Training Device Requirement (TDR)
for the
Close Combat Tactical Trainer (CCTT)
11 July 2000

1. Title: Close Combat Tactical Trainer (CCTT).

a. CCTT is a system of computer-driven combat vehicle simulators such as the M1 Abrams Tank, the M2 Bradley Fighting Vehicle, the M3 Cavalry Fighting Vehicle, the Fire Support Team Vehicle, and emulators that control other vehicle models and which work interactively similar to the vehicles and functions they simulate. These simulators and emulators are connected via local area network. The system's computers create a simulated battlefield which, when viewed by soldiers who are using the system, creates the illusion of moving and fighting over actual terrain while operating or riding inside the actual vehicles, and employing the actual weapons systems mounted in or on the vehicles.

b. CARDS reference number: 0222R (Revised 11 July 00)

2. Need:

a. The active and reserve components of the United States Army need the capability to train the total combined arms force on a simulated, fully interactive, real time battlefield. A system is required to train and sustain collective (crew through battalion task force) tasks and skills in command and control, communications, and maneuver, and to integrate the functions of combat support and combat service support units. The trainer must replicate cues and responses of the operational system, with fidelity sufficient to provide for realistic performance of individual tasks within the context of crew operations. This requires the capability to simulate, in real time, the conduct of combat operations in a realistic environment with an appropriate and challenging opposing force that will require realistic individual, crew, and staff actions, and place the stresses of deficiencies revealed in the Mission Area Analysis (MAA) for the close Combat force and detailed in the Mission Area Development Plan (MADP) and Battlefield Development Plan.

b. Additionally, there is a need for the conduct of joint operations, involving other US services and members of the allied forces with whom we routinely operate outside CONUS. This type of simulation will provide a cost-effective means of conducting a variety of combined arms and joint operations. The system will allow individuals, crews, and units to operate in a simulated combat environment, reducing the impact of restrictions of weapons effects safety, terrain limitations, and time, and will assist in overcoming the effects of crew turbulence and training, and ensure more efficient use of their training assets when they train in the field.

3. FUE: 2nd Qtr FY 97 IOC: 1st Qtr FY 98

4. Operational/Organizational Plan

a. The CCTT will be used by active duty and reserve units for the conduct of training in command and control, tactical training, Army Training Evaluation Program (ARTEP) Mission training, and combined arms exercises. The CCTT will be used for selected training events for unit training and institutional instruction (see appendix 4) have selected collective tasks in a fully interactive, real time environment. Wartime factors, such as varying terrain, obstacles, a cluttered battlefield (i.e., smoke, fog, burning equipment), logistics, and indirect fires, will be integral parts of the simulation as will casualty assessment and maintenance failures. Complete exercising of command and control skills in a 360-degree battlefield will be possible on this system.

b. This system will be constructed in modules that will support the fielding of battalion task force, company team, and platoon sets. These configurations will include combat support and combat service support functions fielded in sufficient quantities, by location, to accommodate the training of selected elements of Close Combat battalion task force, company/team, or platoon sized elements in CONUS and OCONUS.

c. The system will be fielded initially in platoon and company team sites.

(1) Certain of these sites will expand to battalion task force size based upon subsequent Department of the Army directed upgrades. These upgrades will be based on future funding and procurement decisions, which will allow an increase in the number of modules and supporting hardware/software required to conduct battalion task force level training.

(2) Since the initial sites do not have a battalion task force's worth of manned modules, battalion-level task force training will require workarounds. One way to accomplish battalion-level task force training is to have two companies (down to crew level) in manned modules and one company as a semi-automated force (i.e. a computer generated company). Another way to realize battalion-level task force training is to man all available simulators down to only platoon level (i.e. platoon leaders in manned modules with the remainder of his platoon as semi-automated forces). Another possibility to achieve battalion-level task force training would be to augment the existing site configuration with assets from the mobile CCTT. Each mobile CCTT can provide an additional platoon's worth of manned modules.

5. Essential Characteristics:

a. System Requirements.

(1) The system must provide the interactive networking of vehicle simulators and command, control, communications and support work stations that represent the vehicles, operations centers, support functions, and weapons systems of a battalion task force, a company team or troop, a platoon, and the Combat Support and Combat Service Support elements.

(2) The vehicle simulators and workstations must be operable by military personnel in the Military Occupational Specialty (MOS) normally found in the unit that is being trained.

(3) The system must allow the initialization, reinitialization, reconstitution, and activation of vehicles into the simulation either individually or in units. It must provide the capability to emplace sections, squads, platoons, company teams, and supporting units at specific coordinates on the simulated terrain in a configuration that is consistent with acceptable patterns of distribution and orientation. The system set up parameters (i.e., unit displacement, weapons systems, controlled supply rates, etc.) will be provided by unit or instructor personnel.

(4) The system must be designed so that military personnel who are intended as the training audience—not those with computer specialties—can initialize, reinitialize, or reconstitute the system or elements of the system within three attempts after training.

(5) The system must allow for the conduct of up to five separate unit operations simultaneously at a site.

(6) Army Aviation simulators (specifically, the Aviation Combined Arms Tactical Trainer – Aviation Reconfigurable Manned Simulator – AVCATT-A) will be developed and tested as separate requirements from the Close Combat Tactical Trainer (CCTT). The AVCATT-A modules along with the future requirements of Fire Support CATT, Air Defense CATT and Engineer CATT will interface and interact with the CCTT, both digital and analog.

(7) The system must contain Built In Test Equipment (BITE) and self test diagnostics.

(8) The system must be modular in design and allow for product improvements and technology upgrades.

(9) The following essential system characteristics will be developed as preplanned product improvements (P3I): P3I requirements to support this revision are detailed in Paragraph 5k.

(a) The system must be interoperable with other simulation systems.

(b) The system must provide the capability to network simulations at widely separate site locations.

(c) The system must provide for the expansion of certain company team sites to battalion task force size, and the configuration of modules and associated equipment in tank heavy, mechanized infantry heavy, and balanced battalion task force sets.

(10) The system must maintain no less than 90% availability during the normal training day for its M1 family of tank simulators, its M2/3 family of fighting vehicles, as well as the dismounted infantry simulator modules.

b. Vehicle Simulator Modules.

(1) There must be simulators to represent the M1A1/M1A2 family of tanks, M2A2 and M3A2 family of fighting vehicles, as well as planned configurations for the M1A2SEP, M1A1-D, M2/M3A2ODS-D and the M2/M3A3, the M113A3 Armored Personnel Carrier, and the M981 Fire Support Team Vehicle (FIST-V). Based upon weapons systems requirements at the time of fielding the CCTT the M2 FIST variant (M2A2-ODS) may be substituted for the FIST-V. Soldiers must be able to identify individual simulated vehicles by vehicle bumper number or the combat vehicle marking system.

(2) The vehicle simulators must represent the physical appearance and functional aspects of the crew compartments and functional controls, and replicate the performance characteristics of the vehicle and weapons systems they simulate. During operation, the crews must be able to perform the individual tasks that support the collective tasks they would normally perform to shoot, move, and communicate.

(3) The simulators must replicate the aural, visual, and tactile sensations and cues normally associated with these activities in the actual vehicles. The simulated vehicle speed and maneuverability must be consistent with the trafficability and profile of the simulated terrain. Those controls that are necessary for the performance of collective tasks must be functional. Those that are not required for the functioning of the vehicle during the performance of collective tasks will be mock-ups. The training developer will provide the material developer with a list of specific controls, which must be functional.

(4) The simulated weapons systems must exhibit the external and terminal ballistics characteristics of the actual weapons. Ammunition, supplies, and fuel basic loads must be selectable as initialization parameters. Primary fire controls and sightings systems must be represented in sufficient detail to allow the use of precision gunnery techniques from the primary sight using normal gunnery mode from a stationary or moving vehicle. These systems must also replicate secondary fire control systems, night vision devices, and thermal capabilities associated with each weapons system.

(5) The system must represent correct vehicle and weapon system operation, movement, and orientation characteristics. The system must represent weapon system primary and secondary armament systems of 120mm cannon, 25mm automatic gun, .50cal and 7.62mm machine gun, and TOW II missiles.

(6) The system must be fitted with vision blocks, sighting systems, and sensors that replicate those on the actual vehicles. The visual resolution of the simulated terrain must be such that true perspectives are maintained as distance to an object increases or decreases. The system must be capable of displaying friendly and threat personnel, vehicles, and weapons effects. An object must appear to be the proper size with distinguishing characteristics for the indicated range as viewed through the optical systems or sensors employed by the weapons systems. Terrain feature clarity must be sufficient to provide authentic depth perception and distant vision. Visual distortion caused by the operation of the simulators must not interfere with visual task performance.

(7) The system must replicate the Single Channel, Ground/Air Radio System's (SINCGARS) communications capabilities. It must allow the unit that is undergoing training to integrate its organic tactical operations center communications and wire communications schemes. The system must allow crewman to use the combat vehicle crewman's helmet for communications, and must replicate the effects of interference, terrain obstructions, and distance on communications. Preplanned Product improvement must include development of jamming for the communications systems.

(8) The simulators must exhibit the effects of deterministic failures consistent with the operating characteristics and capabilities of the actual weapons and equipment; stochastic failures that could occur within the reliability, availability, and maintainability envelope of the actual weapons and equipment; and battle damage caused by enemy and friendly weapons effects in the actual weapons and equipment. The simulators must also replicate fuel and ammunition consumption rates consistent with the systems they simulate, and must respond to emulator stations that simulate resupply, rearm, and refuel functions.

(9) The simulator inside dimensions and arrangements must mimic the weapons system layout in sufficient detail to allow all crew members to operate at any level of Mission Oriented Protective Posture (MOPP).

(10) The simulator must provide a compass capability, presented in degrees, depicting the orientation of the long axis of the vehicle on the simulated terrain to grid north. This capability will be available inside the simulator after the vehicle has been stationary for 15 seconds. The compass for the M981 should present reading in mils.

(11) The simulation must provide a vehicle which will operate on the terrain and represent the operational characteristics of the High Mobility Multipurpose Wheeled Vehicle (HMMWV), provide a horizontal visual, provide multiple channel; voice communications and have the capability to be augmented by a selection of weapons systems including machine guns, M249 SAW, and MK 19 40 mm Grenade Launcher.

(12) The system must provide a panoramic Field of View (FOV) which represents an open or popped hatch for selected shall be a 360 degree horizontal FOV around the center of the vehicle commanders position that will accommodate a vertical FOV of -15 degrees to +40 degrees at 1-power (1x). The panoramic field of view must provide a minimal simultaneous peripheral vision of the 90 degrees either side of the center view or 180 degrees horizontal. The center of view will be selectable throughout the 360-degree horizontal FOV of the commanders position. The popped hatch FOV will provide a selectable binocular vision which replicates capabilities of standard military binoculars and Night Vision Goggles.

(13) The following essential vehicle simulator characteristics will be developed as pre-planned product improvement.

(a) The system must simulate the following vehicles:

1) Future Scout and Cavalry System (FSCS)

2) Future Combat System (FCS)

3) Command and Control Vehicle (C2V)

4) Battle Command Vehicle (BCV)

5) Engineer Breaching System (Grizzly)

6) Bradley Stinger Vehicle (Linebacker)

7) HMMWV Stinger (Avenger)

8) Heavy Assault Bridge (HAB)

9) M9 Combat Earth Mover

10) M88A2 Armored Recovery Vehicle

11) M270A1 Multiple Launched Rocket System (MLRS)

12) Advanced Field Artillery System (AFAS)(Crusader)

13) Advanced Tactical Missile System (ATACMS)

14) M109A6 Self Propelled Howitzer (Paladin)

15) Non Line of Sight - Forward (NLOS-F)/Enhanced Fiber Optic Guided Missile (EFOGM)

(b) The system must accommodate the following equipment modifications and upgrades:

1) Stingray

2) Target Location Observation System (TLOS)

(c) The system must provide automation of selected simulator crew positions.

(d) The simulators must provide visual simulation of infrared, Forward Looking InfraRed capabilities, and enhanced thermal capability.

(e) The system must simulate the use of digital message devices.

(f) The system must simulate other small and medium caliber automatic weapons systems such as the MK19 40mm Automatic Grenade Launcher.

c. Simulated Terrain and Environment.

(1) The system must accommodate terrain databases of 50 by 75 kilometers, with an active terrain radius of 3500 meters around each simulated vehicle.

(2) As funds become available terrain database must simulate terrain that represents Fort Hood, Texas, Korea, Central Europe and the NTC - 29 Palms area, and must display topographic features such as hilltops, valleys, saddles, ridges, depressions, gullies, streams, trails, hillocks, mountains, rivers, fords, forest, roads, man-made structures, and vegetation features representative of these areas. These databases must be selectable. These features must be displayed with sufficient fidelity to allow 95% of the users to recognize them by shape, size, and relationship to other objects and textures. The NTC area constitutes the first priority for terrain development.

(3) The system must provide the capability to selectively represent terrain in detail that will allow the traverse of terrain and the selection of routes that will cover and conceal vehicle movements. This must be consistent with a contour interval of a maximum of 100 meters and a minimum of 10 meters.

(4) The system must provide Universal Transverse Mercator (UTM) Projection map representations of the simulated terrain a 1:50,000 scale.

(5) The system must provide a means by which existing terrain data bases can be modified, and additional data bases can be programmed to represent additional areas of terrain as needed.

(6) The system must provide normal day and night visibility, and exhibit the effects of smoke, fog, haze, dust, weapons flash, terminal ballistic effects of simulated ammunition and explosive ordnance, and precipitation.

(7) The following essential simulated terrain characteristics will be developed as preplanned product improvements

(a) The system must accommodate terrain databases of 75 by 125 kilometers, with an active terrain area of 12,000 meters around each simulated vehicle.

(b) The system must be capable of rapidly processing Defense Mapping Agency digital Terrain Data.

(c) The system must represent mixed agricultural and jungle terrain.

(d) The system must provide the capability to maneuver dismounted units to within meter of objects, obstacles, and vegetation.

(e) The system must simulate the obscuration and trafficability effects of atmospheric conditions and nuclear, chemical and smoke weapons.

(f) The simulated terrain must be dynamic in that it must display the tracks made by moving vehicles, craters and other damage caused by exploding artillery rounds, degraded camouflage, the effects of engineer activities, the construction efforts of dismounted infantry and surface effects caused by precipitation.

(g) The system must simulate the delivery of specific chemical munitions, and must provide audible chemical alarms to warn of their delivery. Following the delivery of a chemical munition, the system must simulate areas of contamination that are consistent with the persistence of the agent and the method by which it was delivered.

(h) The system must simulate the delivery of specific nuclear weapons, and must provide visual/audible cues to warn of their delivery. Following the delivery of a nuclear weapon, the system must simulate areas of nuclear contamination that are consistent with the type of weapon and the method by which it was delivered, and exhibit the effects of the weapon on terrain, communications, and equipment.

d. Dismounted Personnel. (Infantry and Scouts.)

(1) The system must simulate dismounted soldiers in scout sections, infantry squads, and platoon headquarters, who can be made to dismount their vehicles/aircraft to perform reconnaissance, scan 360 degrees, engage point and area targets with small arms and anti-armor weapons, move in selected formations at appropriate rates, interact with mounted crews and with one another, communicate as they would under combat conditions that require them to dismount, and remount their vehicles/aircraft.

(2) The system must provide the capability to select and control the dismount element's position, rate of movement, the weapons with which they are armed, their rates of fire, and the threat targets they engage. The view as seen by the dismounted personnel must be the same as is they were in the position of the dismounted element. The dismounted personnel must have the capability to change from normal field of view to binocular field of view or night vision goggle field of view and back.

(3) The mounted crews must be able to identify their dismounted elements, and the dismounted elements must be able to identify their vehicle.

(4) The system must portray the dismounted elements as teams of individuals, armed with appropriate weapons, and supplied with selectable basic loads. The dismounted elements must be able to engage the enemy with the following weapons:

(a) M16A2 Rifle.

(b) M240B Machine gun.

(c) M249 Squad Automatic Weapon.

(d) Javelin or the Anti-Armor Weapon System - Medium (AAWS-M).

(e) AT4 Antitank Weapon
(f) M203 Grenade Launcher.

(5) The system must provide the capability to replenish and augment ammunition resources from an infantry vehicle, a scout vehicle or a supply vehicle.

(6) The following essential dismounted personnel characteristics will be developed as pre-planned product improvements:

(a) The system must portray dismounted elements in increments of one, two, three, four, five, or six individuals as selected by the dismounted personnel work station operator.

(b) The system must simulate one soldier depicting the anti-armor specialist with the capability to engage threat targets with the Anti-Armor Weapons System - Medium (AAWS-M).

(c) The system must simulate two personnel depicting the forward observer and his radiotelephone operator, with the capability to communicate using normal communications and the digital message device.

(d) The system must simulate three personnel depicting the dismounted fire support team element with the capability to communicate using normal communications and the digital message device.

(e) The system must simulate four personnel depicting the platoon leader, his radiotelephone operator, and the forward observer and his radiotelephone operator.

(f) The system must simulate six personnel depicting the dismounted infantry leader and soldiers.

e. Command and Control, Combat Support, and Combat Service Support.

(1) The system must simulate the Tactical Operations Center (TOC) and the command, control, communications, and intelligence functions normally performed there. The physical configuration of the TOC will be represented by a mock-up of two M577A2 command vehicles arranged in a standard configuration. The TOC must be authentic in shape and size, and must provide an operational environment that resembles that found in a fully operational TOC in a combat situation. The objective TOC module should be of modular design and construction to allow reconfiguration for the C2V or other future Command and Control vehicle types.

(2) The system must simulate the Combat Trains Command Post (CTCP) (also known as the Administration and Logistics Center), and the administrative and logistical functions normally performed there. The physical configuration of the CTCP will be represented by a mock-up of a M577A2 command vehicle arranged in a standard configuration. The CTCP must be authentic in shape and size, and must provide an operational environment that resembles that found in a fully operational CTCP in a combat situation.

(3) The System must provide the capability to emplace the following vehicles on the battlefield so that they are visible, operational and vulnerable at all times to actions by both enemy and friendly soldiers and equipment, and provide their normal functions (fire support, engineer, resupply, refuel, transport, etc.).

(a) The Heavy expanded Mobility Tactical Truck (HEMTT) family of vehicles. (Cargo, fuel service, and wrecker.)

(b) M577A2 Command Post Vehicle.

(c) M113A2 Armored Personnel Carrier.

(d) M1064 120mm Mortar Carrier.

(e) M109A5 and M109A6 Self Propelled Howitzer.

(f) M9 Armored Combat Earthmover.

(g) Heavy Assault Bridge (HAB).

(h) High Mobility Multipurpose Wheeled Vehicle (HMMWV).

(i) M88A2 Armored Recovery Vehicle.

(j) LMTV (M1078/M1079) and MTV (M1083) series trucks.

(k) M270A1 Multiple Launch Rocket System (MLRS)

(l) Command and Control Vehicle (C2V)

(4) The simulated vehicles and their functions must be controllable from work stations, and must be vulnerable to the effects of enemy, terrain and weather, time, and stochastic failures, deterministic failures, and battle damage in the performance of their functions. The system must provide for their emplacement as initialization parameters, and their movement and functions on the battlefield must be controllable by workstation or by slaving to a manned simulator.

(5) The system must allow pre-positioning and dispensing selected supplies and equipment at designated locations or simulated facilities on the simulated terrain.

(6) The system must simulate the operation of the Unit Maintenance Collection Point (UMCP) and represent it as a HMMWV. The operation of the UMCP must be controllable by a work station that is capable of moving the UMCP HMMWV and the battalion maintenance platoon vehicles, replicating communications, and moving, maintaining, repairing, recovering, and evacuating other vehicles in the system.

(7) The system must provide for the representation of the personnel support section operations and the execution of personnel service support functions collocated with the S-4 in the Combat Trains Command Post. It must have the capability to assess personnel casualties on both mounted and dismounted soldiers based on probable weapons effects.

(8) The system must represent the command and control, communications, and support functions of a higher headquarters to the extent that the command group of the unit is using the system can interact with the higher headquarters as they would under combat conditions.

(9) The system must provide for indirect fire support to the ground maneuver forces.

(a) A task force fire support element must be represented as an M577A2 command vehicle with the capability to move about the battlefield and collocate with the TOC, and to perform selected functions of the Advanced Field Artillery Tactical Data System through the use of a simulated Fire Support Command and Control (FSC2) terminal.

(b) The system must provide an indirect fore control center that replicates a Field Artillery Battalion Tactical Operations Center (FABTOC) with communications and control of supporting artillery fire. These capabilities must be selectable to allow for the substitution of fire support element simulators or the use of weapons effects only. The system must have the capability to displace on the battlefield, and to control indirect fire support units in the execution of all types of missions. The fire support of 155 millimeter howitzer and a battery of M270 Multiple Launch Rocket System (MLRS). It must have the capability to assign fire missions by indirect fore platoon.

(c) The system must provide a mortar fire support work station that will compute firing data, control the fires of the mortar platoon, and provide for the movement of the platoon's vehicles on the battlefield. The

system must portray the fire direction center and the vehicles of the battalion mortar platoon as two mortar sections of one M577A2 and three M1064A2mortar carriers each.

(d) Indirect fire weapons effects must be audible and visible to vehicle crews and dismounted elements on the terrain. Impact sounds must be of appropriate volume relative to the distance from each individual vehicle simulator or dismounted element. The system must replicate the audible and visible effects and target damage effects of all 120mm mortar high explosive munitions, 155 millimeter howitzer munitions, Area Denial Artillery Munitions, Remote Anti-Armor Munitions, Copperhead, High Explosive, Anti-Personnel Improved Conventional Munitions, and Dual Purpose Improved Conventional Munitions. M26 Tactical Rocket with M77 basic warhead, Sense and Destroy Armor (SADARM) warhead, Terminal Guidance Warhead (TGW) and Army Tactical Missile System (Army TACMS).

(10) The system must simulate a virtual attachment of the Tactical Air Control Party (TACP) workstation system to any appropriate tactical vehicle type, i.e. M2A2/M2A3, M113A3 or HMMWV vehicle that replicates the TACP vehicle. The virtual TACP vehicle must be capable of moving about the simulated battlefield and collocating with the TOC. The virtual TACP workstation system must provide space for normal TACP operations, and must contain a workstation for requesting close air support and controlling air sorties allocated to the unit. The system must replicate air sorties of A10, and F16 aircraft and typical ordnance loads of these aircraft.

(11) The system must provide an engineer workstation collocated with the TOC, with the capability to simulate engineer mobility and countermobility operations.

(a) The system must simulate the construction of selected armored vehicle defilade positions and infantry fighting positions, emplacement of mines and obstacles, breaching and destroying obstacles with demolitions, engineer equipment and dismounted personnel, mine rollers, mine plows, cleared Lane Marking System (CLAMS), or an appropriate replacement system that is approved by the U.S. Army Engineer Center and Mine clearing Line Charge (MCLIC) systems.

(b) The workstation must portray and control the movement and operations of the M9 Combat Engineer Vehicle, Armored Combat Earthmover, Grizzly Engineer Breaching System, and the Heavy Assault Bridge (HAB).

(c) Engineer activities must be governed by appropriate time constraints and affect operations on the battlefield appropriately.

(12) The following essentials work station characteristics will be developed as pre-planned product improvements:

(a) The system must simulate the emplacement of mines with the FASCAM system, and must cause the mines to be visible on the simulated terrain.

(b) The system must provide an Air Defense Artillery work station with the capability to portray and control the operational capabilities and movement of SHORAD/FAADS systems to acquire, engage, and report aviation targets operating on or above the simulated terrain.

(c) The system must simulate Army Battle Command System (ABCS) as it is integrated in the army system.

(d) The system must provide for the execution of personnel casualties.

(e) The system must simulate the following vehicles and weapons systems:

(1) Stinger.

(2) ADATS.

(3) MLRS.

(4) Command and Control Vehicle.

(f) The system must replicate the Tactical Air Control Party communications system (UHF/VHF/FM).

(g) The system must provide a remote Army aviation support work station that will allow scout, airlift, and attack helicopters to be utilized in conjunction with ground maneuver elements in operational missions. This workstation must allow the operator to acquire, report, and engage targets in a manner that is doctrinally correct. The operator must be able to represent and control aircraft in the conduct of airlift, reconnaissance, medical evacuation, command and control, and fire observation missions.

(h) The system must represent the Ribbon Bridge.

f. Operations Monitor and After Action Review.

(1) The system will provide a means to monitor, record, and play back the events that take place during a unit training session. The system must record unit movement, weapons engagements, hits, kills, ammunition expended, communications conversations, combat support, and combat service support operations in video and data printout forms during the conduct of training.

(2) The recorded data must be time-stamped so that the commander can stop at significant points during the playback to highlight and illustrate important principles.

(3) The system must provide video playback of a Universal Transverse Mercator Projection view of the entire operation on a high resolution video screen, and project the play back onto a standard 60-inch by 80-inch video projection screen with icons and menu controls for scale. The system must also allow the trainer to flag events as they occur to facilitate locating specific events during playback. The system must be capable of superimposing the operations overlay onto the viewing display at the same scale as was used in its creation, and must provide the capability to increase or decrease the scale of the composite view thereafter. The system must provide the capability to play back an exercise at a selectable ratio of 4:1 or greater over real time.

(4) The system must provide for the conduct of up to five independent/simultaneous after action reviews.

(5) The system must provide a horizontal view of the simulated terrain from any selectable perspective and elevation (up to 300 meters above the terrain data base elevation).

(6) The system must provide the capability to freeze or stop an exercise for a during action review and restart the exercise at that point.

g. The simulation must provide semi-automated forces (SAF) with the capabilities to perform all the battlefield tasks and supporting functions that live forces can perform in the simulation with a minimum of human involvement.

(1) Semi-automated forces must replicate both enemy and friendly forces in battalion size units or a distribution of the subordinate elements thereof including tanks, personnel carriers, command and control vehicles, reconnaissance vehicles, forward area air defense weapons, and dismounted infantry and their weapons. These forces will be controlled down to platoon level by personnel who have been trained in their control and employment, and will be indistinguishable from live forces by those participating in training. CCTT SAF will be capable of evolving to the ONE SAF program when that program is ready to come on line. In the interim the CCTT SAF will be upgraded to maintain relevancy and functionality as necessary.

(2) The system must provide SAF elements capable of assuming offensive or defensive roles in the simulation consistent with selected allied or Threat doctrine and tactics.

(3) The system must provide SAF elements to interact under the control of manned commend simulators and to move as simulated adjacent, forward, and rear elements.

(4) The system must provide a SAF work station that will allow the operator to control vehicle movement, formations, weapons employment, and orientation of friendly semi-automated platoon vehicles in support of command field exercises; and to control fire support assets consistent with the deployment of a Threat Regimental Artillery Group (RAG) and supporting elements of the Division Artillery Group (DAG). Employment of these assets must be consistent with weapons systems capabilities and doctrine.

(5) The system must provide for the conduct of fixed and rotary wing aviation operations to include attack, CAS, and lift/airmobile.

(6) The system must provide the capability to emplace vehicles (OPFOR and/or BLUEFOR) in selected positions and execute movement sequences on the terrain for the conduct of preplanned exercises.

(7) Preplanned Product Improvements for SAFmust include; development of SAF to Regimental or brigade level.

h. This simulation system will be finished in fixed site installations of battalion task force size (1 to 150 simulators with support stations), company/team size (1 to 50 simulators with support stations), platoon size elements (4 or 7 simulators with collocated support stations) and mobile platoon versions (4 or 7 simulators with collocated support stations). Environmental protection for the system is required in accordance with the operational parameters detailed in the operational mode summary and mission profile.

i. Mobile and fixed platoon sites do not require the operational environments for the workstations required in the company and battalion size sites. Platoon sites require collocated workstations.

(1) The PSS, Logistics, and Maintenance terminals must be collocated so that all three functional areas can be operated by one individual.

(2) The Fire Support, Close Air Support, Air Defense Artillery, aviation, and Mortar workstations must be collocated so that all five functional areas can be operated by one individual.

(3) The After Action Review work station and next higher headquarters voice communications must be collocated and must be capable of operation by one individual.

(4) The Engineer workstation must be capable of operation by one person.

(5) The SAF workstation must be designed to be operated by one person.

j. The CCTT System must possess the ability to complete 90% of Platoon and 90% of Company/Company – Team Tactical Training Exercises without a system abort. (see Appendix 3 w/update 1)

k. Pre-Planned Product Improvements Growth Potential and System Enhancements: The following improvements and enhancements are required to keep the CCTT system up dated to meet changing requirements.

(1) After Action Review (AAR)

(a) AAR Improvements. Improve CCTT AAR system to include automated training aids, development of a relational database and improved graphical user interface.

(b) Digital AAR. Build upon AAR Improvements described in para 5k (1) above to provide AAR tools for FBCB2 in CCTT.

(2) SAF

(a) CS/CSS Improvements to SAF - Brigade level CSS Functions for resupply and maintenance such as those performed at the Brigade Support Area (BSA).

(b) SAF Stability & Support Ops (SASO) - Add non-combatant cilivans, vechicles, and paramilitary units to the CCTT training environment with supporting SAF behaviors. Do Combat Instruction Sets (CISs) for SASO behaviors.

(c) Standalone SAF - Capability to run CCTT SAF outside and independent of CCTT support environment.

(d) Digitized SAF (messaging) - Provide additional messages as CCTT digitization expands into new areas as far as equipment support (e.g. Army Tactical Command and Control System (ATCCS)), echelon of Training, and unit types. Typically, each new version of Force XXI Battle Command Brigade and Below (FBCB2) software requires significant modification to the supporting SAF software because of message changes.

(e) Digitized SAF (behaviors) - As the definition of the tactics and doctrine of how the Army Battle Command System (ABCS) equipment is used by the Army matures, the SAF will have to be modified to have similar message sending frequencies and other message sending procedures, such SAF performs similar to a manned module using the equipment tactically correct. SAF can be automated to react to some of the messages. Combat Instruction Sets (CISs) can be written for digital units once the "digitized" doctrine documents are developed. The NTC OPFOR uses Information deception behaviors to defeat digitally equipped units, these behaviors can be added to the CCTT OPFOR.

(f) Brigade or Regimental SAF - Provide the ability to control a Brigade/regiment from a single SAF workstation. Increase the level of automation of behaviors to support this. Increase the SAF workstations editors/displays and other tools increasing the operators productivity. Add units and CISs, to support units/vehicles organized at the bridge/regimental level.

(g) ONESAF Integration - Needed to support the integration of OneSAF into CCTT, This effort is projected for the 02-04 time frame after the award of the OneSAF contract.

(h) Aviation Improvements to SAF - Part of AVCATT. Additions by CCTT needed to be backwards compatible to AVCATT in training exercises.

(3) WORKSTATIONS

(a) Reconfigurable Desktop. Ability to rapidly reconfigure desktop workstations to provide mission specific capabilities, e.g, Combat Engineering and Air Defense Artillery.

(b) Initiation of Master Control Console (MCC). Provides an interface between CITT and CCTT MCC. Allows offsite exercise development.

(c) Improved Mortar Ballistic Computer (IMBC) capability.

(d) Q-36/47 Fire Control Radar Workstation. Workstation simulation for artillery and tactical ballistic missiles fire control radar.

(e) ATLAS (Target Acquisition) Workstation. Workstation simulation for tactical intelligence gathering and directing/controlling artillery, mortar, and air strikes.

(4) DIGITIZATION

(a) Force XXI Battle Command Brigade and Below (FBCB2). Digitization of CCTT manned modules (M1A1D, M2A2ODS, HMMWV, FISTV, M113A3) and workstations (SAF, AAR). Includes Enhanced Position Location Reporting System (EPLRS) and Precision Lightweight Global Receiver (PLGR) emulation capabilities.

(b) FBCB2 TIM/INC Implementation. Implement the Tactical Internet Model and FBCB2 interface into CCTT architecture. Provides realistic FBCB2 communications model.

(c) Army Tactical Command and Control System (ATCCS). Provides capability for CCTT/FBCB2 to communicate with ATCCS tactical hardware and software.

(5) TRAINER UNIQUE

(a) TADSS Interoperability (SE Core). Interface control document outlining standards and requirements needed for varying levels of interoperability with CCTT.

(b) Simultaneous CITV/CPH. Provides continuous simultaneous display of the CPH and the Commander's Independent Thermal Viewer for CPH modules.

(c) TSP Development. Development of additional CCTT TSPs to include digital battlefield TSPs.

(d) Virtual to Live Exercise Linkage. Interoperability (via Fixed Tactical Internet or other means) whereas live entities appear as CGF and interact with CCTT entities.

(e) M2(Variant). Ability to reconfigure the CCTT M2 manned module by applying platform specific variant kits.

(f) M1(Variant). Ability to reconfigure the CCTT M1 manned module by applying platform specific variant kits.

(g) Rapid Reconfigurability of Variants. Allows a company/team of variant kits to be applied to variant modules over the course of a 16 hour shift.

(h) Dismounted Infantry Improvements. Addition of voice recognition, hand/arm gestures, and MOUT capabilities.

(i) Reconfigurable HMMWV. Ability to reconfigure the CCTT HMMWV manned module by applying platform specific variant kits.

(j) Long Haul Networking. Simulator connectivity via land line or SATCOM between CCTT sites or between CCTT sites and other institutional training sites.

(6) DATABASES Required.

(a). Geographic Specific Terrain Databases to be developed and fielded :

(1) Ft Hood Database.

(2) Korea Database.

(3) Balkans Database. (KOSOVO)

(4) Fort Knox database including the Fort Knox MOUT training site.

(5) Agricultural & Jungle Database.

(b). The following essential characteristics of simulated terrain will be developed and provided:

(1) The system must accommodate terrain databases of 75 by 125 kilometers, with an active terrain area of 12,000 meters around each simulated vehicle.

(2) The system must be capable of rapidly processing Defense Mapping Agency digital Terrain Data into useable geographic specific terrain data bases in support of training and contingency operations.

(3) The system must represent mixed agricultural and jungle terrain.

(4) The system must provide the capability to maneuver dismounted units to within meter of objects, obstacles, and vegetation.

(5) The system must simulate the obscuration and trafficability effects of atmospheric conditions and nuclear, chemical and smoke weapons.

(6) The simulated terrain must be dynamic in that it must display the tracks made by moving vehicles, craters and other damage caused by exploding artillery rounds, degraded camouflage, the effects of engineer activities, the construction efforts of dismounted infantry and surface effects caused by precipitation.

(7) The system must simulate the delivery of specific chemical munitions, and must provide audible chemical alarms to warn of their delivery. Following the delivery of a chemical munition, the system must simulate areas of contamination that are consistent with the persistence of the agent and the method by which it was delivered. The system must simulate the delivery of specific nuclear weapons, and must provide visual/audible cues to warn of their delivery. Following the delivery of a nuclear weapon, the system must simulate areas of nuclear contamination that are consistent with the type of weapon and the method by which it was delivered, and exhibit the effects of the weapon on terrain, communications, and equipment.

(c). MOUT databases are specific to a location)e.g. Fort Knox) , and replicate the lay out, appearance, and capabilities of the actual site. Simulators, including dismounted simulators, will be capable, as appropriate, of entering, leaving, operating from/within, on, or under atop, buildings (cellars, stairs, rooms, rooftops), bridges, under/overpasses, towers, walls, culverts, sewers, etc. Dynamic buildings and man made objects will be provided that will, at least behave or, replicate the action of the actual MOUT site.

(7) TACTICAL NON-PLATFORM SIMULATIONS

(a) Improved Atmospheric and NBC Environmental Effects. Dynamic atmospheric and NBC environmental effects.

(b) Communications Jamming Effects. Capability to provide BLUFOR and OPFOR jamming effects.

(c) Enhanced Fiber Optic Guided Missile (EFOGM). Implementation of EFOGM anti-tank missile performance characterisitics.

(d) Light Weight Laser Designator (LLDR). Provides Fire Support team (CCTT DI) with lightweight, manportable targeting and laser designation capability.

(e) Brigade TOC. Upper echelon TOC simulation.

(f) Laser Warning Receiver.

(8) TACTICAL PLATFORM SIMULATIONS

(a) M1A2 SEP. Manned module and CGF simulation of the M1A2SEP tank

(b) M2A3. . Manned module and CGF simulation of the M2A3/M3A3 Bradley Fighting Vehicle.

(c) Command and Control Vehicle (C2V). Manned module and CGF simulation of the C2V.

(d) Grizzly/Wolverine. . Manned module and CGF simulation of the Grizzly/Wolvering combat engineering platforms.

(e) M9 ACE. Manned module and CGF simulation of the M9 ACE combat engineering platform.

(f) STRIKER. Manned module and CGF simulation of the STRIKER (HMMWV FIST).

(g) Bradley FIST. (BFIST). Manned module and CGF simulation of the BFIST.

h) Outfit CCTT manned modules with the AN/VIC-3 Vehicular Intercommunications System (VIS).

(i) Avenger. Manned module and CGF simulation of the Avenger (HMMWV air defense platform).

(j) Linebacker. Manned module and CGF simulation of the Linebacker (Bradley air defense platform).

(k) Stingray (Deployed on M2). The Stingray can counter multiple ground and aerial weapons under almost all battlefield conditions by detecting and jamming enemy optical sighting systems before the weapons can be fired.

(l) M1068 TOC Command Vehicle. Manned module and CGF simulation of the M1068 TOC Command Vehicle.

(m) M109A6 Paladin. Manned module and CGF simulation of the M109A6 Paladin.

(n) Crusader. Manned module and CGF simulation of the Crusader.

(o) Future Scout Cav System (FSCS). Manned module and CGF simulation of the FSCS.

(p) Future Combat System (FCS). Manned module and CGF simulation of the FCS.

(q) MLRS. Manned module and CGF simulation of the MLRS.

(r) HIMARS (wheeled MLRS). Manned module and CGF simulation of the HIMARS.

(s) M2A2 ODS. Manned module and CGF simulation of the M2A2ODS.

(t) Battlefield Combat ID (BCIS). Implementation of BCIS control hardware, software, and symbology into CCTT manned modules and DI.

(u) Tank Extended Range Munition (TERM). Modeling of performance parameters of long range tank munitions.

(v) TOW 2B. Implementation of TOW 2B anti-tank missile performance characterisitics.

(9) DISMOUNTED PERSONNEL

(a) The system must portray dismounted elements in increments of one, two, three, four, five, or six individuals as selected by the dismounted personnel work station operator.

(b) The system must simulate one soldier depicting the anti-armor specialist with the capability to engage threat targets with the Anti-Armor Weapons System - Medium (AAWS-M).

(c) The system must simulate two personnel depicting the forward observer and his radiotelephone operator, with the capability to communicate using normal communications and the digital message device.

(d) The system must simulate three personnel depicting the dismounted fire support team element with the capability to communicate using normal communications and the digital message device.

(e) The system must simulate four personnel depicting the platoon leader, his radiotelephone operator, and the forward observer and his radiotelephone operator.

(f) When operating in a MOUT database, dismounted entities will be capable of tactically operating, as appropriate, to include searching, entering, leaving, operating from/within, on, or under, atop, buildings (cellars, stairs, rooms, rooftops), bridges, under/overpasses, towers, walls, culverts, sewers, etc.

(10) SIMULATOR RECONFIGURATION REQUIREMENTS

(a) VARIANTS:

(1) M2(Variant). Ability to reconfigure the CCTT M2 manned module by applying platform specific variant kits.

(2) M1(Variant). Ability to reconfigure the CCTT M1 manned module by applying platform specific variant kits.

(3) Rapid Reconfigurability of Variants. Allows a company/team of variant kits to be applied to variant modules over the course of a 16 hour shift.

(4) Reconfigurable HMMWV. Ability to reconfigure the CCTT HMMWV manned module by applying platform specific variant kits.

(b) RECONFIGURABLE SIMULATORS: Reconfigurable hardware simulators must satisfy the representation and functionality of selected combat, CS and CSS ground systems, both wheeled and tracked and may consider the use of desktop reconfigurable simulators, helmet mounted displays and voice activation in satisfying this capability. The simulators must provide the following capabilities:

(1) Interoperate on the CCTT terrain database, to include moving on the database and firing at other entities on the database with appropriate results.

(2) Provide the required module fidelity based on a task analysis of the functionality of the systems simulated.

(3) Be capable of representing a minimum of three operational systems through reconfiguration.

(4) Be reconfigured and ready for operation in less than two hours.

(5) Simulate the functionalities of the simulated system, such as firing (ballistically correct direct or indirect fires), observing and sensing (using all sensor capabilities), rearming and refueling, moving as an exposed entity, command and control, and maintenance operations, among others.

(6) Provide a 180 degree traversable panoramic view of the battlefield to allow for target acquisition and engagement, as required.

(7) Provide a communications capability simulating that of the system being simulated, to include digital, as appropriate.

(8) Provide aural and visual stimulation, and maneuverability characteristics and capabilities in the simulation consistent with the capabilities of the system being simulated.

(11) The following essential vehicle simulator characteristics will be developed as pre-planned product improvement.

(a) The system must simulate the following vehicles:

(1) Future Scout and Cavalry System (FSCS)

(2) Future Combat System (FCS)

(3) Command and Control Vehicle (C2V)

(4) Battle Command Vehicle (BCV)

(5) Engineer Breaching System (Grizzly)

(6) Bradley Stinger Vehicle (Linebacker)

(7) HMMWV Stinger (Avenger)

(8) Heavy Assault Bridge (HAB)

(9) M9 Combat Earth Mover

(10) M88A2 Armored Recovery Vehicle

(11) M270A1 Multiple Launched Rocket System (MLRS)

(12) Advanced Field Artillery System (AFAS)(Crusader)

(13) Advanced Tactical Missile System (ATACMS)

(14) M109A6 Self Propelled Howitzer (Paladin)

(15) Non Line of Sight - Forward (NLOS-F)/Enhanced Fiber Optic Guided Missile (EFOGM)

(b) The system must accommodate the following equipment modifications and upgrades:

(1) Stingray

(2) Target Location Observation System (TLOS)

(c) The system must provide automation of selected simulator crew positions.

(d) The simulators must provide visual simulation of infrared, Forward Looking InfraRed capabilities, and enhanced thermal capability.

(e) The system must simulate the use of digital message devices.

(f) The system must simulate other small and medium caliber automatic weapons systems such as the MK19 40mm Automatic Grenade Launcher.

(12) Medium Force Capabilities: Upon system definition by the Medium Force proponent, PM CATT will develop, procure, and field on an expedited basis, force development and training/mission rehearsal capabilities for combined arms tactical training of Medium Force mounted weapons systems and infantry support vehicles using CCTT/SE Core as the baseline simulation architecture.

6. Technical Assessments: Fielded applications have demonstrated that the local area networking technology required to perform this type of simulation is a low risk. Basic microprocessor technology is considered a low risk. Improved graphics systems that meet imagery requirements are a high risk. Long haul networking is considered a high risk. The P3I listed in paragraph 5k have been evaluated and are considered medium risk.

7. System Support Assessment: The system will require a government owned, contractor operated, Life Cycle Contractor Support (LCCS) operation. LCCS will include site management, operations, semi-automated forces operators, simulation system instruction, and simulation systems maintenance and logistics. Mobile version transportation requirements will be part of LCCS.

8. MANPRINT Assessment:

a. Manpower/Force Structure Assessment. Institutional systems may require dedicated military/civilian managers/instructors for proper incorporation of tactical instruction into institutional training exercises. Semi-Automated Forces (SAF) operators, which are knowledgeable in tactics and non- -, US tactical doctrine (s) will be required and will be considered a potential contractor fill. It is anticipated that these personnel will be civilian contractors.

b. Personnel Assessment. The system will not affect accessions into user MOS's. The system must not require a change in the skills and knowledge of effected MOSs'. The system will be maintained and repaired by some form of CLS.

c. Training Assessment.

(1) Comprehensive CCTT Training Support Package consisting of several integrated components including: A Train-the-Trainer module/system, a library of structured training scenarios specified by the co-proponents including examples of successfully executed exercises complete with After Action Review (AAR), an automated training management system, an automated exercise authoring tool to build and modify scenarios and exercises. The system orientation training that encompasses system capabilities and the development exercise initialization parameters development must be conducted by the contractor using contractor developed, user validated and approved lesson materials. These materials will be left behind as the training package for instructor and trainers to use in training the units in the development of exercises and use of the system.

(2) The CCTT must minimize the expenditure of training resources.

(3) The CCTT must not cause degradation of individual skill proficiency.

d. Human Factors Engineering (HFE). The operation of the software must be user friendly to the extent that the target audience, with no more training than listed above, can use it. The CCTT will ensure accurate representation of workspace and operators positions in each of the vehicle variants and work area environments.

e. System Safety. The system will comply with applicable industry and Government standards to ensure the system is safe to operate and maintain. The design and function of the system will, when feasible eliminate safety and health hazards over the system life cycle. Those hazards not eliminated through design must be controlled to the degree that safety risks to personnel and equipment are minimized. Potential safety or health hazards requiring procedural or other non-engineering solutions will be included in applicable training texts and operating procedure manuals for the CCTT.

f. Health Hazards Assessment (HHA). Compliance with industry and Government health hazard standards is required. The vehicle simulation models or system components will not present any uncontrolled health hazards to users, operators or maintainers.

9. Standardization and Interoperability: The CCTT will utilize distributed simulation protocols which will facilitate simulators of various services, countries and types to be integrated onto one simulated battlefield.

10. Life Cycle Cost Assessment: Annex A

11. Milestone Schedule:

Event	Date
TDNS Approved	8 October 1987
TDR Approval	3rd Qtr FY 91
MDR I/II ASARC	3rd Qtr FY 91
SIPR (Contract Award)	2nd Qtr FY 92
TT/IOTE	3rd Qtr FY 96
MDR III ASARC	1st Qtr FY 96
FUE	2nd Qtr FY 98
LRIP	2nd Qtr FY 98
IOC	1st Qtr FY 99

Appendix 1 - Rationale

Appendix 2 - CTEA/TDS

Appendix 3 - RAM Rationale

Appendix 4 - Operational Mode Summary/Mission Profile

Annex A - Life Cycle Cost Estimate

Annex B - TDNS

Annex C - Coordination