFX)
•	•	Deployment Exercise (DEPEX)
•	•	Situational Training Exercise (STX)
	•	Crew Marksmanship (Gunnery) Training
		COMMAND AND STAFF TRAINING
•	•	Fire Coordination Exercise (FCX)
•	•	Command Field Exercise (CFX)
•	•	Tactical Exercise Without Troops (TEWT)
•	•	Command Post Exercise (CPX)
•	•	Map Exercise (MAPEX)
•	•	Logistics Exercise (LOGEX)
		INDIVIDUAL TACTICAL/WEAPON TRAINING
	•	Individual Marksmanship Training
		Sand Table Exercise (ST)
		Classsroom Instruction (CI)

Figure 11. Training events.

- Field Training Exercise (FTX): A high-cost, high-overhead exercise conducted under simulated combat conditions in the field. It exercises command and control of all echelons in battle functions against opposing forces;

- Combined Arms Live Fire Exercise (CALFEX): A high-cost, resource intensive exercise in which player units move or maneuver and employ organic and supporting weapon systems using full-service ammunition with attendant integration of all combat arms (CA), combat support (CS) and combat service support (CSS) functions;

- Live Fire Exercise (LFX): Same as a CALFEX, but does not normally involve external CS or CSS units;

- Deployment Exercise (DEPEX): A training exercise which provides training for individual soldiers, units, and support agencies in the tasks and procedures for deploying from home stations or installations to potential areas of hostilities;

- Situational Training Exercise (STX): A mission-related, limited exercise designed to train one collective task, or a group of related collective tasks or drills, through practice;

- Crew Marksmanship Training: A series of firing tables leading to a weapon crew qualification table which normally requires the use of full-service ammunition (the exception is TOW qualification);

- Fire Coordination Exercise (FCX): A medium-cost, reduced scale exercise that can be conducted at company/team or battalion/task force level. It exercises command and control skills through the integration of all organic weapon systems, as well as indirect and supporting fires. Weapon densities may be reduced for participating units, and subcaliber devices substituted for service ammunition;

- Command Field Exercise (CFX): An opposing force field training exercise with reduced troop and vehicle density, but with full command and control and CSS unit participation;

- Tactical Exercise Without Troops (TEWT): A low-cost, low-overhead training exercise conducted in the field on actual terrain suitable for training individuals. It is used to train subordinate leaders and battle staffs on terrain analysis, unit and weapons emplacement, and planning the execution of the unit mission;

- Command Post Exercise (CPX): A medium-cost, medium overhead training exercise in which the forces are simulated; may be conducted from garrison locations or field sites;

- Map Exercise (MAPEX): A low-cost, low-overhead training exercise that portrays military situations on maps and overlays that may be supplemented with terrain models and sand tables. It enables commanders to train their staffs in performing essential integrating and control functions under simulated wartime conditions;

- Logistics Exercise (LOGEX): A training exercise which concentrates on training tasks associated with the combat service support battlefield operating system;

- Individual Marksmanship Training: A series of firing tables leading to an individual weapon qualification table which normally requires the use of full-service ammunition (the exception is DRAGON qualification);

- Sand Table Exercise (ST): A low-cost, low-overhead training exercise conducted on a sand table with scale models of weapon systems suitable for training individuals on terrain dependent tasks. Used in generally the same manner as a TEWT; and

- Classroom Instruction (CI): A minimum-cost, minimum-overhead means of training staffs and subordinate unit commanders in Standard Operating Procedures (SOPs) and tactical techniques.

An essential element of the development of a training management system for SIMNET is the determination of the relationship of SIMNET to the above training events. This is because training facilities, such as SIMNET, are either scheduled as a training event or are required to support a scheduled training event. This relationship will be addressed in the next section.

ARTEP Mission Training Plan. The Army's collective training standards which SIMNET must support are contained in ARTEP Mission Training Plans defined in TRADOC Regulation 310-1 (C1), Design, Development, Preparation and Management of ARTEP Documents.

The following components of this program impact on the development of a training management system, strategy, and program for SIMNET: Mission to Task Matrix, Task-based Training and Evaluation Outlines, Drills, and Situational Training Exercises.

Prior to the establishment of ARTEP MTPs, ARTEPs were organized by mission. Since the definition of each mission was comprehensive, each contained many tasks which were redundant. This was particularly true in the areas of planning, fire support, and combat service support. To reduce this redundancy and better focus on critical tasks, the MTPs were designed around a Mission to Task Matrix which listed all tasks once and then related them to missions within a matrix. The extract of a Mission to Task Matrix provided in Figure 12 is typical.

The task, rather than the mission, thus became the focal point of the MTP. This had secondary implications in that within the context of the matrix, proficiency on a task within one mission implies proficiency on that task within all other missions to which it is related. In addition, training guidance for the preparation of a training event is now provided in terms of a task list rather than a mission list. A second major implication of the introduction of the Mission to Task Matrix is that Training and Evaluation Outlines (T&EOs), which prescribe standards, are now developed at the task level rather than the mission level.

A second new component of the MTP is the Drill. At the squad, and in some cases, the platoon level, Drills rather than T&EOs prescribe standards for tactical proficiency. The distinction between T&EOs and Drills is that T&EOs provide Army standards for acceptable terminal collective performance, while Drills are Army standard methods for executing standard critical collective tasks. Since T&EOs and Drills serve basically the same purpose, and play the same general role within the Army's training system, albeit at different echelons, only T&EOs will be discussed in this report.

A final new component of the MTP is the Situational Training Exercise (STX). STXs are short, scenario-driven, mission-oriented tactical exercises which provide a vehicle to train a group of closely related collective tasks or battle drills. FTXs and STXs are for the most part indistinguishable except that STXs are generally shorter.

MISSION / COLLECTIVE TASK	MOVEMENT TO CONTACT	ATTACK	RAID	AMBUSH	RECON AND SECURITY	DEFEND	RETROGRADE
MANEUVER							
PERFORM TACTICAL ROAD MARCH	●	●	●	●	●	●	●
OCCUPY ASSEMBLY AREA	●	●	●	●	●	●	●
DELAY							●
PERFORM PASSAGES OF LINES	●	●	●	●	●	●	●
PERFORM ACTIONS ON CONTACT	●	●	●	●	●	●	
ASSAULT AN ENEMY POSITION		●	●				
PERFORM ATTACK BY FIRE		●	●	●		●	
PERFORM RAID			●				
PERFORM AMBUSH		●	●	●			
INFILTRATE/EXFIL...		●	●	●			●
MOBILITY/COUNTER-MOBILITY, SURVIVABILITY	●	●	●	●	●	●	●
BREACH AN OBSTACLE	●	●			●		
EMPLACE AN OBSTACLE				●		●	●
PREPARE FOR A CHEMICAL ATTACK	●					●	●
PREPARE FOR A NUCLEAR ATTACK		●				●	●
...NATION		●	●	●	●	●	●
COMBAT SERVICE SUPPORT	●	●	●	●	●	●	●
PERFORM LOGISTICAL PLANNING	●	●	●	●	●	●	●
PERFORM TAILGATE RESUPPLY	●	●	●	●	●	●	●
PERFORM SERVICE STATION RESUPPLY	●	●	●	●	●	●	●
PROVIDE MAINTENANCE SUPPORT	●	●	●	●	●	●	●
PERFORM CONSOLIDATION/ REORGANIZATION ACTIVITIES	●	●	●	●	●	●	●
INTEGRATE REPLACEMENTS	●	●	●	●	●	●	●

Figure 12. Extract From ARTEP Mission Training Plan Mission to Task Matrix

Events-Based Resourcing Models. The basis for the events-based resource models for training ammunition and funds described on pages 3-13 through 3-16 of FM 25-100 are the Standards in Weapons Training tables contained in DA Circular 350-85 and the HQDA BLTM tables respectively. An extract from DA Pam 350-85 for tank ammunition is provided in Figure 13 and from BLTM for funds in Figure 14.

Annual Crew Training Strategy and Ammunition Requirements for M60A3 with UCOFT (TRC 5)

Table/ Event	Freq	TPDS-T	HEAT-TPT	7.62	CAL .50	Tel-fare	Brew-ster	4.2 Illum	Red Phos	7.62 Blank	Cal .50 Blank	5.56 Blank	ATWS	Hoff-man
UCOFT	12													
III	4													
IV	4													19
V	2			650	350			2						12
Cal	2	3						4						
VI Tel	2				50									12
VII	2	9		250	50			2						16
VIII	2	18	6	150	100									18
IX Tel	2		6	250	100			2						21
XI Tel	2			225	136			2						24
XII	1	12		100	113			1						15
CALFEX	1	5	3	200	200			.5	4					20
UNIT TRNG										3000	804			201
Unit Trng event/veh														
FTX														
Bn/Sqdn	3									200	100			18
Co/Trp	2									400	100			30
Plt	4									400	100			18
FCX														
Bn	1													1
Co	2										2			1
Total										3000	804			201

Figure 13. DA Pam 350-85 M60 tank ammunition authorization.

SYSTEM	NUMBER USED		MILES TRAVELED		COST FACTORS CL IX	CL III		SYSTEM COST
TANK, M1	58	X	70	X	($42.00	+ $ 6.40)	=	$196,500
CFV, M3	6		85		9.25	1.05		5,250
CARRIER, MORT M106	6		60		2.30	.40		970
CARRIER, CP M577	8		50		2.70	.40		1,240
CARRIER, M113	13		75		2.30	.40		1,630
RECV VEH, MED M88	7		75		10.00	1.10		5,825
HEMMT	23		150		.40	.30		2,420
TRUCK, 2 1/2 TON	25		175		1.10	.15		5,470
TRUCK, 5 TON	7		125		.50	.15		570
HMMWV	24		175		.25	.10		1,470
						EVENT COST		$222,350

Figure 14. HQDA Battalion Level Training Model (BLTM) Class VI and IX planning costs for an AC tank battalion FTX.

Note how ammunition is allocated by gunnery table and type training event. The BLTM model is set up in much the same manner for training funds. The significance of this with regard to any analysis of a training system for SIMNET is that the definition of any SIMNET-based training event must provide a basis for defining associated resources in order for the event-based resourcing system to work. Simply calling a SIMNET exercise an FTX, for example, would lead to considerable confusion since an actual FTX requires large amounts of blank ammunition, fuel, and repair parts.

Standard Army Training System

The requirement in subtask 2c to analyze linkages between ITMS (since retitled SATS) and a SIMNET training management system requires a thorough understanding of SATS.

At a FM 25-100 review conference at Fort Leavenworth, KS in May 1988, GEN Thurman, the TRADOC commander, directed that ITMS be fielded as rapidly as possibly. This decision was based on a lengthy discussion at the conference of the burden the FM 25-100 training doctrine places on unit commanders in terms of literature reviews, analyses, calculations, filing, and report and schedule preparation.

ITMS had been specifically developed from the outset to provide automation support for these management functions, but the program was on hold until a UNIX-based system was available in field units. Following GEN Thurman's directive, a decision was made to rehost the ITMS software on the Zenith 248 computer which is currently available in field units. This interim software, which possesses somewhat less capability than the original ITMS software, was designated the Standard Army Training System or SATS. Fielding of the SATS software is currently scheduled to begin in August 1989.

SATS consists of two components -- its application software and its data bases. The data bases, which have been prepared by TRADOC, contain all of the MTP tasks, conditions, and standards; SIWT and BLTM resource tables; and all other relevant data required to support the FM 25-100 training management process.

The top three levels of the SATS menu structure are depicted in Figure 15.

As indicated in the figure, SATS has been specifically structured to support the implementation of the training management system defined in FM 25-100. Of the dozens of FM 25-100 related functions addressed by SATS, the following four deal directly with training events.

SATS Function	Applicability to SIMNET
• Long Range Plan/Calendar	Supports long-range resourcing of training events in accordance with the commander's training strategy for sustainment of proficiency.

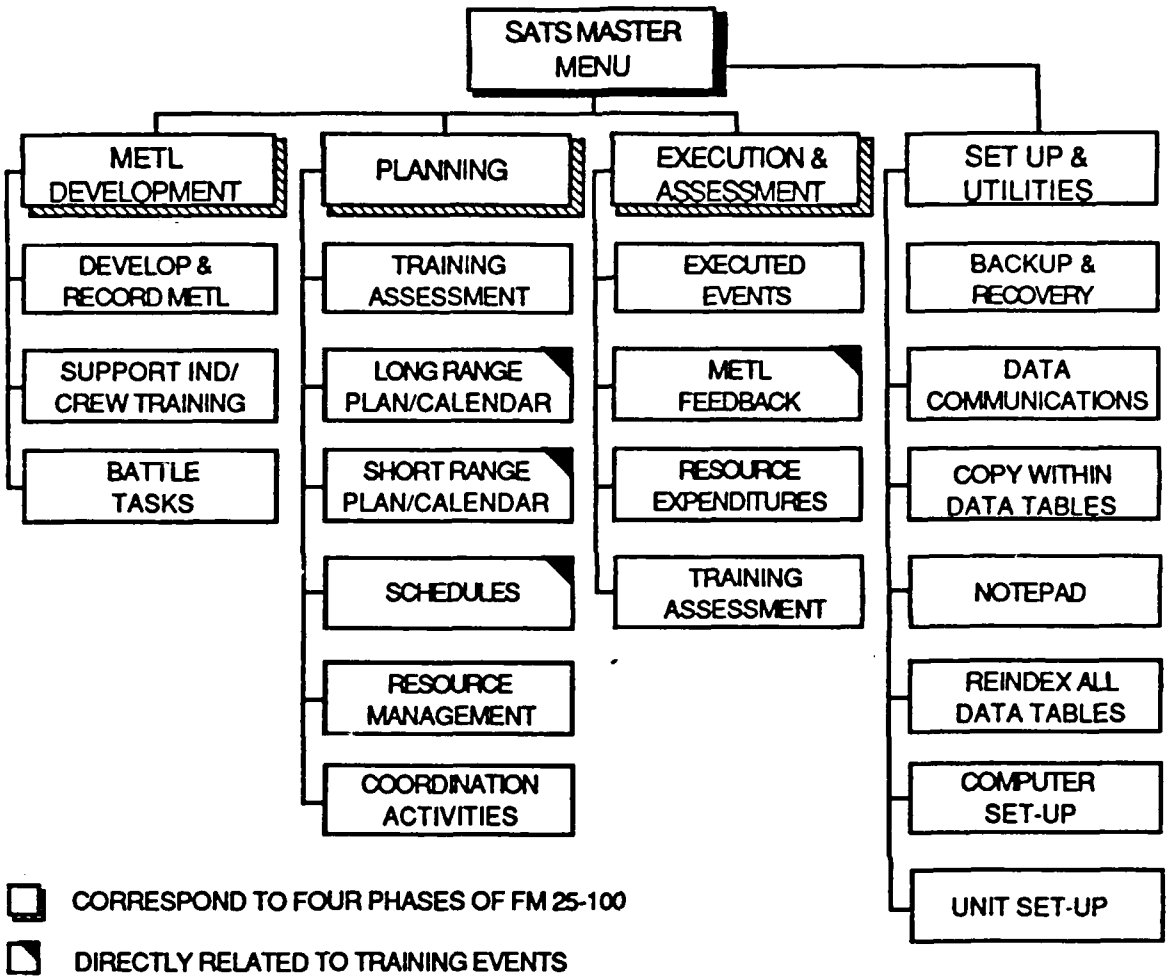


Figure 15. Top three levels of SATS menu structure.

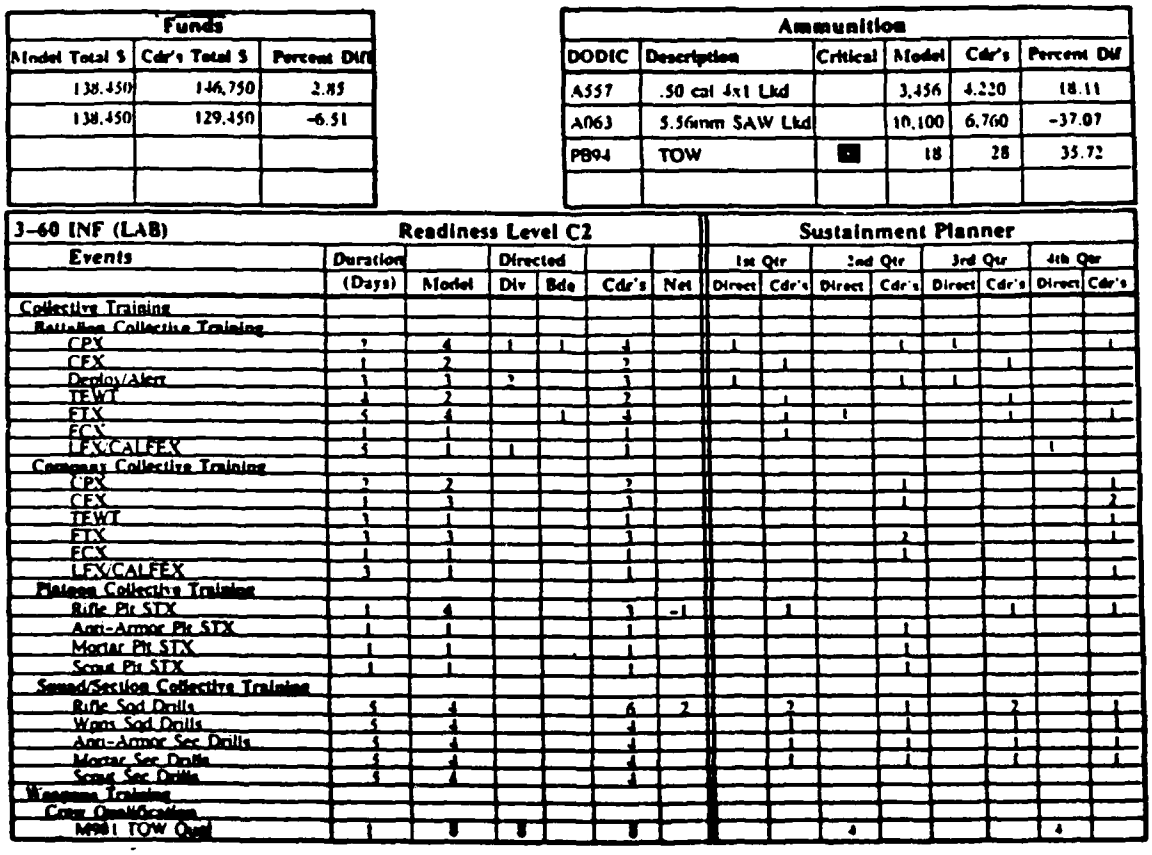
- Short Range Plan/Calendar — Supports the matching of priority tasks for training with the next quarter's resourced training events to formulate a short-range training plan in accordance with the commander's training strategy.
- Schedules — Supports the input of data applicable to each training event listed on the training schedule to include instructor, uniform, etc.
- METL Feedback — Facilitates input of evaluation feedback from training events.

The manner in which SATS supports each of these functions is discussed in detail in the following subsections. In addition, the Training Assessment function is also described in order to provide the

reader with an overall perspective of the entire cyclical training management process. For the sake of brevity, the original ITMS screens are utilized to illustrate the functionality involved, as the SATS functionality is spread over a substantially larger number of screens. Whenever possible, the actual screen diagrams from the ITMS Functional Description are used to explain the functionality involved. Beginning with the discussion of the relationship of SIMNET to a Unit's Training Strategy on page 46, however, SATS screens will be used for better clarity of the points being illustrated.

SATS Long-Range Planning/Calendar Function. During long-range planning, the allocation of training resources to specific types of training events is accomplished on the screen depicted in Figure 16.

This screen is utilized by the commander to calculate his annual funding and ammunition requirements.



Funds

Model Total $	Cdr's Total $	Percent Diff
138,450	146,750	2.85
138,450	129,450	-6.51

Ammunition

DODIC	Description	Critical	Model	Cdr's	Percent Dif
A557	.50 cal 4x1 Lkd		3,456	4,220	18.11
A063	5.56mm SAW Lkd		10,100	6,760	-37.07
PB94	TOW	[redacted]	18	28	35.72

3-60 INF (LAB) — Readiness Level C2 | **Sustainment Planner**

Events	Duration (Days)	Model	Directed Div	Directed Bde	Cdr's	Net	1st Qtr Direct	1st Qtr Cdr's	2nd Qtr Direct	2nd Qtr Cdr's	3rd Qtr Direct	3rd Qtr Cdr's	4th Qtr Direct	4th Qtr Cdr's
Collective Training														
Battalion Collective Training														
CPX	7	4	1	1	4		1			1	1			1
CFX	1	2			2			1				1		
Deploy/Alert	1	1	1		1		1			1	1			
TEWT	4	2			2			1				1		
FTX	5	4		1	4			1	1			1		1
FCX	1	1			1			1						
LFX/CALFEX	5	1	1		1								1	
Company Collective Training														
CPX	7	2			2					1				1
CFX	1	1			1					1				2
TEWT	1	1			1									1
FTX	1	1			1					2				1
FCX	1	1			1					1				
LFX/CALFEX	1	1			1									1
Platoon Collective Training														
Rifle Plt STX	1	4			1	-1		1				1		1
Anti-Armor Plt STX	1	1			1					1				
Mortar Plt STX	1	1			1					1				
Scout Plt STX	1	1			1					1				
Squad/Section Collective Training														
Rifle Sqd Drills	5	4			6	2		2		1		2		1
Wpns Sqd Drills	5	4			4			1		1		1		1
Anti-Armor Sec Drills	5	4			4			1		1		1		1
Mortar Sec Drills	5	4			4			1		1		1		1
Scout Sec Drills	5	4			4									
Weapons Training														
Crew Qualification														
M981 TOW Qual	1	8	8		8				4				4	

Figure 16. ITMS/SATS screen for calculating long-range resource requirements.

The data in the three left hand columns of the screen are automatically entered from the SATS' SIWT/BLTM data base. The commander inputs the data in the fourth column to indicate any training events already directed by higher headquarters (these directed events are implied whenever a higher headquarters schedules a training event at its level, such as a division or brigade FTX). The initial data in "Cdr's" column will automatically be entered to reflect the number of iterations listed in the "Model" column (third from the left), but can be changed by the commander, as long as the resources required for the total number of training events he lists do not exceed those provided in his higher headquarter's planning guidance. The columns on the right in the "Sustainment Planner" section serve as an electronic scratch pad to enable the commander to quickly determine if the number of iterations of each type of training event he selected add up to a sustainment program. A blow-up of a simplified version of the Sustainment Planner is provided in Figure 17 to better illustrate its purpose.

READINESS LEVEL C2			SUSTAINMENT PLANNER			
EVENTS	CDR'S	NET	1ST QTR	2ND QTR	3RD QTR	4TH QTR
COLLECTIVE TRAINING						
BATTALION						
CPX	2		1		1	
CFX	1				1	
DEPEX	3		1	1	1	
TEWT	2		1		1	
FTX	3		1	1		1
FCX	1		1			
LFX/CAFEX	1					1
COMPANY						
CPX	2		1			1
CFX	3			1		2
TEWT	1			1		1
FTX	2		1		1	
FCX	1			1		
LFX/CAFEX	1					1
PLATOON						
RIFLE STX	3	-1			1	1
ANTI-ARMOR STX	1				1	
MORTAR STX	1				1	
SCOUT STX	1			1		
SQUAD/SECTION						
RIFLE DRILLS	6	2	2	2	2	2
WPN DRILLS	4		1	1	1	1
SCOUT DRILLS	4		1	1	1	1
WEAPONS TRAINING						
CREW QUAL						
M901 TOW QUAL				4		4

Figure 17. Simplified ITMS/SATS Sustainment Planner.

In this illustration, when the commander found that he only had sufficient resources to support three battalion level FTXs, he resourced a battalion level CPX and company FTXs during the quarter he was unable to schedule a battalion FTX. This gave him a battalion FTX, or equivalent, during each quarter. As he continued his review of each quarter, he would continue to balance his resource allocations in this manner even if he had to move resources from one event to another to facilitate sustainment. This sustainment balancing of his overall program would be extremely difficult to accomplish if he had to merely rely on the figures in the "Cdr's" column.

The figures in the "Net" column automatically warn the commander if the number of training events he lists in his Sustainment Planner differ from those in the "Cdr's" column. Once satisfied that he has established a long-range plan which will sustain proficiency to the maximum extent consistent with available resources, he prints a report which lists his consolidated fund and ammunition requirements. This report is then sent to his higher headquarters.

Once he receives his actual fund and ammunition allocation, these data are entered into the SATS data base and he utilizes a similar function screen to adjust his training plan to accommodate any shortfall between his resource request and actual allocation. The SATS calendar function is then used to place the resultant resourced events on the unit's long-range calendar.

FM 25-100 suggests two strategies for matching training resources with training events during long-range planning. Beginning on page 1-5, the manual encourages commanders to structure collective and individual training plans to repeat critical task training at the minimum frequency necessary for sustainment. It further states that as depicted in Figure 18, sustainment training enables units to operate in

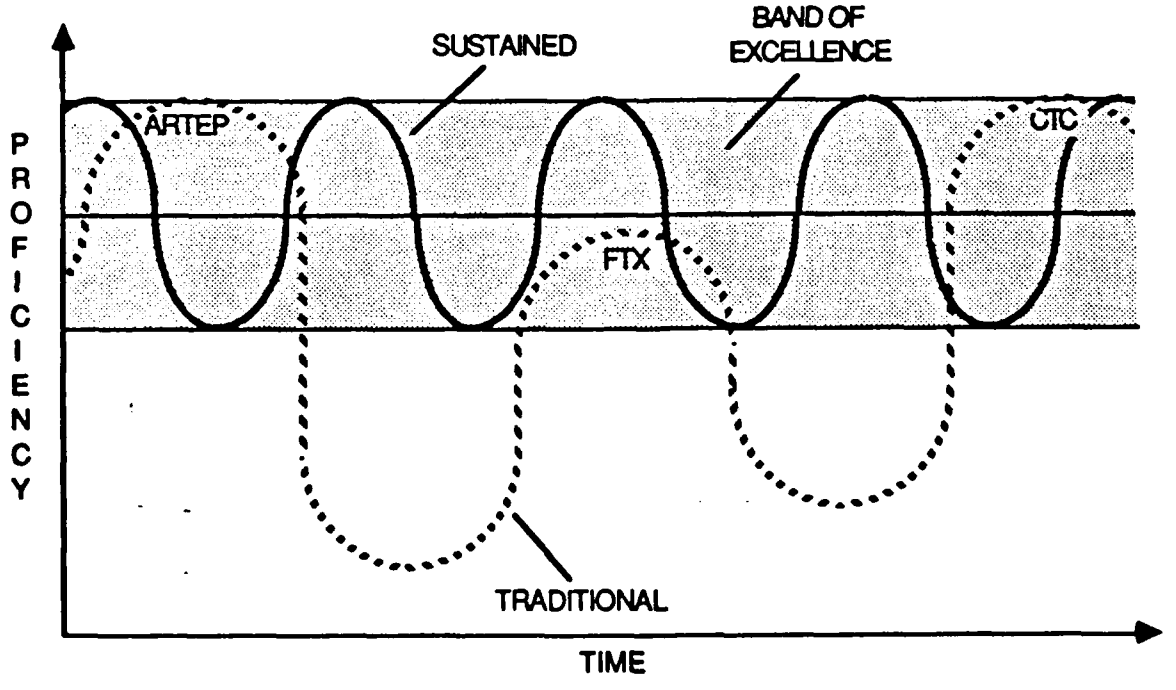


Figure 18. Concept of Band of Excellence for sustained proficiency.

a "band of excellence" by appropriate repetitions of critical task training during prime time training periods.

On page 1-6 it further suggests that the commander must simultaneously train individuals, leaders, and units at each echelon. It then goes on to state that multiechelon training is the most efficient way of training and sustaining a diverse number of mission essential tasks.

SATS Short-Range Planning/Calendar Function. Following the use of SATS to assess which tasks require training during his 3 month short-range planning period, the screen depicted in Figure 19 is utilized to allocate these tasks to the resourced events available during that period (automatically extracted from the long-range plan).

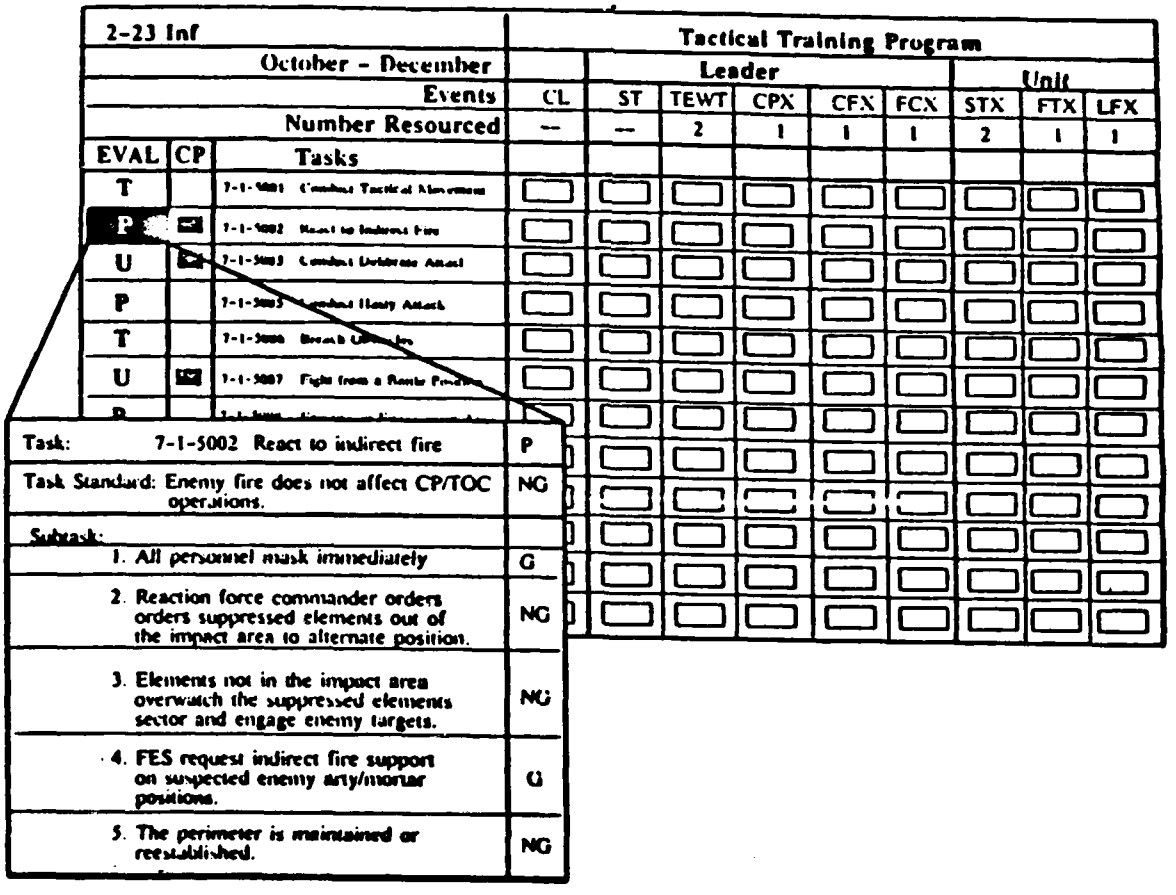


Figure 19. ITMS/SATS screen for developing short-range plan.

All of the unit's METL tasks, together with their current level of proficiency and an indication of whether they have been selected as the commander's priority for training (CP) are listed along the left side of the screen. The number and types of training events which have been resourced for the next quarter are displayed along the top. The commander cross-references the tasks to specific types of training events by scrolling a cursor to the appropriate box within the matrix and pressing his "Space Bar." In doing so, he utilizes the Army's "crawl-walk-run" methodology as the basis for his strategy. If the unit is particularly deficient in performing a task, the commander assigns it to two or more events (crawl). If the unit is proficient in performing the task, it is normally covered in only one exercise in order to sustain the unit's proficiency on that task (run). In order to assist the commander in making this allocation, a window can be opened to display the subtask evaluations for the task.

Once all tasks have been allocated to one or more types of training events, a window is opened for each group of training events to enable the commander to further allocate the tasks to the individual iterations of each type training event which have been resourced. The number of resourced events available to a commander are listed directly below the title of each event (see Figure 19).

Once this process is completed, the commander then directs the system to print out his short range plan. This printout contains a listing of each separate training event together with the METL tasks which have been assigned to it and the date it has been scheduled on the short-range calendar.

SATS Schedules Function. The weekly training schedule is prepared by calling up a screen similar to that depicted in Figure 20 which initially lists in the "What" column each training event scheduled on corresponding dates on the short-range calendar.

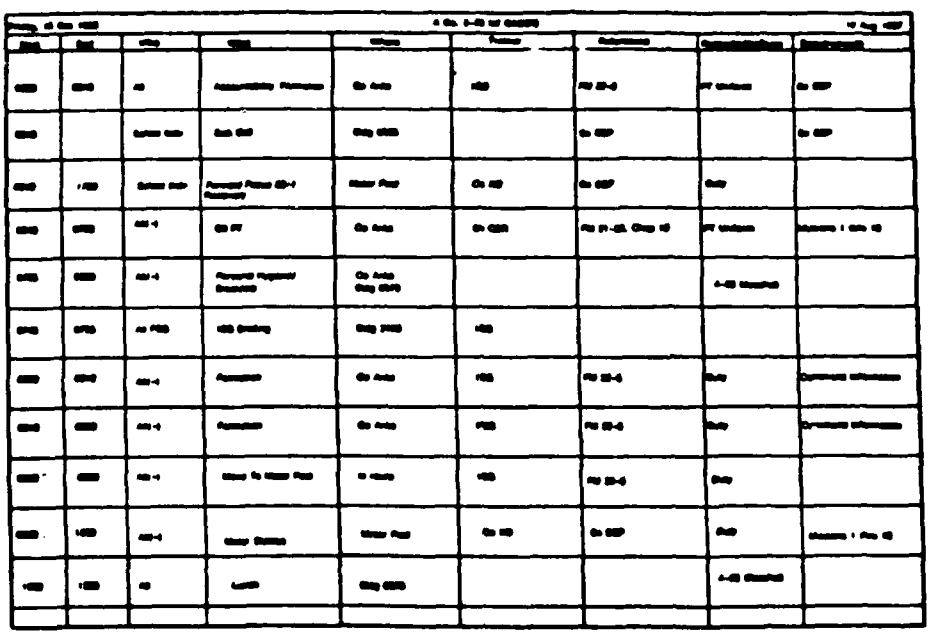


Figure 20. ITMS/SATS screen for training schedule development.

The commander then enters the remaining data to include administrative activities and the individual responsible for each activity and event. When completed, the commander directs the system to print a copy and posts it as the weekly training schedule.

SATS METL Feedback Function. Pending the availability of electronic clipboards, the SATS METL feedback function is utilized to print data collection forms on a training event by training event basis (Figure 21).

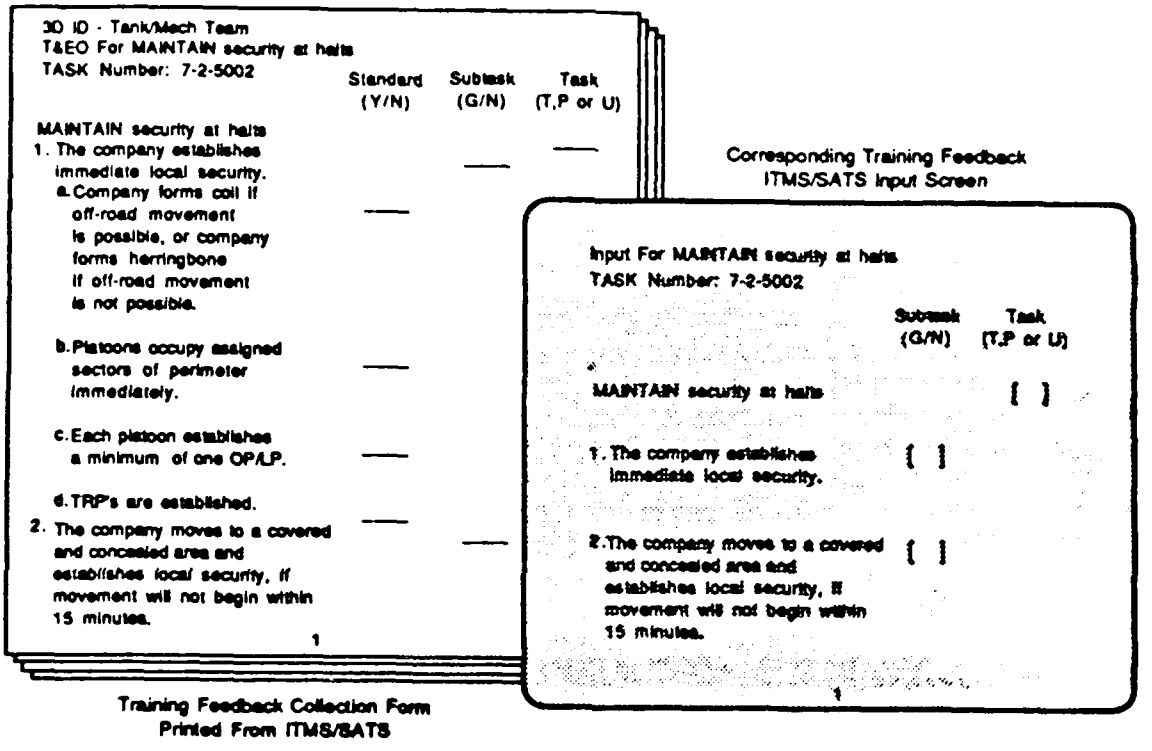


Figure 21. ITMS/SATS training evaluation feedback data collection form.

Each group of forms lists the tasks, subtasks, and standards for each task assigned to the training event. These forms are then manually filled out during the evaluation of training by entering a Y for yes or N for no for each standard and, in turn, a G for go and N for no go for each subtask based on an assessment of the number of standards which were met. The subtask assessments are then rolled up and each task is in turn designated as T for trained, P for needs practice and U for untrained. These data are then manually entered into the SATS data base via screens which correspond exactly to each individual page of the data collection forms (Figure 21).

This input process is begun by entering the unit designation, date and type of training event, and then entering the evaluation for each subtask and task by scrolling a highlight bar down through each task and subtask on the screen. The provision of screens whose format corresponds exactly to each page of the data collection forms, together with the scrolling feature, greatly speeds up the data entry process.

SATS Training Assessment Function. Towards the end of each quarter, the evaluation feedback which has been entered during that quarter is assessed by means of the screens depicted in Figures 22 and 23. The evaluation feedback contained in the SATS data base is automatically displayed in columns 2 and 3 of the screen in Figure 23, together with the type of exercise from which it was obtained and the number of months since that training event took place.

A Co, 2-23 Inf	METL Task Assessment										As of:	
	Historical Data										Current Assessment	
TASKS	NTC		Ext. Eval		Training Iterations						METL Task	Operating System
C³												
7-2-5517 Prep for Combat Operations	T	12	T	8	T	STX 5	T	FTX 4	T	FTX 2		
7-2-5535 Consolidate and Reorganize	T	12	P	8	P	STX 5	T	CPX 3	T	FTX 2		
Maneuver												
7-2-5505 React to Ambush	T	12	T	8	P	STX 4	P	FTX 4	P	FTX 2		
7-2-5506 React to Indirect Fire	T	12	P	8	P	STX 5	T	CPX 3	T	FTX 2		
7-2-5506 Fix or Bypass an Enemy Location	P	12	P	8	P	STX 5	P	FTX 4	P	FTX 2		
7-2-5515 Passage of Lines (Forward)	T	12	P	8	P	STX 5	T	CPX 3	T	FTX 2		
7-2-5519 Passage of Lines (Rearward)	P	12	P	8	P	STX 5	P	FTX 4	P	FTX 2		
7-2-5520 Disengage	T	12	P	8	P	STX 5	T	CPX 3	T	FTX 2		
7-2-5522 Set an Attack Under Cover of Limited Vis	T	12	T	8	P	STX 4	P	FTX 4	P	FTX 2		
7-2-5526 Land Aircraft	P	12	T	8	T	STX 4	T	FTX 4	T	FTX 2		
7-2-5532 Attack by Fire	P	12	T	8	P	STX 4	U	FTX 4	U	FTX 2		
7-2-5531 Conduct Linkup Operations	T	12	P	8	P	STX 5	T	CPX 3	T	FTX 2		
NBC												
7-2-5507 Operate in Chemically Contaminated Area	P	12	P	8	P	STX 5	T	FTX 4	T	FTX 2		
CSS												
7-2-5544 Recover Bodies on the March	U	12	P	8	T	STX 5	T	CPX 3	T	FTX 2		
7-2-5549 Conduct Service Station Resupply	T	12	T	8	P	STX 5	T	CPX 3	T	FTX 2		

Figure 22. ITMS/SATS screen for entering task/BOS assessments.

These data are displayed for the last NTC evaluation, the last external MTP evaluation and the last three internal evaluations. Based on his review of these data and his personal observations, the commander then enters in an overall evaluation for each task and, in turn, an overall evaluation for each battlefield operating system.

Once this is accomplished, the screen in Figure 23 is called up which displays these generalized task and BOS assessments in a MTP Mission To Task Matrix format.

A Co, 2-23 Inf	Mission Assessment						As of:		
Operating System Tasks	Missions: Cdr's Priority	Hasty Attack	Contingency Operations	Delay	Defend	Limited Visibility Attack	*Deploy-ment*	ASSESSMENT: METL Tasks	Operating Systems	System Priority
Commander's Priority		☐	☐	☐	☐	☐	☐			
Mission Assessment		☐	☐	☐	☐	☐	☐			
C^3									T	☐
7-2-5517 Prep for Combat Operations		T	T	T	T	T	T	T		
7-2-5518 Consolidate and Reorganize		T	T	T	T	T		T		
Maneuver									P	☐
7-2-5505 Attack to Assault		P	P	P	P	P		P		
7-2-5506 Attack to Defend Fwd		T	T		T			T		
7-2-5508 Fix or Bypass an Enemy Element		P	P			P		P		
7-2-5510 Passage of Lines (Forward)		T	T	T		T		T		
7-2-5511 Passage of Lines (Rearward)				P	P			P		
7-2-5520 Disengage		T	T	T	T	T		T		
7-2-5521 Ops on Assault Under Cover of Limited Vis			P		P	P		P		
7-2-5526 Land Assault			T				T	T		
7-2-5532 Assault by Fire		U				U		U		
7-2-5533 Conduct Linkup Operations			P	P		P		P		
NBC									T	☐
7-2-5507 Operate in Chemically Contaminated Area		T	T	T	T	T		T		
CSS									T	☐
7-2-5543 Operate Behind the Main Battle Area		T	T	T	T	T		T		
7-2-5545 Conduct Terrain Denial Operations		T	T	T	T	T		T		

Figure 23. ITMS/SATS screen for prioritizing METL tasks for training.

The commander then enters an assessment for each mission in row 2 based on his review of his assessment of each task within that mission. Based on his Mission and BOS assessments, he then designates in row 3 and column 4 which missions and BOS he wants to give priority during the development of his short-range plan. Each task assessed as either U or P which falls within a priority mission or BOS is then automatically designated as having priority for training in column 3. These task prioritizations are then stored in the SATS data base from which they are automatically called up when the SATS Short-Range Planning/Calendar Function is utilized (see discussion above).

Personal observations and experience play a major role in this and all SATS functions. The purpose of SATS is merely to automatically display all available data within a format which is most useful to a commander. The final decision concerning the implications of the data is left up to the commander. Throughout the entire ITMS/SATS development process, it was found that commanders at all levels were strongly opposed to any system which attempted to make assessments for them. They clearly desired to be directly involved in the decision process.

This is not the only way in which feedback data can be rolled up and assessed, and other methods are currently under investigation. The objective, however, remains the same regardless of what approach is employed; the systematic assessement of all available evaluation feedback data.

Standard Definitions

Based on the above discussions of the Army training system and SATS, the key terms in subtasks 1b and 2c -- training management system, strategy, and program -- are defined as follows.

Training Management System. While no current training publication defines a "training management system," for the purposes of this study it is assumed to be the systemic procedures contained in the training management cycle depicted on page 1-11 of FM 25-100 (see Figure 10).

Training Strategy. While the term "training strategy" is in general use within several contexts, it has a precise definition in FM 25-100. Beginning on page 3-4, FM 25-100 states that:

> "The commander, assisted by the staff, develops a strategy to accomplish each training requirement which includes improving proficiency on some tasks and sustaining performance on others. Through the training strategy, the commander establishes training priorities by establishing the minimum frequency each mission essential task will be performed during the upcoming planning period. The strategy also includes broad guidance that links METL with upcoming major training events."

Then on page 3-12, FM 25-100 states that:

> "Senior commanders link training strategies to executable training plans by designing and scheduling training events. During long-range planning, commanders and their staffs make a broad assessment of the number, type, and duration of training events required to accomplish METL training. In the subsequent development of short-range training plans, training events are fully defined in terms of METL based training objectives, scenarios, resources, and coordinating instructions."

A training strategy is thus the basis for allocating resources to training events to support long-range sustainment and, in the short-term, allocating METL tasks to resourced training events to ensure proficiency is achieved.

The basis for a long-term strategy is the concept of the Band of Excellence which is achieved through repetitive training at frequent intervals and the simultaneous scheduling of training for multiechelons as discussed on pages 1-5 and 1-6 of FM 25-100. The basis for a short-range strategy is the "crawl-walk-run" methodology discussed on pages 5-2 and 5-3 of FM 25-XY.

Within this context, the requirement for a "global" strategy specified in subtask 1b is interpreted to refer to strategies which guide the association of resources and METL tasks with all appropriate training events rather than just with SIMNET-based events.

Training Program/Plan. A review of current training literature indicates that the term training program normally refers to service school instruction while the term training plan normally refers to training in units. Except for that distinction, both terms are generally synonymous. Both terms refer to a grouping of training events which collectively increase proficiency on specified tasks to the maximum extent possible commensurate with available training resources, including time. Within a service school, the training program is focused on the obtainment of individual rather than collective proficiency. Accordingly, a training facility such as SIMNET within service school instruction is at best utilized for familiarization since it is unlikely that sufficient repetitions will be available for each individual to rotate through each key position. The few exceptions are possibly NCOES or tank commander courses since only four rotations would be required to get each student through each crew station. Service school training programs are generally stable over time and normally only change at two or three year intervals. On the other hand, unit training plans change considerably from plan to plan. This is particularly true with regard to short-range plans which are dictated by the tasks which require training and the mix of training events which can be supported with the changing resource allocations. In any event, the term training program could not be found in any current training literature which addressed unit training management and the term training plan could not be found in any literature addressing service school courses.

RELATIONSHIP OF SIMNET TO ARMY TRAINING SYSTEM

The foregoing investigation of SIMNET and the Army's current training system has the following implications with regard to the design of a SIMNET unit training management system, strategy and program/plan:

- The Army is fully committed to its recently implemented training management system prescribed in FM 25-100. While it will likely accept modest modifications to this system if necessary to accommodate SIMNET, it is unlikely that it will accept or implement an entirely new SIMNET-based system at this time. As such, the design of a SIMNET-based training management system must begin with the maximum utilization of the FM 25-100 system and then add new components only when absolutely justified to ensure the effective and efficient utilization of SIMNET.

- While the Army's training management system prescribed in FM 25-100 encompasses a large number of separate, diverse processes, only a relatively small number of them, albeit important ones, will be influenced by the introduction of SIMNET -- Long-Range Planning, Short-Range Planning, Schedules, and METL Feedback. The common denominator among each of these

processes is the training event (Figure 24). Training management is in reality the management of training events. The effectiveness of any training management system is thus the extent to which these events increase or sustain a unit's combat proficiency.

- The soon to be fielded automation support for training management and the focus of subtask 1c on an automated SIMNET exercise planning and control system, indicates a requirement for the effective and efficient transfer of digitized data between the two systems.

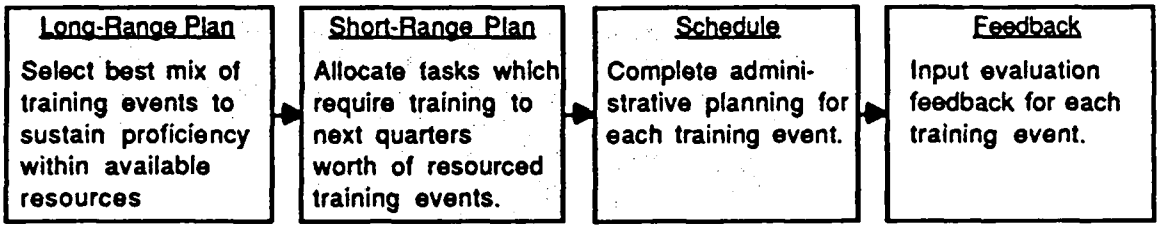


Figure 24. Role of training events within the Army training system.

Based on the above, the design of a SIMNET unit training management system, strategy, and program/plan requires:

- The establishment of the relationship of SIMNET to the Army's existing training events;
- The establishment of the relationship of SIMNET to a unit's training strategies;
- The definition of specifications for data interfaces between SATS and the system to be developed in subtasks 1c to plan and control SIMNET/CCTT exercises; and
- Assurance that findings and recommendation are applicable to the service schools and both active and reserve component units.

Each of these issues is addressed in turn in the following subparagraphs.

Relationship of SIMNET to Training Events

The Army's current training management system indirectly addresses the utilization of training systems such as SIMNET based on their association with training events. Accordingly, it will support the management of SIMNET-based training only to the extent a relationship can be established between specific training events and SIMNET.

Two options are available. A relationship must be established between SIMNET and one or more of the Army's current standard training

events, or the SIMNET-based training exercise must be designated a training event in itself.

The analysis in Figure 25 considers the relationship of SIMNET to each of the Army's standard training events listed in Figure 11 except for the JTX which is not a viable option until such time as foreign countries possess a SIMNET capability.

A summary of this analysis is provided in Figure 26.

This analysis indicates that SIMNET cannot fully substitute for current standard Army training events due to its inability to simulate a substantial number of critical operational functions, inconsistency with the training technique involved, or both. (A summary of this analysis is provided in Figure 26). Accordingly, it is suggested that a SIMNET-based training exercise should be considered a training event in itself. For the purposes of this study, such an event will be referred to as a SIMEX.

This designation of SIMNET as a unique training event rather than a means of supporting an existing training event, such as an FTX, is based on the following three factors. First, as indicated in the above analysis, the substitution of SIMNET for the traditional means of supporting an existing training event changes the training capability or technique of that event. Even with regard to a SIMNET-based FTX, where casual observation indicates that the SIMNET terrain data base serves as a satisfactory substitute for actual terrain, the SIMNET-based exercise would possess far less training potential in that:

- Dismounted infantry could not be played; this reduces a key element of the combined arms team to little more than light tanks;
- Engineers, another key element of the combined arms team, cannot be integrated into the exercise;
- Chemical and Radiological weapons cannot be played in a realistic fashion;
- Mortar Fire Direction Centers and mortar firing crews cannot be integrated into the exercise;
- Available intelligence collection systems, such as Ground Surveillance Radar (GSR) and dismounted patrols cannot be played; and
- A somewhat incorrect appreciation of terrain and time-distance factors is gained due to the sparseness of vegetation, lack of urban areas, absence of obstacles, and uninhibited visibility.

Combined Training Exercise (CTX).	
Training Capability SIMNET, by the nature of its design, provides many of the training capabilities inherent in a CTX. Subject to the limitations noted in Appendix A, it supports the participation of all members of armor and mech maneuver units to include vehicle crews, staffs, and the commander. In addition, it can accommodate tactical air support and indirect fire support. It cannot, however, accomodate participatation by engineers and FIST vehicles.	Training Technique Very similar; it can be conducted in a two-sided, free-play mode. In some respects it is superior to a CTX with regard to the realism with which indirect fire and aircraft can be employed.
Field Training Exercise (FTX)	
Training Capability Same as for an FTX, subject to limitations noted in Appendix A.	Training Technique Same as for an FTX.
Combined Arms Live Fire Exercise (CALFEX)>	
Training Capability While there is a reasonable match with regard to the employment of tanks, even there SIMNET is limited in that it cannot support tank machine gun engagements or precision gunnery. In addition, loaders play no direct role in a SIMNET-supported exercise. While this is considered acceptable within a SIMNET-based FTX, it is a delimiting factor when using SIMNET to replicate a CALFEX. In addition, many of the limitations listed in Appendix A are also delimiting factors with respect to the use of SIMNET to replicate a CALFEX.	Training Technique Very similar; provisions are available within SIMNET to set up static and moving target arrays to support specific training objectives.
Live Fire Exercise (LFX).	
Training Capability Same as for an CALFEX..	Training Technique Same as for a CALFEX.
Deployment Exercise (DEPEX).	
Training Capability Although a DEPEX is in many respects similar to an FTX, it possesses several characteristics which make it incompatible with SIMNET. The first portion of a DEPEX normally involves the uploading of equipment onto vehicles, entering communications nets, and starting and moving the unit's vehicles. The uploading of the equipment and the actual movement of a unit's operational vehicles are critical tasks within a DEPEX and cannot be accomplished with SIMNET. In units stationed within CONUS, the final portion of a DEPEX often involves (Cont)	Training Technique Same as for an FTX.

Figure 25. Analysis of relationship of SIMNET to current standard Army training events.

Figure 25 (Horizontal)

Deployment Exercise (DEPEX) - Cont.	
Training Capability some form of vehicle uploading on trains, aircraft, or ships; none of which can be accomplished with SIMNET. The only portion of a DEPEX which can realistically be supported with SIMNET is the road march and occupation of an assembly area. SIMNET is not particularly effective in supporting even these requirements, however, in that it cannot support road guides, does not make provisions for civilian traffic, does not support the use of ground guides in assembly areas, and so on. While some value could indeed be gained from using SIMNET for nothing more than practicing the road march from the installation to the unit's forward asssembly area or deployment site, this entire route will most likely not be incorporated into the SIMNET facility's terrain data base.	Training Technique
Situational Training Exercises (STX).	
Training Capability SIMNET is as capable of supporting the planning, execution, and evaluation of STXs as it is in supporting FTXs. Although they are generally shorter than an FTX, they are otherwise almost exactly the same as FTXs, once the FTXs have had tasks assigned to them.	Training Technique Same as for an FTX.
Fire Coordination Exercise (FCX).	
Training Capability The use of SIMNET to support a FCX presents a somewhat unique situation in that the SIMNET-based exercise appears to provide a more effective training capability than the FCX itself. The FCX was developed to provide a low-cost CAL.FEX/LFX training capability through the utilization of subcaliber devices. While this was accomplished with moderate success, two significant limitations could not be overcome. Due to the scale involved, only the chain of command could be involved, and when utilized in the defense large, cumbersome baffles are required to delimit sectors of fire. A SIMNETsupported exercise will accomplish the same objective without the two limitations noted above. The one difference would be that the indirect firing units would not be involved as they are within the FCX. This is not a major (Cont.)	Training Technique Very similar; provisions are available within SIMNET to set up static and moving target arrays to support specific training objectives.

Figure 25 (Horizontal)

Fire Coordination Exercise (FCX)-Cont.	
Training Capability	Training Technique
issue, however, in that they were primarily incorporated into the FCX only to provide indirect fire impact cues and the crews themselves obtained little training that could not be obtained in other ways.	
Tactical Exercise Without Troops (TEWT).	
Training Capability	Training Technique
TEWTs are primarily focused on the application of techniques with respect to terrain. As such, the conduct of a TEWT on actual terrain currently possesses greater training value than one conducted with the SIMNET terrain data base. In addition, the TEWT is currently a low-cost exercise, so little or none of SIMNET's cost savings are accrued. Viewing these same factors from a different perspective, an on-the-ground TEWT actually serves as an effective means for compensating for the lack of dynamic terrain within a SIMNET-based training event.	A TEWT exercise requires that all participants be able to simultaneously view and discuss the terrain selected by the individual who is picked to brief his solution to the trainer. This would be extremely awkward if each participant had to do so while isolated in his CVS. While provisions could be made to accommodate this requirement, such as the incorporation of of a large screen into the SIMNET system which could be viewed by all of the participants, there is currently no stated requirement for such a component.
Command Field Exercises (CFX).	
Training Capability	Training Technique
Command Field Exercises were initially designed to cut the cost of field exercises to a minimum by requiring only a third of a unit's combat vehicles and support elements to be utilized. At the battalion level, for example, the platoon leader and his vehicle is utilized to represent all of the vehicles in a platoon. As such, the CFX provides an excellent, low cost means of providing commanders and staffs an opportunity for detailed tactical terrain appreciation and to experience real-world time-distance factors. Accordingly, CFXs are excellent exercises to augment SIMNET-based exercises. If the focus of the training is merely on the commander and his staff, as is the case within a CFX, and resources were not available to support a CFX, a model-based exercise would appear to provide a more cost-effective solution than a SIMNET Exercise (see Command Post Exercise below).	Since CFXs require that each vehicle represent 4 to 5 vehicles, the semi-automated forces model within SIMNET must replicate all blue forces in addition the current replication of red forces. This capability is not currently built into the semi-automated capability for blue forces.

Figure 25 (Horizontal)

Command Post Exercise (CPX)	
Training Capability	Training Technique The use of SIMNET is inconsistent with CPXs in that their primary purpose is to support command and staff training without the involvement of individual crews and small unit leaders. While SIMNET could be modified to support CPXs through the introduction of semi-automated blue forces to portray individual crews, such an endeavor would be extremely questionable in view of the ready availability of model--based simulations, such as ARTBASS, which were specifically designed to support this type of training. The utilization of a SIMNET facility for this purpose, at the expense of letting the vast majority of the SIMNET components, the CVSs, sit idle, would appear to constitute considerable inefficiency. Even if the cost of SIMNET facilities could be brought down to the point where entire units could partake in almost unlimited SIMNET-supported exercises, effective multi-echelon training management would still indicate a requirement for Command Post type exercises.
Map Exercise (MAPEX).	
Training Capability	Training Technique The use of SIMNET is inconsistent with the primary purpose of MAPEXs for the same reasons as those cited above for CPXs.
Logistics Exercise (LOGEX)	
Training Capability	Training Technique Since LOGEXs are primarily conducted within the context of CPXs, use of SIMNET is inconsistent with their primary purpose for the same reasons as those cited above for CPXs.

Figure 25 (Horizontal)

Sand Table Exercise (ST).	
Training Capability	Training Technique
	The utilization of SIMNET to support a sand table exercise would require a large screen for the plan view display and a means for a participant to easily position and move all of the individual vehicles within a unit being represented. There is not only no currently stated requirement for such a capability, but there are so many other less expensive alternatives that it is extremely unlikely that such a requirement would ever be approved.
Classroom Instruction (CI).	
Training Capability	Training Technique
	Classroom instruction requires that each participant interact with an instructor or some type of machine-based programmed instruction. While it is conceivable that one of the CRTs at each crew station could be periodically used for this purpose, such a capability does not currently exist. Even if this capability were added to SIMNET, some means would still have to be found to enable the instructor to monitor each student's progress.

Figure 25 (Horizontal)

ASSESSMENT	TRAINING EVENT
Training events which currently provide more training capability than a SIMNET-based training exercise	Combined Training Exercise (CTX) Field Training Exercise (FTX) Combined Arms Live Fire Exercise (CALFEX) Live Fire Exercise (LFX) Situational Training Exercise (STX)
Training events which require modifications/ additions to the current SIMNET in order for it to support them. Such modifications do not appear viable in all cases.	Command Field Exercise (CFX) Tactical Exercise Without Troops (TEWT) Command Post Exercise (CPX) Map Exercise (MAPEX) Logistics Exercise (LOGEX) Sand Table Exercise (ST) Classsroom Instruction (CI)
Training event for which no feasible modification appears to exist which would enable SIMNET to support it.	Deployment Exercise (DEPEX)
Training event which should be discontinued once SIMNET is implemented.	Fire Coordination Exercise (FCX)

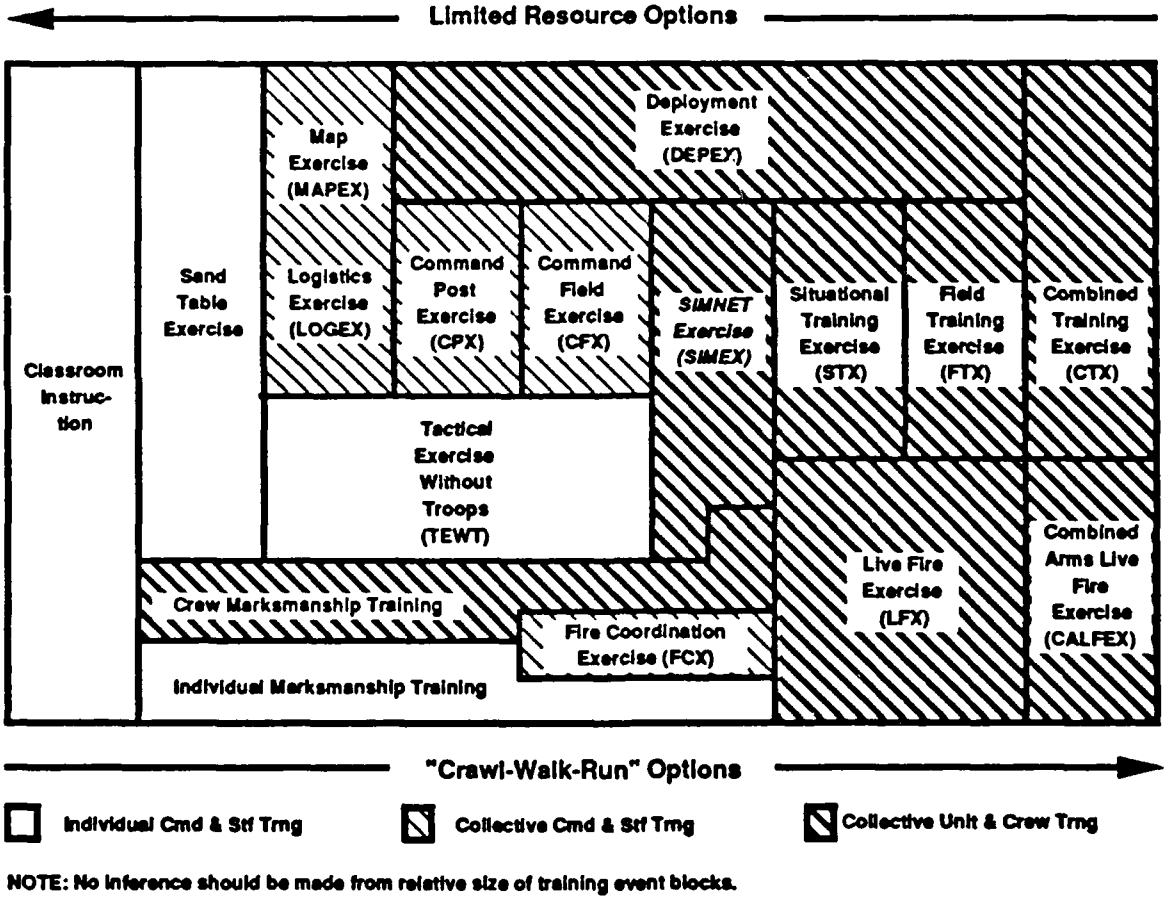
Figure 26. Summary of training event analysis.

The second factor which must be considered with regard to the relationship of SIMNET to existing training events deals with the growing automation of the Army's training management process. During both the Advanced Technology Unit Training Management System (ATUTMS) and ITMS programs, a clear requirement was identified for the standardization of common management terms. This is particularly important with regard to the definition of training events which drive a considerable portion of the entire process. The BLTM and SIWT resourcing models, for example, automatically call up a numerical planning figure for fuel and ammunition from the SATS data base when a specific type training event is selected. This has been feasible up to now since each type of current training event could be associated with a finite set of training resources for planning purposes. Within this context, it makes no difference whether the FTX is supported with the Multiple Integrated Laser Engagement System (MILES) or not in that blank ammunition is required in either case and the MILES devices are not managed as an expendable resource. Similarly, no distinction is required if a CPX is to be supported with any one of several available

battle simulation systems as such systems are also not managed as an expendable resource.

The final factor which was considered was the possibility of annotating an existing training event to reflect that it was supported with SIMNET, such as FTX-SIMNET. This possibility was discounted in that it is not consistent with previous conventions. A CPX is not referred to as a CPX-ARTBASS, nor is a CTX referred to as a CTX-ARMOR/ARTILLERY/ENGINEERS.

Based on the characteristics of the Army's current standard training events, the implications of the FM 25-100 training management system, and the above analysis of SIMNET's relationship to training events, the relationship of a SIMEX to current standard battalion-level Army training events depicted in Figure 27 is proposed.



NOTE: No inference should be made from relative size of training event blocks.

Figure 27. Relationship of SIMNET to training events from the battalion perspective.

Within its larger context, this proposed relationship suggests along its vertical axis that two-sided, free-play tactical exercises and live fire exercises complement rather than support one another.

Along its horizontal axis it suggests that, within a hierarchy of training events, SIMEXs fall generally between command and staff exercises and unit field exercises and between Crew Marksmanship Training and LFXs.

At a more detailed level, the proposed relationship along the vertical axis indicates that the DEPEX complements rather than supports, or is supported by, a SIMEX, and that the SIMEX plays some role in crew marksmanship (or gunnery) training. DEPEXs and SIMEXs are viewed as complementing one another in that SIMEXs cannot feasibly address the uploading of basic loads, the loading of combat vehicles and equipment on an aircraft or ship, or, in many cases, the extended deployment road march to a forward assembly area.

Beginning at the left, each training event, or group of training events, generally focuses on a subset of techniques or skills which can be addressed within the training event directly to its right. This horizontal relationship has several implications. First, it progresses from individual command and staff knowledge and skills, through collective command and staff training, and then on to events which support the collective proficiency of the entire unit. Unit collective proficiency events, in turn, progress from unit to combined units.

This model is fully compatible with the utilization of a "crawl-walk-run" strategy during the formulation of a unit's training plan or a service school's training program. If a task required extensive training, a "crawl" strategy would be employed and this would lead to the selection of a combination of exercises beginning from the left. This does not imply, however, that the training program must progress through each type of training event. On the other hand, if a unit merely needed to sustain proficiency on a task, a "run" strategy would be employed and the task would be incorporated into a training event as far to the right as possible, consistent with available resources.

The second implication of this left-to-right hierarchy is that some form of training can always be conducted regardless of the resource constraints involved. If sufficient funds or fuel were not available within a short-range planning period to support a full unit-type field exercise, then the training plan would culminate with a SIMEX. If, in addition, the SIMNET and ARTBASS facilities were not available during that same period, the plan would culminate with a scenario driven CPX which was augmented with a TEWT. In any event, the model indicates workable training strategies regardless of the training resource constraints encountered.

The model proposed to support a company level training plan is depicted in Figure 28.

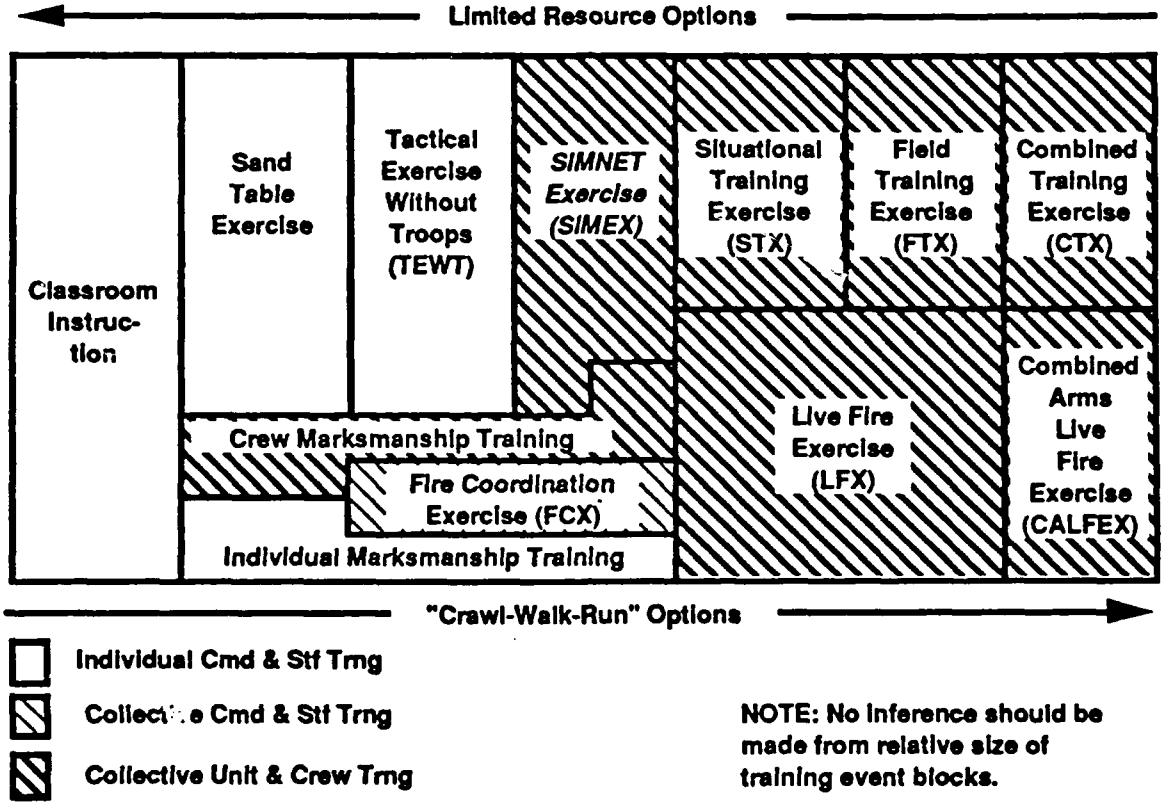


Figure 28. Relationship of SIMNET to training events from the company perspective.

Key deletions are those training events which are normally not conducted at the company level -- MAPEX, LOGEX, CPX, CFX, and DEPEX.

Likewise, the relationship proposed for platoon level training, the training plan for which is normally developed at the company level, is depicted in Figure 29.

Key omissions from the company level are Individual Marksmanship Training and Crew Marksmanship (Gunnery) Training which are normally scheduled at the company or battalion level.

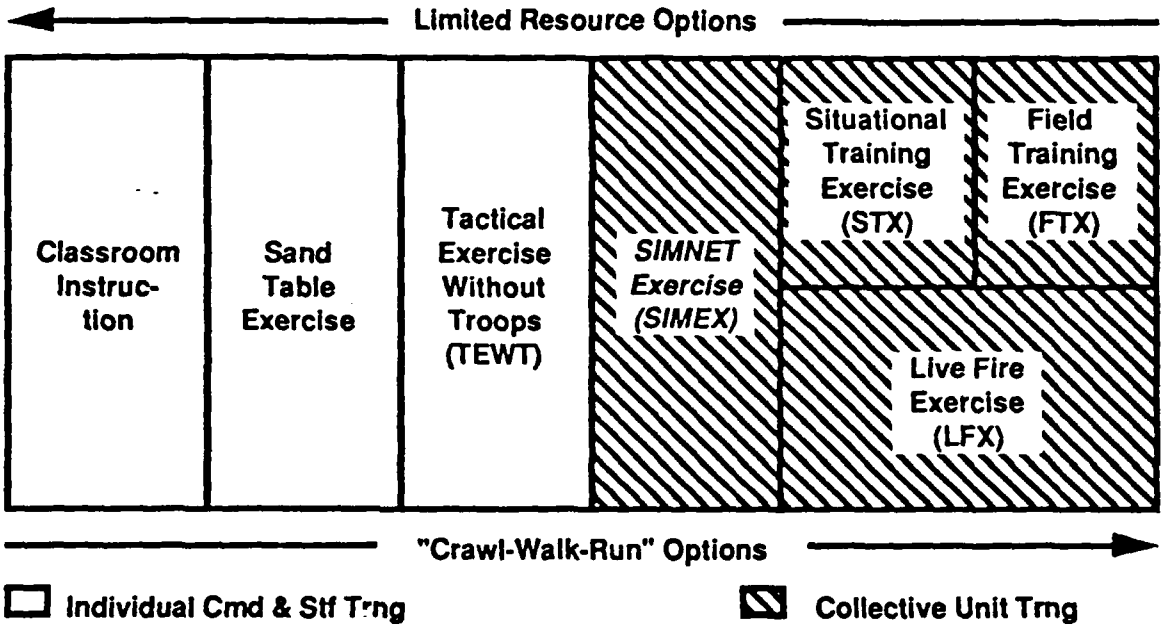


Figure 29. Relationship of SIMNET to training events from the platoon perspective.

It should be noted that the above relational structures will change when the further development of SIMNET overcomes the shortcomings discussed above. The key enhancements required to upgrade SIMNET to the point where it can actually duplicate the training capabilities inherent in current standard training events are depicted in Figure 30.

It must be stressed that functional relationships suggested above are only intended to indicated general relationships. Their value is that they enable SIMNET to be readily incorporated into the Army's existing FM 25-100 training management system, the system's key sub-programs such as BLTM and SIWT, and the emerging SATS automated training management support system. Most importantly, they are designed to help ensure that the maximum possible training value can be gained from SIMNET-based training events and at the same time ensure that provisions are available to compensate for current SIMNET limitations

If the proposition that SIMNET-based training constitutes a new form of training event in itself is accepted, the following steps are required to implement it:

- Add SIMEX to the listing of training events in FM 25-100 and FM 25-XY; and
- Add SIMEX to the listing of training events in the SATS data base.

Type Training Event	Enhancements Required for SIMNET to Duplicate Training Event	
Combined Training Exercise (CTX)	See Appendix A	(1)
Field Training Exercise (FTX)	See Appendix A	(1)
Combined Arms Live Fire Exercise (CALFEX)	Machine guns, dismounted maneuver, fidelity of loader simulation.	(1)
Live Fire Exercise (LFX)	Same as for CALFEX	(1)
Deployment Exercise (DEPEX)	Terrain data base for entire route from motorpool to AA for uploading or within GDP rear area. Will still fall short with regard to supporting initial uploading of vehicles and uploading of personnel and equipment onto aircraft or ships.	(2)
Situational Training Exercise (STX)	See Appendix A	(1)
Fire Coordination Exercise (FCX)		
Tactical Exercise Without Troops (TEWT)	Enhanced terrain and large screen oblique view of tactical area	(3/4)
Command Field Exercise (CFX)	See Appendix A	(3/4)
Command Post Exercise (CPX)	Semi-automated BLUFOR play identical to that of REDFOR and enhanced staff support models	(3/4)
Map Exercise (MAPEX)	Same as for CPX	(3/4)
Logistics Exercise (LOGEX)	Same as for CPX	(3/4)
Sand Table Exercise (ST)	Ability for player called upon to easily reposition weapon systems/units within plan view display	(3/4)
Classroom Instruction (CI)	Means for delivering instruction.	(3)

1 - Not all required technologies cost-effective

2 - No known technical solution

3 - Major deviation from basic purpose of SIMNET

4 - More cost-effective alternatives appear to be available

Figure 30. Enhancements required to enable SIMNET to substitute for existing training events.

Relationship of SIMNET to a Unit's Training Strategy

Incorporation of SIMEX into SATS. If the SIMEX concept described above is adopted, then SIMEXs would be incorporated into the SATS' Short-Range Plan screen depicted in Figure 31. As noted earlier, SATS' screen formats rather than the more compressed ITMS formats will be utilized throughout the remainder of this report.

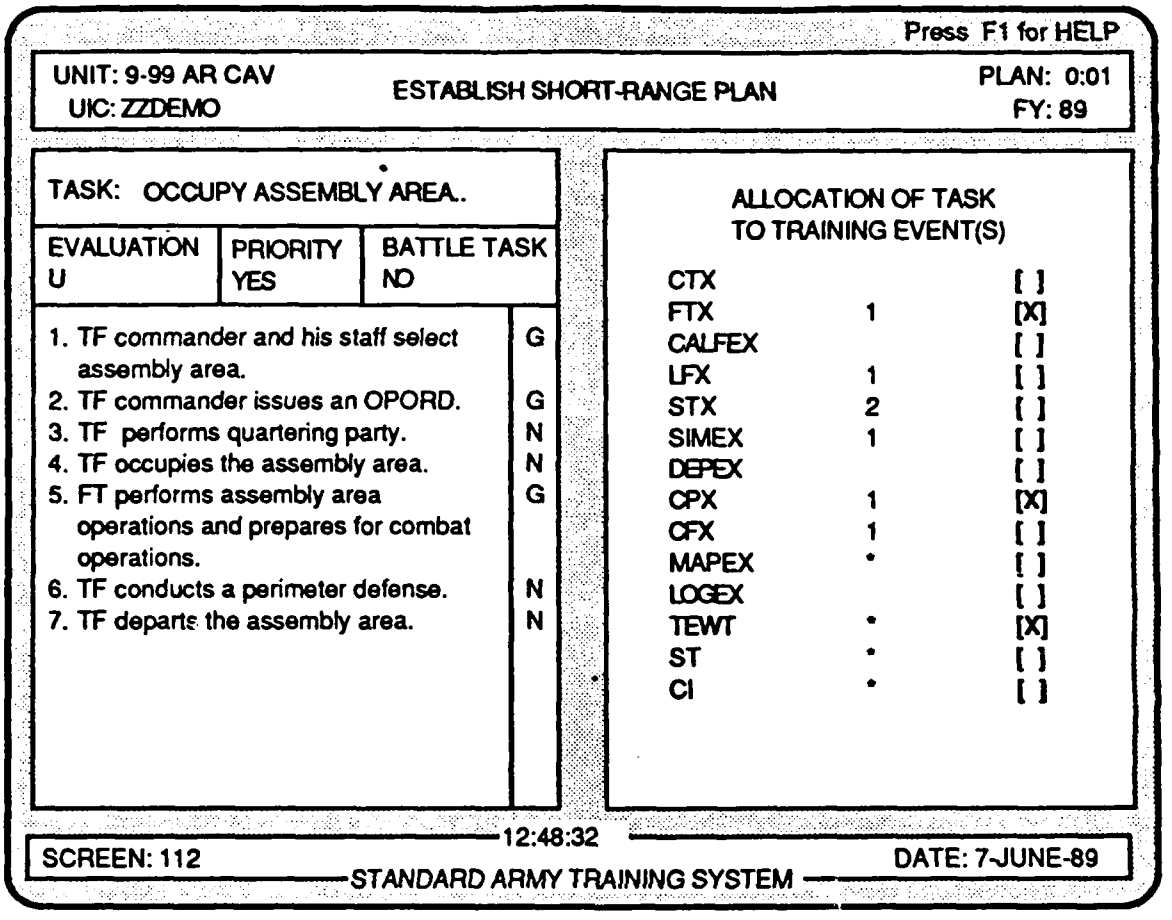


Figure 31. SATS battalion level short-range plan screen with the SIMEX incorporated.

As is the case with most screens since SATS has been rehosted on the Zenith 248, this screen depicts a single row of the data displayed on the original ITMS screen (See Figure 19). Its purpose and use, however, remain the same. The task, together with its overall evaluation and an indication of whether or not it has been designated as being a commander's priority task for training, is displayed at the upper left hand corner of the screen. Subtask evaluations are listed at the lower left. All of these data are automatically extracted from the SATS data base. The training event options are listed in a column on the right side of the screen. Based on the commander's "crawl-walk-run" strategy, or whatever strategy he elects to use, the commander highlights each training event in which he wants to address the task and then presses the Space Bar. When he has selected all of the training events in which he desires to address the task he presses the Return Key to call up the next task. The screen In Figure 31 indicates that the task listed in the upper left will be addressed within a TEWT, CPX and FTX; a crawl strategy based on the low proficiency indicated by the subtask evaluations.

Once this process had been completed, the commander would open a screen similar to that depicted in Figure 32 to further allocate the

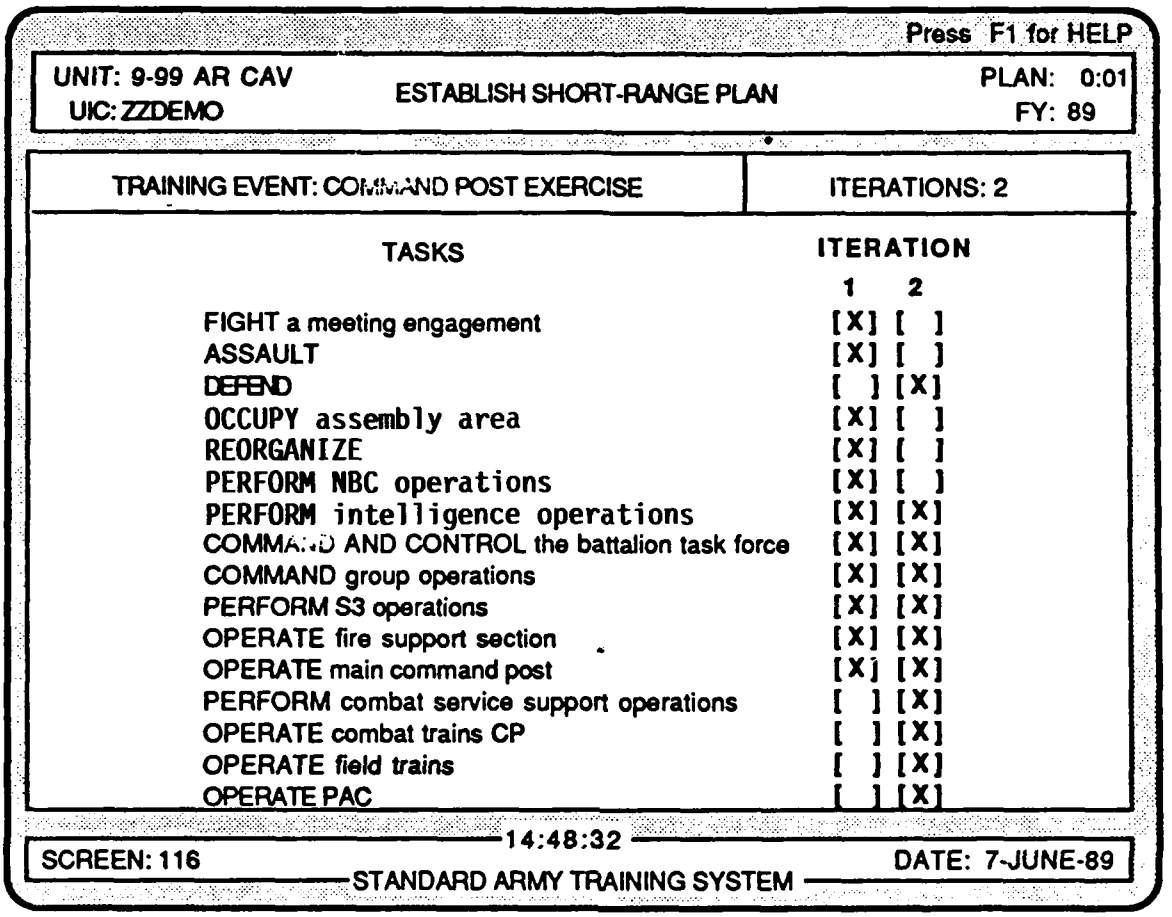


Figure 32. SATS supplemental short-range plan screen.

tasks assigned to each type training event to a particular iteration of that event.

Once this had been accomplished, the commander's training plan would look similar to that depicted on the screen in Figure 33.

This screen display, of course, depicts only a portion of the plan; the remained is reviewed by scrolling down the screen. At his option, the commander could then have the system print out a copy of his plan. When the commander left the SATS program, all of these data would be stored and could be recalled for review and/or modification at the commander's discretion.

Development of Training Strategy Guide. During the development of ITMS, a problem was identified during the development of the short-range plan which will be exacerbated by the introduction of SIMEXs. It surfaced during the implementation of ITMS within the 9ID (MTZ) Testbed when it became apparent that some tasks could be better addressed within some training events than within others. The use of a MAPEX, for example, is probably not the best means of training or evaluating a unit on the subtask of "TF departs the assembly area." Since most MAPEXs are

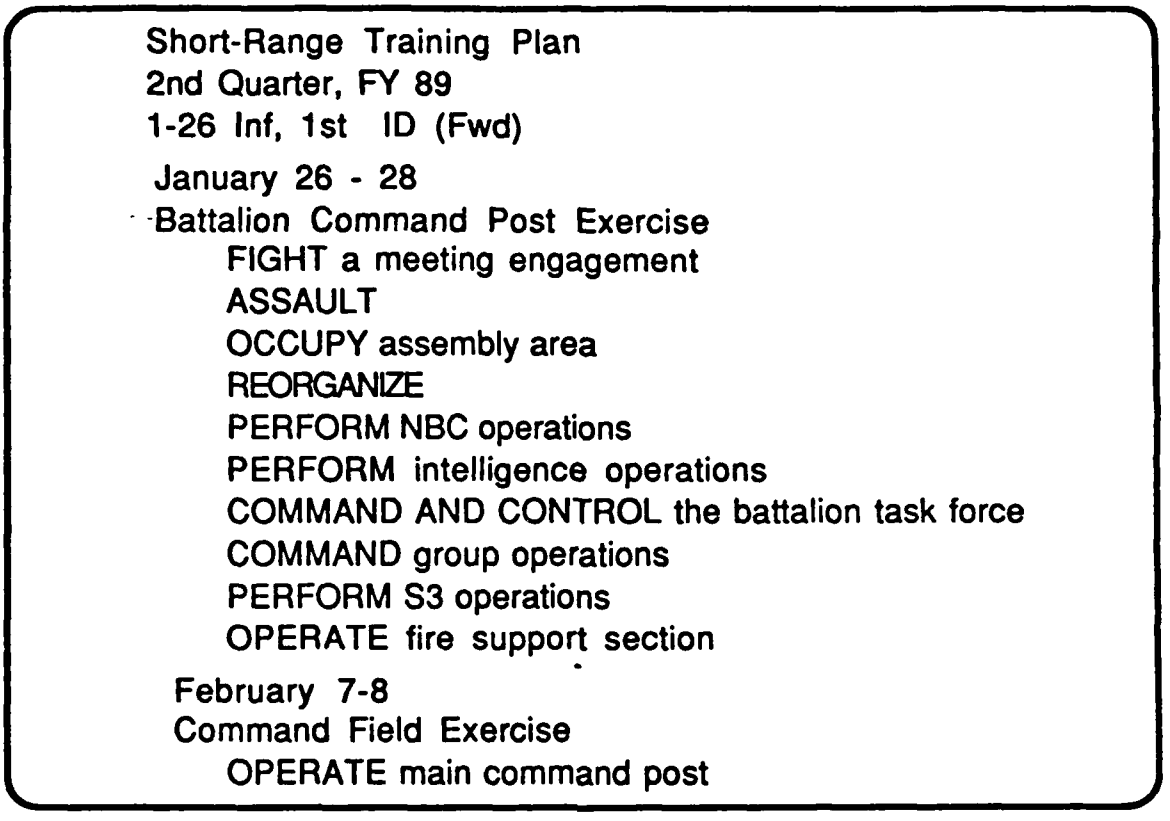


Figure 33. SATS short-range training plan screen.

conducted within a facility rather than at a field site, it would be difficult to evaluate the training to the following standards specified for that subtask, except possibly the last one.

- All equipment and supplies are moved at the designated time as stated in the OPORD;
- Last element to depart clears the assembly area as scheduled in the OPORD;
- No intelligence information is left behind;
- Vehicles do not line up on roads but move directly from their hide positions to road march configuration at the designated time; and
- Order of march facilitates orderly departure by emptying from front to rear.

The real challenge here is that while the development of the short-range plan occurs at the task and training event level, the factors which dictate how well a task matches a particular training event occur at the subtask and standard level.

While the systematic process explained in FM 25-100 and incorporated in SATS for the development of a short-range plan is judged to be far better than that contained in previous training management systems, the more effort the commander puts into it, the more difficult it becomes. If a commander wants a tight match between his priority tasks for training and his resourced training events, he would need to assess the relationship of hundreds of subtasks to the fifteen different training events. This becomes even more complex when consideration is given to the fact that some training events can be augmented to support particular subtasks. While it is not possible to address the decontamination of a vehicle within a SIMNET facility, for example, provisions could be made to position several tanks at the rear of the facility and have crews rotate through that location to perform decontamination procedures.

A concept which was formulated during the development of ITMS, but never fully investigated at that time, was the provision of a built-in guide for commanders which indicated which training events best supported which tasks.

Since such a capability would be of particular value with regard to SIMEXs in view of the constantly changing training capabilities available within SIMNET due to enhancements, this concept has been further investigated as part of this research project.

This investigation got off to numerous false starts based on the initial approach which attempted to assess the relative "goodness" of the ability of a particular training event to support the training and evaluation of a task or subtask to the standards specified in the MTP. The failure of such an approach, such as the designation of a high, medium, or low correlation, proved unworkable when it was found that it was difficult to maintain consistency across a large number of tasks.

A workable solution was finally arrived at when the training event was assessed in terms of whether it could or could not support the evaluation of the task or subtask involved. That, after all, is the simplest and most straightforward means of evaluating any training event. If it can be utilized to evaluate a task, then it can be used to train a task; if it can't be used to evaluate a task, then it can't be used to train a task and as such should not be used to support that task. With that as a starting point, various other factors were added to the assessment of the training event such as whether such a task would normally be conducted during that type of event even if it were possible to do so. A typical example would be the assignment of an offensive task to a DEPEX. With the entire unit deployed, it is certainly possible to execute an offensive task, however such an undertaking would be totally inconsistent with the intent of the DEPEX in most cases.

A description of the process which evolved from an initial detailed assessment of fifteen battalion level MTP tasks follows.

At the standard level, the relationship of the standard to each type of training event was assessed in accordance with the following criteria.

Assessment	Criteria
• N: None	The subtask cannot be evaluated to the specified standard within the exercise indicated, and the techniques and procedures involved cannot be effectively addressed.
• T: Techniques	The subtask cannot be evaluated to the specified standard within the exercise indicated, but the exercise can be utilized to cover the techniques or procedures involved.
• E: Evaluation	The subtask can be evaluated to the specified standard within the exercise indicated.

The above assessments of the MTP standards for each subtask were then rolled up for an overall subtask assessment in accordance with the following criteria:

Assessment	Criteria
• E: Evaluation	Evaluations could be made to at least 80% of all standards.
• E-: Partial Evaluation	Evaluations could be made to at least 50% of all standards.
• T: Techniques	Relevant techniques or procedures associated with each standard could be observed, but not measured within at least 80% of all standards.
• T-: Partial Techniques	Relevant techniques or procedures associated with each standard could be observed, but not measured within at least 50% of all standards.
• N: None	Relevant techniques or procedures associated with each standard could not be observed or measured in at least 50% of all standards.

And finally, the subtask assessments were then rolled up for each task for an overall task assessment in accordance with the following criteria. Within this analysis, E-'s were treated as Es and T-'s were treated as Ts.

Assessment	Criteria
• E: Evaluation	Evaluations could be made within at least 80% of all subtasks.

- E-: Partial Evaluation — Evaluations could be made at least 50% of all standards.
- T: Techniques — Relevant techniques or procedures associated with each standard could be observed, but not measured within at least 80% of all subtasks
- T-: Partial Techniques — Relevant techniques or procedures associated with each standard could be observed, but not measured within at least 50% of all subtasks.
- N: None — Relevant techniques or procedures associated with each standard could not be observed or measured in at least 50% of all standards.

The application of this analytical process to 15 MTP tasks produced the results indicated in Figure 34. For ease of reading, N's have been omitted and are represented with blank spaces. Not counting the CI and ST training event, which are not listed in FM 25-100, the analysis indicated that:

- 14 of the 15 tasks could not be trained to standards within at least one type of training event;
- If the TEWT was discounted, 6 of the 15 tasks could not be trained to standards within at least one of the remaining types of training events; and
- Within 10 of the 15 training events, less than 50% of the tasks could be fully evaluated.

If these data were incorporated into the SATS data base, the resultant SATS short-range plan screen would appear as depicted in Figure 35.

The impression gained having gone through the above process is that a reasonable discrimination can be made between the relative training value of alternative training events in supporting different tasks, subtasks, and standards. Moreover, the incorporation of these relationships into the SATS short-range training plan function, particularly with the introduction of SIMEX, appears to be useful to the commander in the implementation of his training strategy. As a minimum, there appears to be sufficient indication from this preliminary analysis to justify a field test of this concept for a strategy guide.

In arriving at a decision as to whether this technique deserves further investigation, the following factors should be considered.

	Ind	Cmd & Stf		Cmd & Stf Collective					Unit Collective						
TASKS / TRAINING EVENTS	CI	ST	TEWT	LOGEX	MAPEX	CFX	FCX	CPX	DEPEX	SIMEX	STX	LFX	CALFX	FTX	CTX
FIGHT a meeting engagement	T-	T-	T-	E-	T-	E-	T-	E-	E-	E-	E	E-	E-	E	E
ASSAULT	T-	T-		E-	E-	E-	E-	E-	E-	E	E	E	E	E	E
DEFEND	T-	T-	T-	E-	E-	E	E-	E-	E-	E	E	E-	E-	E	E
OCCUPY assembly area	T		T-	E-		E-	E-	E-	E-	E-	E	E	E	E	E
REORGANIZE	T			E-		E-		E-	E-	E-	E	E-	E-	E	E
PERFORM NBC operations	T-	T-		E-	E-	E-	E	E-	E-	E-	E	E	E	E	E
PERFORM intel operations				E-	E-	E-	E-	E-	E-	E-	E	E-	E-	E	E
COMMAND AND CONTROL BN TF	E-	E-	T	E-	E-	E	E-	E-	E-	E-	E	E-	E-	E	E
COMMAND group operations	T	T	T	E-	E-	E-	E-	E-	E-	E-	E	E-	E-	E	E
PERFORM S3 operations	E-	T	T	E	E-	E	E	E	E	E-	E	E	E	E	E
OPERATE main commmand post	E-	E-	E-	E	E	E	E-	E	E	E	E	E	E	E	E
OPERATE fire support sec ops	T			E	E	E	E	E	E	E-	E	E	E	E	E
PERFORM CSS operations	T			E-		E-		E-	E-		E			E	E
OPERATE combat trains CP	T			E-	E-	E-		E-	E-	E-	E-			E-	E-
OPERATE field trains CP	T			E-	E-	E-		E-	E-	E-	E			E	E

Figure 34. Training Event/Task Analysis

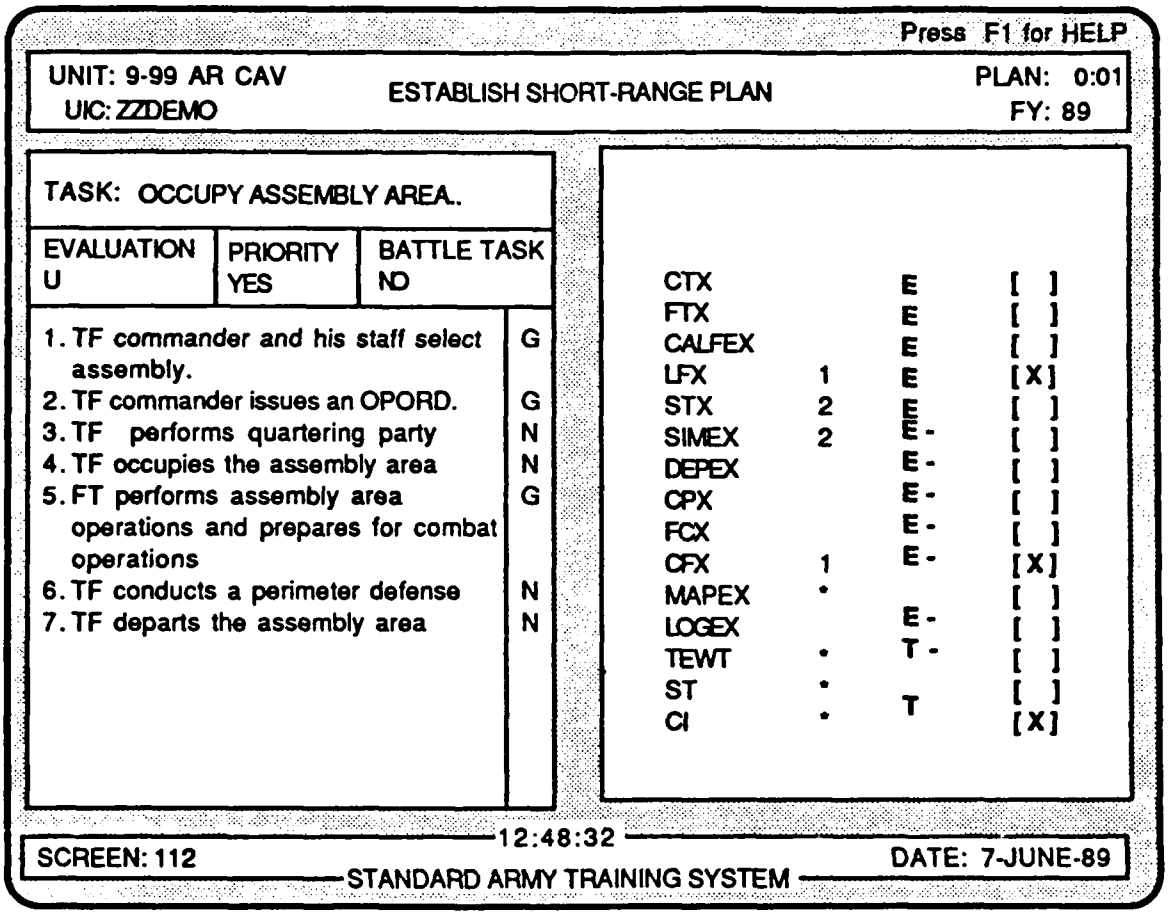


Figure 35. Enhanced SATS short-range plan screen.

First, a thorough understanding of the capabilities and limitations of each type training event and considerable judgement is required to conduct an analysis of this type. Accordingly, it is probably best conducted by a group of experienced personnel rather than by an individual.

Second, the analysis itself is relatively time consuming. This is not judged to be a limiting factor, however, as it can be accomplished by breaking it down into smaller parts and assigning them to the responsible directorates within the service schools just as the responsibility for task and subtask development is currently accomplished.

And finally, with regard to the cost-effectiveness of undertaking this endeavor, the following should be considered. Beginning with the development of MILES and on through the development of battle simulations and SIMNET, the Army has spent hundreds of millions of dollars on high technology training systems. Likewise, MTP development itself is a multimillion dollar operation. In spite of the expenditure of funds of this magnitude, the current process for matching MTP tasks with training events is handled in a generally uninformed manner. The

process described above should assist in remedying this, and in so doing, should provide the Army a greater return on its investment in training devices and facilities.

Relationship of SATS to SIMNET Exercise Planning and Control System

This subsection addresses the linkages between the SATS-based training management system described above and the SIMNET Exercise Planning and Control System (EPCS) being developed within subtask 1c.

Availability of SATS data. The following data required as input to the proposed SIMNET EPCS are available within the SATS data base:

- EPCS Administrative Data Component
  - Exercise date;
  - Unit;
  - Commander's name;
  - POC (Trainer) name;
  - Type unit; and
  - Unit Size.
- EPCS Requirements Determination Component
  - Type exercise;
  - Missions/Tasks Exercised

Source of EPCS Automation Support. Based on ITMS experience, only two options are realistically available to support the Army-wide fielding of the automated EPCS -- (1) Integrating the EPCS within SATS and (2) Hosting the EPCS on a computer within the SIMNET facility.

If an EPCS software package is developed and fielded to units, the Zenith 248 is the only available option for hosting it at this time. If this course of action were followed, it is feasible to integrate EPCS within SATS. Only the minor change to the SATS menu structure indicated in Figure 36 would be required.

Such integration would not impose any confusion on the part of the user in that both the SATS and EPCS software are menu driven and both menu structures are very similar. Menu items within SATS can be selected by moving a highlight bar to the item selected in a similar fashion to that suggested for EPCS. The only difference is that the SATS menu items are numbered and can also be selected by entering the number of the a menu item and then pressing the Return key. The integration of EPCS into SATS appears to be the most desirable option in that EPCS could capitalize on the implementation training, software maintenance, and data base upgrade programs already established for

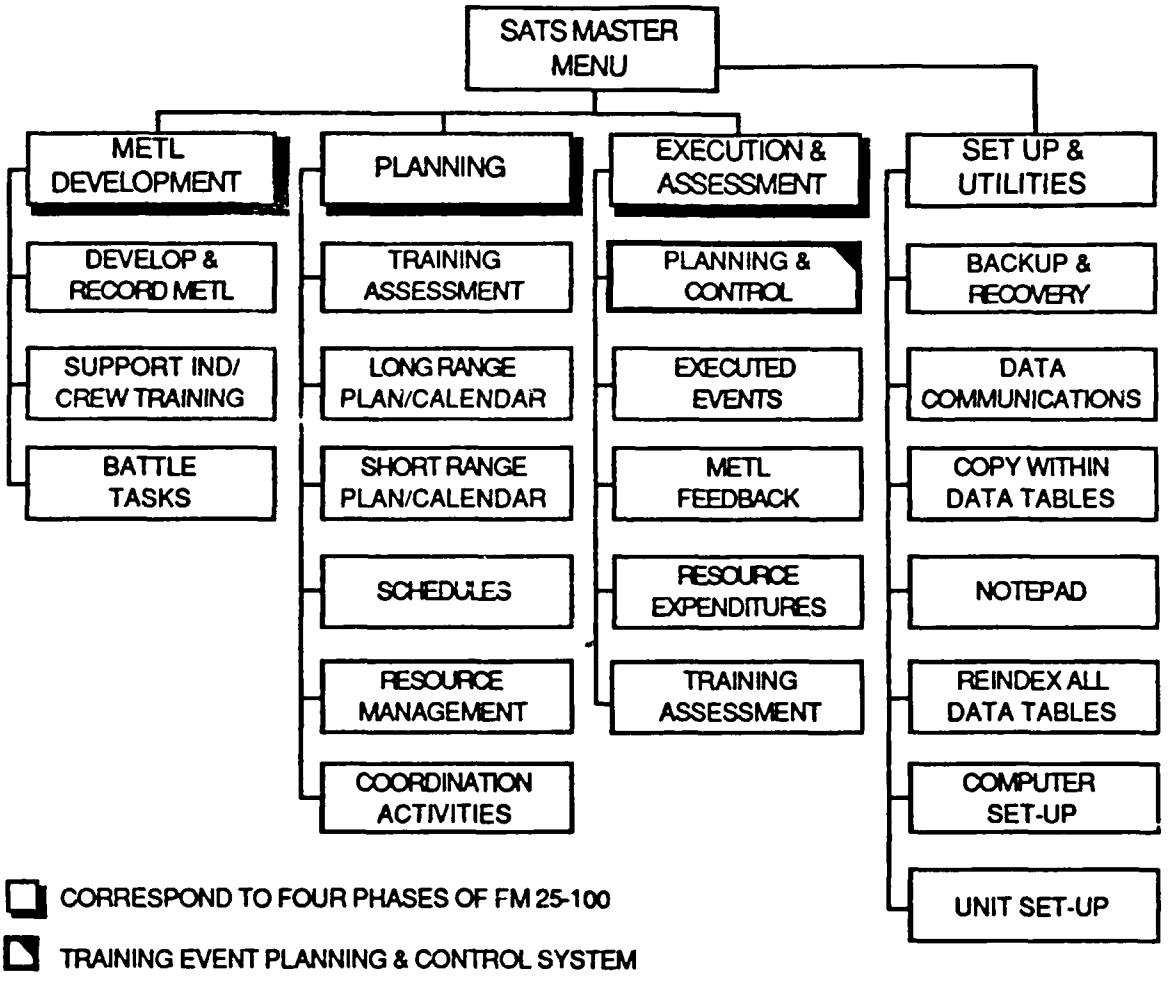


Figure 36. Proposed SATS/EPCS menu structure.

SATS. The single drawback to this option is the possibility that existing user requirements on the Zenith 248 may not afford sufficient access to it by trainers at convenient times. Accordingly, this is something which needs to be looked into during the initial implementation of SATS. If EPCS is incorporated into SATS, its data elements must conform to the data element specifications defined in the Army Development and Employment Agency (ADEA) Interface Requirements Specification for the Integrated Training Management System (ITMS), dated August 31, 1988. These specifications have been designated as the standard for all similar training data elements within all automated training systems throughout the Army by the Director of the Training Information Management Office, DCST, TRADOC

If sufficient user time is not available on the Zenith 248 for the trainer to execute the EPCS, consideration could be given to hosting EPCS on a computer at the SIMNET facility. While it was determined during ITMS development that the Army will not procure additional computers for units to support the management or planning of training, it does seem reasonable that approval could be obtained for procuring a

single modest-priced computer for use at each SIMNET facility. The real drawback to this option, however, is that it places the planner at a considerable distance from his commander during the planning process when close coordination between the two is extremely important.

Provisions for collection of MTP evaluation feedback. The single apparent omission in the proposed design of EPCS with regard to its interface with SATS is its failure to provide METL task and subtask evaluation feedback. Since SATS already has the capability to print out data collection instruments specifically tailored to each training event based on the tasks which are assigned to it, consideration should be given to placing this function within the EPCS menu structure if EPCS is incorporated into SATS.

Development of a universal EPCS. While the focus of this research is on SIMNET, consideration should be given to implementing EPCS in a universal mode which could support the planning and control of all of the types of training events the unit will conduct. This approach is proposed in view of the similarity between the planning and control process for SIMNET and that required for other tactical training events. The common aspects of the major functions within the planning and control process for all tactical training events is depicted in Figure 37.

	CI	ST	TEWT	LOGEX	FCX	MAPEX	CPX	DEPEX	CFX	SIMEX	LFE	CALFEX	STX	FTX
ADMINISTRATIVE SEGMENT	○	●	●	●	●	●	●	●	●	●	●	●	●	●
EXERCISE PLANNING SEGMENT														
REQUIREMENTS DETERMINATION														
MISSION/TASK MODULE	○	●	●	●	●	●	●	●	●	●	●	●	●	●
FIRE SUPPORT MODULE		○	○	○	●	●	●	●	●	●	●	●	●	●
CSS MODULE		○	○	●		●	●	●	●	●	●	●	●	●
OPFOR MODULE		○	○	●	○	●	●	●	●	○	○	●	●	●
CONTROL & COORDINATION				○	○	●	●	○	●	○	○	●	●	●
SCENARIO DEVELOPMENT														
CONTROL DOCUMENT MODULE:		●	●	●	●	●	●	●	●	●	●	●	●	●
TACTICAL DOCUMENT MODULE:		●	●	●	●	●	●	●	●	●	●	●	●	●
EXERCISE CONTROL SEGMENT														
PLAN SHEET # 1		●	●	●	●	●	●	●	●	●	●	●	●	●
PLAN SHEET # 2						●	●			●				
PRINT EXERCISE PLAN														
ADMINISTRATIVE COMPONENT	○	●	●	●	●	●	●	●	●	●	●	●	●	●
ROUTE DETERMINATION COMPONENT	○	○	○	●	●	●	●	●	●	●	●	●	●	●
TIME/EVENT LIST		●	●	●	●	●	●	●	●	●	●	●	●	●
MASTER EVENT LIST		●	●	●	●	●	●	●	●	●	●	●	●	●
WARNING ORDER		●	●	●	●	●	●	●	●	●	●	●	●	●
OPORD		●	●	●	●	●	●	●	●	●	●	●	●	●
FRAGO		●	●	●	●	●	●	●	●	●	●	●	●	●
OPFOR INSTRUCTIONS				●	○	●	●	○	●	●	○	○	●	●
EXERCISE INITIALIZATION SHEETS		○	○	○		●		●		●	○	○		
LESSON PLAN	●													

● HIGH LEVEL OF COMMONALITY ◐ MODERATE LEVEL OF COMMONALITY ◐ MODERATE COMMONALITY, BUT NOT APPLICABLE

Figure 37. Common aspects of major planning and control functions for all standard training events.

If this approach were adopted, only minor modifications would be required to pull additional data from the SATS data base which were directly applicable to particular exercises, such as the ammunition, funds, ranges, etc. associated in the data base with each training event

One issue which should be considered with regard to this proposal is the prospect of expending funds to implement a planning and control system for SIMNET and at the same time ignore the planning and control requirements for other type training events. If this approach were taken, the system could easily be designed so that when the trainer called up a specific training event within the EPCS, it would automatically tailor the subsequent menu structure to support the planning and control of that type of exercise at the echelon it was scheduled for on the short-range calendar.

Application of Research to Reserve Component Units and Service Schools

While the focus of the above research has been on a training management system for AC units, it is equally applicable to RC units and service schools.

Application of research to reserve component units. As noted, the Army Chief of Staff has directed that the FM 25-100 training management system described in FM 25-100, the system proposed to support SIMNET, is equally applicable to both the AC and RC. Likewise, current plans call for implementing SATS in both the AC and RC. The RC version of SATS will be identical to that for the AC with regard to all of its functions which interact with training events. Its only functional differences will be with regard to the manner in which it requests and manages resources and the incorporation of extended time lines for long- and short-range planning. The only distinction which will be noticed when utilizing SATS to support the RC is that there will normally be fewer training events within the short-range plan. Other that that, an RC commander would utilize SATS to manage his training, to include the use of SIMNET, in exactly the same manner as that described above for an AC commander.

Application of research to service school training programs. The training management process proposed above for unit commanders can also be utilized effectively by service school directors to formulate their programs of instruction. Any combat arms course in which tactical command or staff procedures comprise a major portion of the curriculum can be set up in a manner similar to that of a unit's training plan. The course developer would first derive a Course Essential Task List from the appropriate MTP, or front end analysis, and then conduct a training assessment based on the test results of the previous classes' performance. The SATS short-range training plan function would then be used to select the best mix of training events to support the training. The primary difference would be with regard to the strategy employed which in most cases would be focused on familiarization or reinforcement rather than sustainment. The reason for this is that sufficient time would not normally be available during most officer courses to rotate each student through each command and staff position. This is not a major limitation, however, as that is about the best the service schools

can do now, and the same cost savings will accrue if SIMNET is utilized to reduce the use of actual combat vehicles. Within squad/crew courses, however, it is feasible to rotate all students through the tank commander's and gunner's positions. A second anticipated difference is that Classroom Instruction will likely play a greater role than it does within a unit training plan. Once each exercise was selected, the EPCS would then be utilized to support its planning and control. The single exception would be the development of the Classroom Instruction, to include the media involved -- film, video, self-paced audio-visual, etc., which would be prepared in accordance with existing practices.

FINDINGS

The following findings are derived from the above analyses.

General

The primary value of the research required to support subtasks 1b and 2c is that it affords an opportunity to examine SIMNET within the larger context of the Army's overall training system. Failure to do so with regard to similar major programs in the past has led to the development of unique solutions which field commanders were unable to effectively integrate into their plans. A typical example is the evaluation criteria utilized at the National Training Center during the first four years it was in operation. These locally developed NTC unique evaluation criteria utilized by the observer/controllers simply could not be correlated in a reasonable manner with the Army's ARTEP criteria. As such, commanders were forced to training up to ARTEP criteria in preparation for their NTC rotation and then train up to NTC criteria upon their return. The extensive research devoted to that area by ARI has since rectified this problem to a large degree.

In order to preclude situations such as this occurring with regard to the management, planning, execution, and evaluation of SIMNET-based training, ARI incorporated subtasks 1b and 2c into its initial comprehensive research program for SIMNET. A review of the limited documentation previously available on SIMNET indicates that this was a timely decision. In the after action report prepared by an Armor battalion commander following his return from the NTC, he points out numerous advantages and shortcomings associated with using SIMNET in preparation for his NTC rotation. He notes that SIMNET did not prepare him to operate his CSS elements, but does not cite the conduct of a LOGEX. He notes the lack of dynamic terrain within SIMNET, but does not cite the conduct of a TEWT. He notes that SIMNET caused his unit to be too aggressive, but does not cite a battle simulation supported CPX or a MILES supported STX. Whatever his reason for not conducting these complementary exercises, it certainly wasn't due to a lack of resources. None of them consumes substantial amounts of fuel or ammunition except for the latter, and it has been specifically designed to hold resource requirements to a minimum.

This is an admittedly unfair assessment of that report in that its author was no doubt asked to specifically comment on the role of SIMNET in preparing him for the NTC. It's not his report which is wrong, it's the question. A better one might have been to assess where SIMNET best

fit into his overall training plan in preparation for the NTC. It is this latter question which is addressed in the following findings.

Global Training Strategy (1b)

The foregoing research analysis began with the hypothesis that the Army's current training management system, as defined in FM 25-100, Training the Force, was capable of managing SIMNET-based training. Nothing was found to disprove that hypothesis. If SIMNET is visualized as a training event, and there is no reason why it can't be, then it can be managed just as effectively within the provisions of FM 25-100 as any of the Army's dozen or more other standard training events. Within the Army's training management system, the term strategy is defined as the basis for matching METL tasks which require training with the best training event, or events, which are capable of supporting that training. SIMNET was found to be compatible with that definition of a strategy. Within the overall continuum of training events, it doesn't cause the unit to run quite as fast as a MILES supported FTX or to crawl quite as slow as a CPX. Moreover, it can be tailored internally through the formulation of its OPFOR and pacing to provide either a crawl, walk, or run environment. Little elaboration is required within this report of this training management system or definition of a strategy, as both are covered in detail in FM 25-100 which is readily available. As such, FM 25-100 should be viewed as a component of this research report. The issue is thus not the formulation of a SIMNET training strategy, but the incorporation of SIMNET into the Army's overarching strategy.

Programmatic Content For SIMNET Training (1b)

Within any discussion of SIMNET, it can be viewed in one of two ways. Some view it as the ultimate training system which makes all other types of training obsolete. This group stresses its unquestionable advances as a cost-effective simulator and dismisses current shortcomings with apparent full faith that they will be remedied during its full scale development. The second group views SIMNET as a welcome addition to the Army's current family of training facilities and devices. This group recognizes that while many of SIMNET's current shortcomings will indeed be corrected, it may be more cost-effective in the long run to compensate for others through participation in complementary or supportive training events.

The above review of the current shortcomings inherent in SIMNET tends to support the view of the latter group. The incorporation of fully dynamic terrain, dismounted infantry, CSS units (rather than just the planning for their use) and other essential upgrades may never come to pass in view of cost limitations. In addition, there is another important factor which must be considered. Attempting to force-fit all tactical training into a SIMNET facility through SIMNET-CPXs, SIMNET-TEWTs and so on, is projected to totally overtax the SIMNET facility. One can readily imagine the impact of a situation in which every maneuver, air defense, and aviation platoon, company, and battalion on a brigade plus size installation was required to conduct its training within a single training area or facility which could only support one battalion size unit at a time.

The overall programmatic content of SIMNET training is thus a variable. It is a function of the relative ability of SIMNET to support each task which requires training and the number of complementary or supportive training events which can be conducted with available resources. The FM 25-100 training management system provides a process for formulating the programmatic content of such a grouping of training events through the development of a short-range plan. This process for developing the programmatic content of a SIMNET-based training event is thoroughly described in FM 25-100 and the above description of SATS. In addition, the reasons why a training manager might elect to allocate a portion of his training to training events other than those supported by SIMNET is provided in the above discussion of the limitations of a SIMNET-based training event relative to other types of training events.

The study also found that the development of a strategy guide to assist commanders in allocating their training requirements to the best mix of resourced training events is feasible. This guide, used in concert with the FM 25-100 and ITMS/SATS training assessment and short-range planning processes and the "crawl-walk-run" strategy, should thus serve as the basis for determining the general programmatic content of SIMNET-based exercises.

With regard to the detailed programmatic content of a SIMNET-based training event, which is dictated by the size of the OPFOR, pacing, and so on, it is addressed in that portion of the overall research program which deals with SIMNET exercise planning and control -- subtask 1c. With regard to the proposals made for that subtask, the use of data bases to reformulate task lists into more meaningful forms and to define a fully realistic OPFOR appear to be particularly desirable.

Since the training management process described in FM 25-100 is the basis proposed for the selection of programmatic content, these findings are applicable to both active and reserve components.

They are also applicable to service school instruction with regard to the selection of the best mix of training events to support a program of instruction. In this latter case, however, no distinction would normally be made between the classifications of "Evaluation" and "Techniques" since the training events involved would not normally provide a basis for evaluating the performance of each individual student.

Appropriate Measures of Performance (1b)

Simply put, the tasks, conditions and standards contained in the Army's MTPs must serve as the primary measures of performance for all of a unit's training. Any other alternative destroys the integrity of the overall process. If one set of criteria is used to evaluate NTC exercises, another for SIMNET-based exercises, and yet another for CPXs, it is impossible for the commander to formulate a consistent short-range training plan.

Within this context, the utilization of the common measures of performance developed within subtask 1a is feasible as long as a cross-walk exists between them and the MTP standards (Figure 38). The research undertaken to date in support of subtask 1c appears to have accomplished this with regard to the preparation of a SIMNET training event. There is no evidence, however, that this has yet been accomplished with regard to transforming the feedback from the SIMNET-based event back into MTP form for entry into SATS.

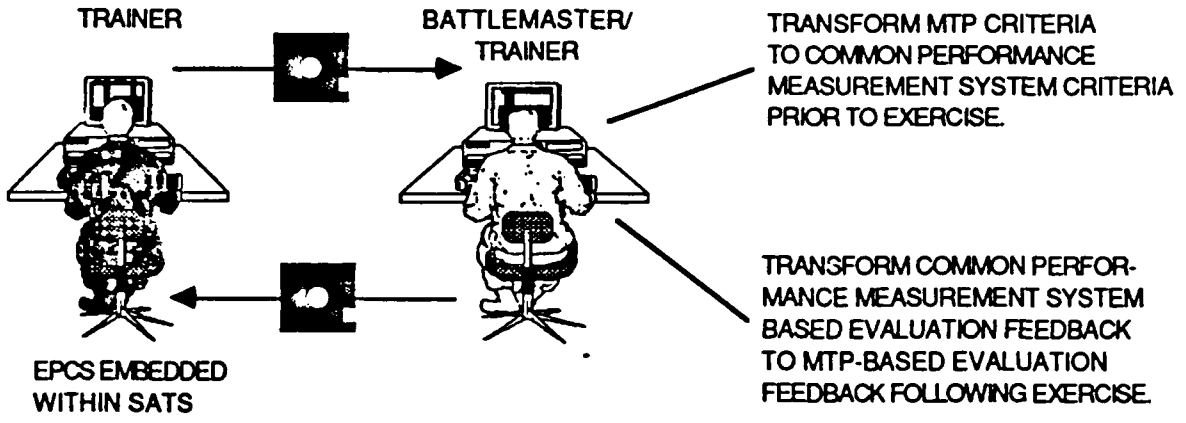


Figure 38. Provision of cross-walk between proposed common measures of performance and MTP tasks.

Prescription of Training Events (2c)

FM 25-100 provides a general process for prescribing training events which is further structured within SATS. While this process appears to be fully workable and effective, it does require extensive knowledge on the part of the commander with regard to the nuances of the tasks involved and the training capabilities of the training events under consideration. Accordingly, this research effort examined a training strategy support system based on the identification by each respective MTP proponent of the relationship of each training event to each MTP task and subtask. These relationship indicators are then incorporated into ITMS/SATS and used by the commander as a guide during the preparation of his short-range plan.

The proposed strategy guide provides annotations for each training exercise which indicate its relative ability to support each task. These annotations, together with their definitions, are as follows.

Assessment	Definition
• E - Evaluation	Evaluations can be made to all specified standards.

- T - Techniques — Relevant techniques or procedures associated with each standard can be observed, but not measured to the specified standard.

- N - None — Relevant techniques or procedures associated with less than 50% of all standards can be observed, but not measured to the specified standards.

The derivation of these criteria for five diverse MTP tasks, down through the subtask, standard, and substandard level indicated that the establishment of such criteria was feasible. Should this strategy guide be incorporated into SATS, it is anticipated that it will significantly enhance the effectiveness and efficiency of matching tasks with training events and, in turn, enhance the unit's training plans and the Army's return on its investment in technology-based training facilities and devices.

This approach to the selection of training events is considerably more systematic than that currently utilized in the field, but at the same time admittedly falls short of being actually prescriptive. While it could ultimately be made prescriptive, a prescriptive model of that type is currently inconsistent with the "man in the loop" philosophy of FM 25-100 and would probably not be readily accepted by commanders in the field. The relative merits of building upon this approach towards a prescriptive model, however, should eventually be addressed.

User Interface Requirements (2c)

The findings that the Army's current FM 25-100 training management system can support a SIMNET-based training event and that SATS supports the FM 25-100 process resolves the user interface issue. The SATS' man-machine interface in the form of menu-driven function selection, the use of the cursor and enter key to select options, and the capability to input data from a keyboard is very similar to that utilized by the EPCS proposed to satisfy subtask 1c. Accordingly, no further investigation of user interface requirements appears necessary.

With regard to the SATS/EPCS application software interfaces, provisions need to be made for automatically transferring the following data between SATS and the proposed EPCS:

- SATS Output: The SATS training management system data base, in its current form, contains the following data which is directly applicable to the planning and preparation of a training event (to include those supported with SIMNET):

  - Unit to be trained;

  - Type of training event, to include SIMNET-based;

- Date and time of training event;
- List of subunits/personnel who are to participate in the training event;
- Location of training event;
- Designation of trainer;
- References to be used in preparing the training event;
- Individual equipment and equipment required by the participants; and
- METL tasks to be addressed with the training event.

- SATS Input: The following feedback must be entered into the SATS data base following each training event (to include those supported with SIMNET) to support its Training Assessment process which in turn directly supports the SATS Long-Range Planning process:
  - Unit which was evaluated;
  - Type of training event;
  - Date of training event;
  - Task evaluations; and
  - Subtask evaluations

ITMS/SIMNET Compatibility (2c)

ITMS (or SATS) and SIMNET are fully compatible in that one is a training management system and one is a training event, and the former can manage the latter. Moreover, the above analysis found that the planning and control system developed for a SIMNET-based training event can be easily incorporated into the SATS menu structure and that there are advantages in doing so. Moreover, because of the requirement identified to supplement SIMNET-based training to compensate for its current shortcomings, it appears essential that ITMS/SATS be utilized to support SIMNET-based training.

Implications of Findings on the Larger Research Project

The above findings have the following implications on the larger research project described in the introduction:

- SIMNET is an excellent training system and should be utilized whenever possible to reduce training costs and sustain unit proficiency;

- SIMNET-based training exercises should be managed as a new form of training event with the suggested title of SIMEX;

- SIMEXs should be managed within the context of the FM 25-100 training process in general and ITMS/SATS in particular;

- During the unit's overall training management process, special emphasis should be placed on ensuring that whenever a SIMEX is scheduled, supplementary training events are also scheduled to overcome the current shortcomings inherent within SIMNET;

- The Exercise Planning and Control System developed in support of SIMNET should be further refined for universal application and be incorporated into ITMS/SATS;

- The proposed short-range strategy guide should be incorporated into ITMS/SATS to facilitate the association of tasks with training events;

- Provisions must be made for cross-walking the common performance measurement standards developed in support of subtask 1c back into MTP form in order to support their input into ITMS/SATS;

- When SIMNET is implemented, the Fire Coordination Exercise should be dropped from the Army's inventory of training events.

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APPENDIX A
SURVEY OF SIMNET CAPABILITIES TO SUPPORT TRAINING

Terrain and Trafficability Representation

The difference between SIMNET terrain representation and the actual terrain is such that special SIMNET maps must be used by the players. While it is possible to use actual military maps for planning, the SIMNET map is used during the conduct of the tactical operation.

The sparseness of the simulated vegetation and distances between the points used to compute slopes within the SIMNET model make the SIMNET terrain somewhat more trafficable than the actual terrain.

Both hard surface roads (red) and dirt trails (black) are depicted. Hard surface roads are depicted as either single or multilane. Vehicle movement along roads is not curtailed by environmental conditions such as mud, snow or ice.

Man-made obstacles -- mines, craters, antitank ditches, destroyed bridges -- are not played within SIMNET. They cannot be emplaced, detected, or neutralized; nor can they impede vehicle traffic.

A disabled vehicle can block a road, "bridge" and defile.

Buildings are depicted, but they are not currently situated to form urban areas. They impede vehicle movement; if a vehicle runs into a building, the vehicle is assessed appropriate damage which must be repaired.

Neither direct fire, indirect fire, or being run into by vehicles will rubble buildings.

Some of the wood lines impede vehicle movement. If a vehicle runs into one of these trees, the vehicle is assessed appropriate damage which must be repaired. Typical damage involves main gun being thrown out of battery.

Woods are currently depicted by wood lines which do not have depth.

Some trees have canopies which provide concealment from aircraft.

Rivers impede vehicle movement. Rivers depicted as dark blue cannot be forded; those depicted as light blue can be forded. River velocity cannot be measured. Bank slope conditions are not played. The width of rivers can be estimated, however, the current system depicts almost all rivers as the same width.

Bridges are not played; roads merely cross rivers. Accordingly, bridge classifications cannot be conducted, bridges cannot be primed for demolition, destroyed, or cleared of demolitions. Nor will bridges collapse regardless of the weight of the vehicles crossing them.

Marshes are not played.

Military crests are played.

Sufficient terrain features and vegetation are available to support assignment of sectors of fire.

Observation Representation

Due to the design of the system, the maximum range at which a vehicle target can be detected is 3,500 meters. The size of each target vehicle is scaled as a function of its distance from the observer. It is extremely difficult to identify the type of vehicle being observed at ranges in excess of 2,000 meters.

Weather conditions are not played; it is always high noon on a sunny day. There is currently no way to represent limited visibility or night conditions.

Night vision devices are not played.

Artillery-delivered smoke is played realistically. The extent and duration of its obscuration effect is a function of prevailing wind direction and speed. You cannot see through the smoke. Targets cannot be detected through smoke with thermal devices since such devices are not played. Because of the design of the system, you cannot drive through smoke.

Ground Surveillance Radar is not played.

REMS are not played.

Illumination -- flares or searchlights -- is not played.

Land Navigation and Range Estimation

Drivers can easily follow a road.

It is possible for drivers to maintain approximate road march vehicle intervals. Because vehicle lights and limited visibility are not played, vehicle lights cannot be used to assist in maintaining vehicle intervals.

Routes cannot be marked with panels, signs, lights, or dismounted guides.

It is a little harder to navigate cross country than on a road, but such travel can generally be performed in a realistic manner.

All vehicle simulators have odometers which measure distance in kilometers.

M1 tank simulators possess Azimuth Indicators; the actual M1 tanks do not.

Ranges can be estimated to an acceptable degree, and artillery can be visually adjusted. The M1 tank combat vehicle simulator's LRF can give precise ranges.

Communications Representation

Military radios are simulated with CB radios which are hard wired together. Each radio has a frequency selector for selecting any one of 40 frequencies. Accordingly, up to a maximum of 20 separate radio nets can be set up. Each station can enter and leave any net it desires and the procedures for changing the net frequency can be played. Currently, fourteen of the frequencies can be recorded by the observer/controller for replay during the AAR. No means is currently available to automatically record the length of each transmission over the net, nor is a capability provided for simulating the processes associated with encription devices.

Radio direction finding is not played; location of electronic emission cannot be determined.

Visual signals -- flashlights, strobe lights, panels, flags, hand and arm signals, etc. -- are not played.

The range of radio transmissions is not played as a function of distance between stations or location (line of sight) of stations.

292 antennas are not played.

Land lines can be played, but there are no external telephone jacks provided on the vehicle simulators.

Vehicle Representation

Regardless of whether both sides are played by units utilizing U.S. organizations, vehicles, and tactics, or one side is played by a unit utilizing OPFOR organizations, vehicles, and tactics, the system always portrays your opposing force as being Soviet equiped.

Only tracked vehicle and aircraft simulators are provided. Limited wheeled play can be performed on the Macintosh terminal provided in the Trains element for maintenance and logistics support. Accordingly, no wheeled vehicle support can be provided for quartering parties or to transport personnel who do not possess a tracked vehicle (XO and 1SG).

Vehicle cross country movement rates are a function of the vehicle's accelerator setting, type of soil being driven over (there are five types) and slope of terrain.

When vehicles are counted while passing through a passage point, they cannot be individually identified by means of their bumper number.

Vehicles cannot be dug in.

Provisions have been made for playing hull defilade.

Vehicles cannot be camouflaged with vegetation or camouflage nets.

Vehicles can be concealed in the forward edges of wood lines with gun tubes and sights extended through the trees.

External and internal vehicle lights are not played.

Vehicles cause small dust clouds when they are moving. Size of cloud depends on speed of vehicles on type of terrain being traversed.

Both the turret and commander's cupola have full 300 degrees traverse.

Turrets can be offset while the vehicle is moving in a road march in order to provide flank security while the driver looks forward.

Vehicles can drive through some wood lines and not through others.

Vehicle damage is automatically assessed whenever a vehicle runs into a hard object -- buildings, trees, other vehicles, etc.

Probability of hit is a function of range, lay, round dispersion, type of round, angle of incidence, and proper operation of the system. Probability of kill, given a hit, is a function of target aspect and type of ammunition employed.

When a vehicle is damaged or killed, the system does not provide casualty assessments for each member of the crew.

Vehicle locations cannot be marked to support utilization to hide positions, occupation of assembly areas, or relief in place.

Ammunition cannot be stockpiled at vehicle locations.

Vehicle crews can hear engine, turret, track, and battlefield sounds. Near misses are not heard.

Dismounted Infantry Representation

Dismounted attacks cannot be conducted.

Dismounted quartering party cannot mark routes with panels, signs, or dismounted road guides; nor can they guide combat vehicles into position.

Dismounted probes or patrols cannot be played.

Dismounted observation posts (OPs) cannot be played.

Dismounted, eyeball to eyeball liaison can be played if personnel dismount from vehicles which have been "driven" to the same location. These personnel cannot "see" the battlefield, however, unless they get back in their vehicles and utilize the vehicle vision devices.

Indirect Fire Representation.

Vehicle simulators are not provided for FISTs or mortar carriers.

Indirect fire requests are submitted over the Command or Fire Support Net to the battalion fire support officer who also serves as the fire direction center. The FSO performs his FDC duties by inputting fire requests into a Macintosh terminal which automatically computes and executes the fire mission on command. At the time of impact, an appropriate impact signature is depicted within the vehicle simulator sights and vision blocks at the projected point of impact, and on the plan view display. Two types of rounds are played -- HE and smoke. The effects of both HE and smoke are realistically simulated with appropriate vehicle damage and visual obscuration effects. Two types of fuses are provided -- PD and DT.

Aviation/Air Defense Representation

Aircraft can be detected through vehicle periscopes and sights. All direct fire weapons can engage aircraft. It should be noted, however, that tank machine guns are not played.

Current woods do not provide air cover for vehicles. A test is currently underway with regard to canopied forests. which will provide concealment from the air.

Aircraft representation is sufficiently detailed to permit friend or foe identification of aircraft.

Only the A-10 and Apache are played as friendly aircraft; effect of their ordinance on targets is realistic.

Vehicle track marks are not played; they cannot be seen from the air.

Electronic IFF is not played.

FASCAM is not played.

Air assaults cannot be conducted.

FARPs are not played.

Vehicle simulators are not provided to represent ADA weapon systems.

Engineer Representation

Engineer vehicles or activities -- bridge construction, cratering, etc. - are not played.

Chemical and Radiological Weapon Representation

Chemically contaminated areas are not played; there is no way to detect, monitor, or mark chemically contaminated areas.

Radiologically contaminated areas are not played; there is no way to detect , monitor, or mark chemically contaminate areas.

There is no means of indicating whether or not a vehicle is contaminated with chemical agents or radiation.

The employment of chemical and nuclear weapons is not played; there is no way to represent their effects.

Internal mask connections are not provide within vehicles to support MOPP play while mounted.

Logistics, Maintenance and Resupply Representation

Fuel resupply is played fairly realistically. Each vehicle has a fuel gauge which can be preset to a desired level by the unit commander (trainer) at the start of the exercise. The gauge portrays fuel remaining based on a fuel expenditure rate which is a function of the type of terrain being driven over. When the unit desires to refuel its vehicles,, the player on the Logistics support terminal at the Trains location sends a computer generated refueling vehicle to that unit's location. When it comes within 200 meters of the vehicle it needs to refuel, after a time delay which is a function of distance and vehicle speed, the refueling vehicle becomes visible to the vehicle. When the vehicle which needs to be refueled drives with 30 meters of the refueling vehicle, refueling operation commences, with an appropriate time delay involved.

Ammunition resupply is handled in much the same manner as refueling operations. Five types of ammunition are resupplied -- Tank He, Tank Sabot, BFV 25mm HE and AP, and BFV TOW rounds. These are the only types of ammunition which are currently played. Tank cupola and coax machine guns are not played.

Vehicle simulator crews can monitor their own fuel and ammunition.

Vehicle recovery is played in much the same manner as vehicle refueling and ammunition resupply.

Vehicle simulators are automatically made non-operational on a random basis based on the MTBF rate of the unit's operational vehicles. Trouble shooting is then performed by the vehicle crew based on warning lights and other indicators. Once the cause is diagnosed, those failures which can be corrected by the crew are automatically corrected and the vehicle simulator becomes operational again after an appropriate time delay. If maintenance support is required, it is played in much the

same manner as fuel and ammunition resupply, with appropriate time delays. If the crew misdiagnoses the cause of the fault, however, and the wrong "parts" are delivered by the maintenance team, the entire process, to include time delays, must be repeated until the correct part is delivered and an appropriate time delay has occurred.

AVLB's are not played.

APPENDIX B
NTC AFTER ACTION REPORT

THRU: COMMANDER
[----------] ARMORED BRIGADE
FT. KNOX, KY 40121

TO: COMMANDER
USAARMC
FT. KNOX, KY 40121

SUBJECT: POST NTC SIMNET TRAINING EVALUATION

1. PURPOSE: To provide comment on the training value of SIMNET having now completed NTC rotation [----] and utilized SIMNET extensively in pre-NTC training. Comments are compiled from CO, XO, S3, and Team Commander discussions.

2. FORMAT: Each of the seven operational systems will be discussed followed by a prioritized listing of recommended improvements.

3. OPERATING SYSTEMS:

a. INTELLIGENCE:

(1) SIMNET assisted us greatly in intelligence planning. Staff interaction within the IPB process specifically terrain analysis, decision support templating, and Reconnaisssance and Surveillance (R&S) planning were exercised. We were generally successful with IPB planning at the NTC. However, in execution we had our problems. Patrols integral to the R&S plan were often not able to confirm or deny the situational templates. Our nightwatch and counter-reconnaissance efforts were largely unsuccessful. SIMNET with no limited visibility thermal capability, no GSR, no dismounts to replicate OP's or local patrols did not allow us to exercise these missions.

(2) SIMNET assisted us greatly in spot reporting. Though our NTC spot reports were not perfect, without SIMNET training our reporting would have undoubtedly been of less quality.

(3) Though we integrated a higher HQ (Bde) into our SIMNET training, this cell was little more than a station to forward reports to. We were not reacting to missions of a higher HQ. In hindsight, this did not stress us especially in terms of intelligence. We should have integrated top down intelligence information flow (e.g. status of flank units, aerial recce flights, TAC ,SAT, etc.) to allow our S2 to integrate this data and provide tracking and analysis of the battle.

(4) We never encountered a thinking enemy until the NTC. We designed the OPFOR scenario in SIMNET and manned the semi-automated OPFOR station with organic personnel (S1, S2, S3, AIR, LNO). Bde S2 also assisted in SIMNET OPFOR play during our last training iteration. Hence we were never surprised by the SIMNET OPFOR. An autonomous OPFOR controller who fights a doctrinal, thinking enemy is needed to allow the TF command group and staff to react realistically. We can, to some extent, provide this through Bde and BN assets. A dedicated OPFOR player at the SIMNET site would have been helpful.

b. MANEUVER:

(1) SIMNET's biggest shortfall lies in defensive planning and execution. Without dynamic terrain and obstacles, defensive planning steps which mandate precise time and resource management cannot

be exercised. (By dynamic terrain I mean gullies, folds and dropoffs not a gentle rolling plain). Such critical tasks as siting engagement areas, TRP's, preparing individual fighting positions, dozer handoff, and using obstacles to shape the battlefield, are the keys to defensive preparation. None of these essential tasks can be trained in SIMNET.

(2) We emphasized actions on contact in SIMNET, but encountered some negative training in this area. Because of the lack of terrain contour relief in SIMNET, actions on contact tended to become slug fests. Seeking cover and dismounting elements to develop the situation cannot be done in SIMNET. No "near miss" sens'ng is provided hence the essential jockeying for cover and movement out of a fire sack is not done. At the NTC we tended to react in similar "slug it out" fashion. We were in a sense too aggressive, too quick to push on. We were weak in developing the situation, waiting for indirect fire to suppress or smoke the enemy, and dismounting infantry to dislodge the enemy. All to often we pressed on until an entire company/team was decisively engaged in an enemy kill zone, and subsequently annihilated.

(3) SIMNET did aid us significantly in fire distribution. This positive training is induced by the fact that enemy vehicles when hit in SIMNET burn. Crews have no trouble distinguishing kills.. The same is not true at the NTC where GVKI lights are not readily visible at extended ranges and live fire targetry kill sensors do not indicate destroyed vehicles as clearly.

(4) CO/Plt movement at the NTC proved to be a strength for [------]. Since we had no opportunity to maneuver the CO/Tm's over extended distances except in SIMNET, we must attribute this training strength largely to SIMNET. CO/Plt movement in wedge formations, bounding /traveling overwatch, and specific movement techniques such as defile drills were generally praised by OC's. While SIMNET definitely builds expertise in movement techniques in the collective(Plt/CO) sense it does not help the individual vehicle driver. Our tank drivers were weak in their individual driver skills especially terrain driving. Again the lack of relief in SIMNET's terrain does not allow drivers this practice.

(5) [---------] experienced difficulty in moving smoothly in darkness form an assembly area to a Line of Departure and into a task force movement formation. We executed this numerous times in SIMNET but always in daylight. At the NTC this movement from AA to march formation habitually occurred under periods of darkness (0400-0500). Though route reconnaissance, and marking (chem lights) was done we still experienced difficulty. Often this movement was complicated by battlefield clutter (i.e., bumping into various other units, artillery batteries, smoke detachments, air defense units, etc...)

c. FIRE SUPPORT:

(1) SIMNET provides excellent training in calling for and adjusting indirect fires. The audio visual effects are outstanding. The fire support computer terminal is however, too handy. It allows the FSO to directly process and affect calls for fires. This is unrealistic. It makes the FSO the man pulling the lanyard on the howitzer. At the NTC fire planning and calls for fire had to negotiate multiple layers....FIST, FSO, TAC Fire Shelter, Firing Battery, STAR WARS building, and fire markers. Our fire plan never survived this layered journey. After detailed coordination in which TAI's, obstacles and EA's were targeted, Smoke, FASCAM and ACA's coordinated, FPF and

trigger lines planned, and the entire fire support plan synchronized with the scheme of maneuver/commander's intent, the final fire plan returned from brigade never reflected our initial submission. Targets were deleted, moved, disapproved, etc. Consequently, in the fight, indirect fire support was either non-existent or ineffective. This became a major source of frustration. Even after detailed indirect fire rehearsals, timely, accurate supporting fires seldom occurred. To replicate the layered artillery planning process the SIMNET computer terminal must be removed from the TOC. FIST and FSC personnel must work through the fire planning process and learn to effect the necessary coordination at each level. We must play each level in SIMNET and make each component do its job. Digital and voice calls for fire must be processed. It is incumbent upon SIMNET users to implement this fix.

(2) We learned at the NTC that the TF commander does need the FSO and ALO in his hip pocket (if not on his vehicle at least in one that follows closely). Providing these vehicles (FSO/ALO) in SIMNET would greatly enhance this interaction.

(3) Our use of FIST personnel in SIMNET paid dividends at the NTC, where they were well integrated into the operational procedures of each CO/TM.

d. COMMAND AND CONTROL:

(1) CO/TM command and control at the NTC was strong. SIMNET contributed to this success. It is a good trainer of CO/Plt TAC SOP's familiarizing all personnel with operational procedures. Command and Control was difficult when changing from MOPP 2 to MOPP 4. Incorporating jack boxes in SIMNET (similar to UCOFT) and requiring soldiers to bring CVC and protective masks would aid in this training.

(2) CO/TM Commanders were not ready to control all attachments. Link up and control of Stinger teams, Vulcans, GSR, smoke teams and engineers was generally awkward. Maneuvering with these type assets in SIMNET would assist greatly the integration of the combined arms team.

(3) We generally conducted two mission per day in SIMNET. Though this kept the individual vehicle commanders and crews busy, it overly taxed the staff planning process. The coordinating staff (S2, S3, FSO, ENGR, ALO, S1, S4) would hastily prepare two or more orders instead of methodically going through the detailed planning process necessary to synchronize a plan. Executing one TF mission per day is optimal. This allows time for the staff planning process, reconnaissance, troop leading procedures, rehearsals, brief backs and DAR/AAR's. Platoon and company level operations could be incorporated if needed to round out the training day.

(4) The SIMNET TOC is too clean. Radios always work even if the battle is 35 km distant. There is no need to jump the TOC or maintain local security. Generators don't break down. To make the TOC command and control process more realistic we intend to induce jamming/imitative deception, simulate TOC displacement and retrans/remote radios.

e. MOBILITY COUNTER-MOBILITY/SURVIVABILITY:

SIMNET provides little training in this operational system. Without dynamic terrain and obstacles the ability to shape the SIMNET battlefield is limited. Breaching drills cannot be exercised. The current limitation of SIMNET severely restricts any positive training in these vital areas.

f. AIR DEFENSE:

As with para e above SIMNET offers little benefit in the training of air defense. With no .50 cal capability SAFADS cannot be exercised. A lack of air defense simulators precludes incorporating their movement and overwatch. SIMNET software must be refined so that aircraft appear as either blue (AlOs) or red (say MIG 27 or HIND's).

g. COMBAT SERVICE SUPPORT:

Through SIMNET we exercised CSS planning and reports. This assisted us at the NTC but was of little value when it came to execution. A First Sergeant's vehicle is needed to allow him to bring forward the LOG PAC. If Medic and M88 simulators cannot be provided separately these could be brought forward in package form by the 1SG. SIMNET attempts to simulate CSS play, however "beaming" HEMMT's around the battlefield is much different than trying to push actual LOG PAC's at night.

4. Based upon the [------] SIMNET and subsequent NTC experience we recommend the following prioritized SIMNET refinements. (We consider these improvements MUST HAVES).

a. Develop dynamic terrain. This would include:

(1) Greater relief/terrain contour allowing drivers/TC's to seek defilade and use the terrain properly.

(2) The ability to dig or appear dug in.

b. Adopt SIMNET Observer Trainers (OT's). These personnel would advise using units on the capabilities and limitations of the system as well as coach units on doctrinal employmentsand operational tactics, techniques and procedures. They could also lead the AAR's.

c. Incorporate obstacles - This would allow defending units to shape the battle field and attacking units to practice breaching drills.

d. Incorporate limited visibility (night/smoke) capability. This would allow training in the worst case/most difficult command and control situations.

e. Incorporate a dismount capability. Most importantly this must include reconnaissance dismounts (LP/OP, Patrols). Of lesser priority is infantry dismounts. (Reconnaissance dismounts would report only, infantry dismounts would be required to report and kill)

f. A number of supporting vehicles are needed. These simulators need not be fancy. A box with vision blocks (allowing navigation) and a radio is all that is needed. A prioritized list follows:

(1) First Sergeant's vehicle.
(2) FIST vehicle.
(3) Engineer vehicle.
(4) ALO vehicle
(5) Combat Trains (Medic, M88)
(6) Air Defense vehicles.
(7) Enough Bradleys to provide 1 Mech CO (14) and 1 Scout Plt (6-10)

5. The following SIMNET improvements are categorized as nice to have:

a. NBC capability
b. Thermals
c. NTC Terrain

d. Higher Hq cell (an intergrated station with compatible CB radios).
e. Combat vehicle markings
f. Machine guns, M85, M2, Coax, M60, MAG 240.
g. MIG and HINDS

6. CONCLUSION: SIMNET helped [---------] prepare for its NTC rotation. With experience we learned to use SIMNET better. With the NTC experience behind us we know how to get more out of SIMNET. Trainers must understand the limitations of SIMNET. It will never replicate full up maneuver operations but can assist units in achieving a walk or perhaps trot state. To progress to the run state units must deploy to a training area with all attachments and operate full up. As minimum I see a Battalion/TF needing 5 days of training per quarter and each CO/TM needing 2 days per month.

Though SIMNET assisted us greatly at the CO and Plt level it is at that level primarily a direct fire/maneuver trainer. Its potential is maximized as a task force level trainer whereby combat multipliers can be synchronized and battalion command and control affected.

In my estimation SIMNET's best contributions lie in the following areas:

a. Command and Control.
b. Maneuver (especially Co/Plt formations/drills)
c. Reporting.
d. Fire Support Effects
e. Navigation.
f. DAR/AAR's
g. JAAT.
h. Familiarization with M1 crew/individual duties. As we enter M1 Net, my 19E soldiers (drivers especially) may benefit from familiarization with the M1 SIMNET simulators.

//Signed//
[----------]
LTC, AR
Commanding