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Initial Capabilities Document

for

Common Driver Trainer (CDT)

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1.0 Joint Functional Area

This Initial Capabilities Document (ICD) describes potential driver training capabilities to reduce loss of Army readiness due to the death and injury of soldiers and the loss of Army Motorized Vehicles (AMV). The lack of sufficient Army-wide driver training is evidenced by the rising number of serious injuries and fatalities resulting from vehicle accidents attributed to driver error and skill levels. These losses have become significant enough that they are a detriment to Army force readiness. The driving tasks, conditions, and standards (TCS) required for operation in the Current Operating Environment (COE) are too dangerous, difficult, and expensive to train with real equipment in the garrison or in the operational environment. This ICD recommends the use of a Common Driver Trainer (CDT) simulator as part of mix of live, virtual, and classroom training to address these deficiencies.

The CDT is a system training device with variants to be procured, to be defined. The CDT driver training system can reduce training costs and risks, provide Soldiers more experiences on a broader range of driving conditions, and standardize training across Military Occupational Specialties (MOS). A Training Effectiveness Analysis (TEA) conducted by the TRADOC Analysis Center, White Sands Missile Range for the Transportation School on driver training for the 88M MOS validates the use of driving simulators as effective training devices. The Operators Driving Simulator (ODS) has been employed at the Transportation School, and is also being used by the Marines for truck driver training. Following the proven efficiencies in the Stryker Driver Trainer (SDT) series, the CDT is a simulator that is easily reconfigured for multiple vehicles and utilizes a large collection of terrain, weather, and hostile force models.

This CDT ICD supports the following top level training requirements:

- **Joint Operations Concepts (JOC), November 2003, paragraph 5.C.3** states that "Capabilities-based force packages, designated as components and not permanently assigned, will conduct routine training exercises in the live, virtual and constructive (LVC) training environments." Training scenarios should be built around an adaptive and complex opposing force or a dynamic crisis situation that may be conducted in a "free play" environment that stresses Soldiers and leaders to the point of failure." This JOC leads to the use of simulators for driver training, as changes in the COE have required driving conditions and standards be raised to levels that are dangerous to train live with real equipment in garrison or operational environments.

- **TRADOC Pam 525-3-90**, change 2, The United States Army Operational and Organization Plan (O&O Plan), Maneuver Unit of Action, 30 June 2003, paragraph 4.2 states, "To be effective across the full spectrum of operations against an adaptive, learning enemy in any terrain condition, the UA achieves greater empowerment in small unit tactical operations through improvements in conducting individual and collective training that seamlessly links LVC environments." This section of the O&O plan leads to the use of the CDT simulator as an integral part of a live, virtual, and classroom driver training approach.

- **Force Operating Capability (FOC) 10-03: Realistic Training** dictates that "FF training capabilities must, to the maximum extent possible, replicate the OE. … Further, the virtual and constructive environments must provide the realism and feel needed to train individuals, teams, and Units effectively across the spectrum. The following capabilities are critical to achieve this FOC:

- Training that provides realistic replication of weapons and battlespace effects.
- Models and simulations that enable training and mission rehearsal for the full spectrum of operations in a Joint Improvements and Modernization (JIM) environment.
- A synthetic training environment that accommodates training the full spectrum of operations."

The CDT recommended by this ICD supports this FOC with a simulator that supports the full spectrum of operations consistent with the COE.

- **FOC 10-04: Responsive Training Development** dictates that "The end state training development system must have the capability to support shorter cycle times by rapidly capturing and integrating garnered insights and changes, leading to timely and effective training products needed for both individual and collective training for Future Force (FF) jobs. A responsive training development system must be capable of:

  - Producing soldiers who can perform a wide range of tasks,…
  - Conducting comprehensive analysis of FF functions, jobs, skills, and knowledge requirements, and
  - Enabling trainers and training developers to work collaboratively in a distributed environment to rapidly develop training tailored to individual or Unit needs.

  The CDT recommended by this ICD supports this FOC through interfaces with the Synthetic Environment (SE) Core and Objective OneSAF (OOS) as a means of creating scenarios that reflect an evolving COE and distributing these scenarios to all the CDT simulators, where they can be combined with specific vehicle configurations and tailored to the needs of the unit instructor or proponent school.

- **FOC 10-02: Accessible Training** dictates that "Training for the FF will capitalize on emerging technologies to make training readily accessible to soldiers any place, any time. Dispersed soldiers and Units will be linked with one another and with the training institutions through distributed training and integrated LVC training environments." This ICD focuses on the CDT as the cornerstone component of a training approach that uses a integration of live, virtual, and classroom driver/operator training.

2.0 Required Capability

As envisioned in the LVC Integrated Architecture (LVC-IA) ICD, the CDT will support fully trained Soldiers and units. The CDT will provide Soldiers the capability to practice dangerous as well as routine driving maneuvers in the virtual training environment (TE). CDT enables the unit or institution to exercise or rehearse drivers in individual skills in a single or collective environment to support combat operations, stability operations and homeland security. CDT will contribute to developing more qualified and experienced Soldiers. CDT Supports four of the five Joint Functional Concepts (Force Application, Protection, Battlespace Awareness and Focused Logistics).

The CDT addresses key FOC, as presented in the Functional Area Analysis (FAA). These concepts are summarized below, along with implications for driver training and discussions of how the CDT addresses these FOC.

- **FOC 03-01: Mobility** dictates that "Future Force units will possess superior tactical mobility. Platforms will negotiate the majority of surfaces—road, off-road, trails, CBRN

contaminated terrain, water crossing, and narrow gaps. Mounted units must move at greatly improved speeds (at least 50 kilometers per hour)." The implications for Driver Training are more complex tasks for driver training. FOC 03-01 indicates the higher speeds to be expected of manned ground vehicles and the growing complexity of vehicles (particularly in the use of sensor systems to support all-weather operations and command and control systems to support situation awareness for the vehicles) resulting in an increased in cognitive load on the driver.

- **FOC 03-02: Operations in Urban and Complex Terrain** dictates that "the Future Force must have the ability to move under limited visibility conditions. … [Advanced sensors] will allow Future Forces to move under all weather and light conditions, regardless of ambient lighting conditions. These systems must have the ability to adjust rapidly to changes in lighting conditions, negating 'white out' effects normally experienced during close quarter urban operations. Future Force systems must have the ability to move rapidly across open areas, and be highly maneuverable within the confines of the urban battlespace. Systems must have the ability to rapidly negotiate rubble, and reduce/negotiate obstacles, while on the move, and provide in-stride or rapid detection and protection against TIM in the battlespace." The implications for driver training are that soldiers must be able to practice rapid and complex maneuvers in urban and complex terrain while using advanced sensor systems. This kind of training can be done safely and cost-effectively only in a simulator like the CDT.

- **FOC-05-01: LOS/BLOS Lethality** states that a "fusion of fire support effects will permit the Future Force to conduct decisive maneuver, and cause the rapid disintegration and destruction of enemy forces of significantly larger size, without having to employ attrition techniques. These same advanced fire support capabilities will have the range, versatility, and flexibility to protect combat support and combat service support elements, throughout the depth of the extended and nonlinear battlespace." Highly deployable and mobile LOS/BLOS fire support assets are required to permit the Future Force to conduct decisive maneuver to achieve positional gain, which implies that fire support ground vehicles be able to move rapidly throughout the extended and nonlinear battlespace in all weather and terrain conditions. These conditions required highly skilled vehicle drivers to exploit the capabilities and know the limitations of their equipment. The CDT will give the soldiers the chance to practice these maneuvers in a safe environment at a lower cost than live training.

- **FOC-05-02: NLOS Lethality** states that the "dynamic nature of the close fight demands very responsive and agile fires, to ensure maneuver and fires remain synchronized. The Future Force must orchestrate and synchronize a diverse and versatile mix of fires and fused effects capabilities in real time. It must rapidly set the conditions to overwhelmingly defeat enemy conventional forces and asymmetrical threats, in all environments and dimensions, including austere theaters of operations." The fire support elements must be able to travel at the same rate and over the same terrain with the same agility as the maneuver forces, and must be able to move and operate under all the conditions required of the Maneuver units. Thus the driving tasks and requirements facing the Maneuver units will also apply to the NLOS Fire Support units. Furthermore, the NLOS Fire Support units will have different vehicles with more emphasis on supply, meteorological support, and the command, control, and communications required for joint fires linking sensors to shooters. Thus the NLOS soldiers must be able to exploit the capabilities and know the limitations of

all of their vehicle configurations, including supply, target acquisition sensors, meteorological support, and command, control, and communications. The reconfigurable design of the CDT makes training on multiple vehicle configurations operating in the COE feasible.

- **FOC 06-01 Provide Assured Mobility** requires "support for all those actions that guarantee the force commander the ability to deploy, move, and maneuver, by ground or vertical means, where and when desired, without interruption or delay, to achieve the intent." The FOC defines conditions for the maneuver of engineer systems, which in turn identify conditions for training of the drivers/operators for engineer systems. This FOC also highlights the need to detect and avoid or otherwise defeat IEDs and the need to secure supply routes. These requirements are difficult, if not impossible, to train in a live environment safely and effectively, but can be trained with a CDT simulator.
- **FOC-06-02: Deny Enemy Freedom of Action** requires soldiers using systems to deny "the enemy freedom of action[, including] proactive measures to leverage the physical environment to isolate enemy forces, deny key terrain, and deny, impede, or canalize enemy movement, in order to protect friendly forces and their freedom of action, and to place enemy forces in positions of disadvantage." Like the previous FOC, this FOC requires driver/operator training in the use of engineer equipment. Simulators are not currently available to the Engineers for this training; implementation of the CDT can solve this lack.
- **FOC-06-03: Engage and Control Populations** requires capabilities that "facilitate the Future Force commander's ability to conduct rapid and decisive combat operations; deter, mitigate, and defeat threats to populations that may result in conflict; reverse conditions of human suffering; and build the capacity of a foreign government to effectively care for, and govern, its population. Required capabilities include population movement, collection, evacuation, and resettlement controls." This FOC implies that Future Forces must be able to maneuver with minimum likelihood of death, injury, or property damage to foreign populations, even in densely populated urban environments. This requirement is difficult, if not impossible, to train in a live environment safely and effectively.
- **FOC-09-01: Sustainability** requires a "warfighting support apparatus must be capable of maintaining the same OPTEMPO as maneuver forces, in all weather and battlespace conditions. Sustainment must become an integral part of the maneuver commander's battle rhythm, vice an adjunct appendage." This FOC highlights the need for support systems to operate at the same OPTEMPO as maneuver forces. This implies that driving TCS for support units must be consistent with maneuver force requirements and the COE, again requiring virtual training consistent with the capabilities of the CDT.
- **FOC-09-02: Global Precision Delivery** is equipping "the Future Force with distribution enablers that allow rapid transit of multiple classes of supply over vast distances (both surface and air)." It is requiring that "Speed and precision [replace] sustainment by mass. Velocity, coupled with managed distribution and responsive transportation, is replacing stockpiles of supplies and lessening needed services." This FOC also emphasizes the need for sustainment flow anywhere in the battlespace, which implies TCS for support unit driver training that require virtual training consistent with the capabilities of the CDT.

3.0 Concept of Operations Summary

The CDT provides training institutions and units with a highly tailorable, deployable, full-dimension, individual virtual training system with a robust scenario development sub-system and AAR capability. CDT's movement centric design provides Soldiers the ability to train driving and operating skills repetitively; in simulated weather, Urban Operations and complex virtual terrain environments. CDT provides cost efficient, frequent and repetitious training designed to meet the increased skill development requirements for Soldiers operating in increasingly complex operations. It meets the requirement for a home station trainer that enables "Train-Alert-Deploy" levels of training readiness.

The FAA developed for this ICD identified four distinct driver training situations each requiring a different concept of operation, but all sharing the CDT as a common element. These situations and the concepts of operation for them are described in the following paragraphs. These situations are:

- Institutional driver training for MOS with driving critical tasks.
- Institutional driver training for MOS without driving critical tasks.
- Installation driver training for all Soldiers.
- Unit driver training.
- Reserve and National Guard driver training.

3.1 Institutional Driver Training for MOS with Driving Critical Tasks

The CDT is a key element for providing driver training at TRADOC institutions. It is consistent with the COE and is a primary mechanism for standardizing TCS.

Driver training simulators are currently being used to train some MOS that have identified driving critical tasks, namely the 88M Motor Transport Operators, the 19K Abrams Armor Crewman. The CDT will eliminate the stove-piped development of driving simulators for different vehicles, thus saving the US Army significant development and operational costs. These institutions will also benefit from the development of training scenarios based on lessons learned in the COE. Note that the installations where this training takes place, FT Leonard Wood and FT Knox, provide training for multiple MOS using many different vehicles. The rapid reconfigurability of the CDT will give the TRADOC schools at these installations flexibility in scheduling driver training on multiple vehicles.

Other TRADOC institutions with identified driving critical tasks do not have simulators, such as the Field Artillery (FA) School, the Military Police (MP) School, and the Engineer School. These institutions would benefit the most from fielding of the CDT simulators. The range of vehicles, especially at certain schools such as the FA and Engineer schools, suggest a common, reconfigurable materiel platform for driver training that would maximize reuse and also provide the institutions with flexibility in scheduling the training through the reconfigurability of the simulators. Further, when operating and maintenance costs are included, as well as the student / instructor ratios, the return on investment for a CDT increases relative to live vehicle training.[1]

[1] The operation of an actual tank costs about $92 per mile. The total operating costs of high-end 6-degree-of-freedom (DOF) simulator is less than $6 per mile including salaries for instructors and operators as well as maintenance and electricity.

3.2 Institutional Driver Training for MOS without Driving Critical Tasks

The problem for TRADOC schools training MOS that don't have identified critical tasks for driving is getting the resources, particularly the time, for that training. Approaches considered during this analysis include extension of Advanced Individual Training (AIT) to include driving skills and the definition of driver Additional Skill Identifiers (ASI) for MOS with a low density of drivers.

The concept of operation for institutional driver training recommended in this ICD is based on the Army Driving Task Force (ADTF) recommendation of a 40 hour driver training element be included in Basic Training. This training would focus on basic driving skills in the context of general purpose vehicles such as the High Mobility Multi-Wheeled Vehicle (HMMWV). This training would allow Unit commanders to assume a basic level of driver training when making assignments, and would reduce the burden on Battalion commanders and staff for driver training other than delta training and licensing on specific types of vehicles. This approach is consistent with the TRADOC identification of "Operate a Vehicle in a Convoy" as a specified critical Soldier (Warrior) task that is being trained for all soldiers. However, the underlying skill of driving a vehicle is not considered a critical Soldier (Warrior) task.

This approach does not require implementation of ASI for drivers who are low density in a MOS, nor does it require that TRADOC institutions are required to train AIT students who are unlikely to use their driver training skills.

Development of a CDT simulator and installation of copies of this system at multiple TRADOC Institutions are part of the set of solutions that are proposed in the Functional Solutions Analysis (FSA) to deal with the need for better driver training. Three materiel approaches are recommended for Institutions that will not get the fixed CDT simulator facilities:

- Mobile configurations of the CDT simulator, described in more detail in Paragraph 6.2.
- Web-downloadable simulations, described in more detail in Paragraph 6.2.
- Low-cost vehicle add-ons that can recreate the tactical vehicle dynamics on baseline vehicles for reconfigurable live training.

3.3 Installation Driver Training

Army installations will provide the facilities needed for TRADOC school driver training for those schools located at a particular installation, including facilities to house the CDT. The reconfigurability of the CDT will provide flexibility for sharing this resource across multiple TRADOC schools or among schools and Units garrisoned at the installation. CDT facilities at home-station garrison for force projection Units can provide sustainment and new personnel driver training.

The ADTF is recommending a phased demonstration and implementation of Driving Centers of Excellence (DCOE), described in Paragraph 6.1.7. The DCOE will support a mixture of live, virtual, and classroom training.

Army installations are responsible for Driver Safety Training, particularly in regards to safe operation of Privately Owned Vehicles (POV). They use the ASMIS-1 – POV Risk Assessment Tool described in Paragraph 6.1.3 as a means for counseling Soldiers before they leave on extended trips using POV.

3.4 Unit Driver Training

The concept of operation for unit driver training focuses on the following approaches:

- Use of CDT simulators at home-station garrisons equipped with fixed CDT facilities. Garrisons that also host TRADOC schools and/or ARNG Regional Training Sites should have their CDT simulator facilities sized to support Unit sustainment and new personnel training as well as TRADOC school and ARNG training. Reconfigurability of the CDT will facilitate this mix of training.
- Use of mobile CDT configurations as described in Paragraph 6.2 for garrisons that are not equipped with fixed CDT facilities.
- Non-materiel changes that would provide Commanders with the information needed to make informed decisions about driving assignments and to help the Commanders do a better job of conducting driver training.

3.5 Reserve and National Guard Driver Training

Installation of CDT simulators at ARNG Regional Training Sites or allowing their access to other CDT sites (such as FT Leonard Wood, FT Benning, FT Bliss, FT Sill, FT Jackson, and FT Knox that are also Basic Training locations) will allow Reserve and National Guard soldiers to benefit from simulation-based driver training consistent with the COE.

4.0 Capability Gaps

The FAA identifies several specific needs for changing how the Army conducts driver/operator training. These needs include: an increase in mounted missions under difficult conditions that require skilled drivers; a decrease in basic driving skills of recruits; restrictions on terrain, time, instructors, equipment, and supplies that are preventing the TRADOC schools from providing driver training using performance exercises with live equipment that address the unit driver training requirements; an increase in unit OPTEMPO that is making it difficult for unit leaders to provide appropriate driver training; and Army Transformation and Modularity that is making driver training more difficult for the units.

The following capability gaps were identified in the Functional Needs Analysis (FNA) and shown to lead to sub-standard performance in field conditions or to adversely influence accident rates:

- **Driving training inconsistent with COE**. In the COE Unit commanders often require Soldiers to drive under conditions that are not trained or cannot be trained safely using traditional techniques at the Institutions or Installations.
- **Lack of simulator commonalities/reconfigurability and availability**. Expenses associated with research, development, bidding, and acquiring separate simulators for each vehicle type is expensive and redundant in many areas. A driver simulator is not available to large portions of our Institutional, Operational, and Reserve forces.
- **Missing or inconsistent TCS data**. No critical driving tasks are identified for most MOS that may serve as drivers as an additional duty as opposed to their core competency. For some driving tasks, conditions and/or standards are ill-defined and often differ in level of condition and standards detail provided.

- **Inconsistency of driver training requirements**. Requirements documents focus on system tasks and largely exclude driving-related implications of the systems carried on their prime mover.
- **Unit driving assignments**. A Commander may not have information on a Soldier's driving experience, or may not take the Soldier's experience into consideration when assigning driving tasks. Modularity is requiring battalion commanders to deal with task organizations for specific missions that may include new and different vehicles with varying driver training requirements.
- **Inconsistency of driver training implementation**. Reserve and Guard Components face a lack of resources, training environments, and control over training time relative to the AC. The OPTEMPO will continue to constrain live training by units.
- **Non-optimized mix of LVC training**. Because virtual training tools like simulators have not been available to large portions of Institutional, Operational, and Reserve forces, a less than optimal mix of training techniques has been used (i.e., the instructors have built their training around what is available) so they have adapted their training to what they can teach. The appropriate mix of LVC training will differ from one training situation to another.

5.0 Threat/Operational Environment

5.1 Threat to be Countered

While CDT is not specifically designed to counter or target a specific threat, it will assist Soldiers in learning or sustaining driving and operating skills necessary in support of combat operations in a contemporary operational environment. However, the threat to be countered or targeted through use of the CDT are those associated with driving in convoys and unit movements, and operating equipment in an asymmetric COE. The threats which Army drivers/operators must train to address are expected to remain consistent with the COE. Conditions identified in the AUTL indicate that Military Operations in Urban Terrain (MOUT), Stability Operations and Support Operations (SOSO), and night and/or bad weather driving are likely for future conflicts.

5.2 Projected Threat Environment

Threats to CDT include physical threats (e.g., sabotage, espionage, etc), information collection threats (internal and national), data denial or manipulation threats (introduction of malicious codes or viruses), and reactive threats (identification of system capabilities or dependence could increase the possibilities of countermeasures). Future connectivity to telecommunications or satellite networks in multiple distributed locations and the incorporation of commercial technologies also hold inherent threat implications for CDT.

6.0 Functional Solution Analysis Summary

6.1 DOTMLPF Analysis

6.1.1 Doctrinal Solutions

The following gaps identified in the FNA have doctrinal implications:

- Driving training inconsistent with unit driving assignments and COE.
- Missing or inconsistent TCS data.
- Tracking and assigning unit drivers.
- Lack of simulator commonalities, reconfigurability, and availability.
- Non optimized mix of LVC training.

The FSA presented the following doctrinal solutions to these gaps:

- Shift from AR 600-55 to 350-XX to provide the framework for standardizing TCS across MOS. This would allow TRADOC to use existing training review processes and TCS normalization processes (such as Critical Task Selection Boards) to standardize driver training requirements and methods across the Army.

- Include "Operate a Vehicle" as a task to be reviewed by all TRADOC Critical Task Selection Boards. There is a distinction between driving tasks and equipment operation tasks. Driving tasks are related to the mobility of weapon systems, but these weapon systems have other capabilities besides moving, including equipment operation tasks. The ADTF recommends that "Operate a Vehicle" be considered as a potential driving-related task for MOS that may have to drive a vehicle.

- Update TCS to reflect COE conditions and requirements. This requirement can be implemented as part of the review of "Operate a Vehicle" as a candidate driving-related task, and will include review of lessons learned from OIF/OEF as well as AMV accident data compiled by the Combat Readiness Center (USACRC). The TCS related to driving are spread across the TRADOC schools and different equipment development and training programs, particularly for those MOS where driving is an implied task and has not been identified as a critical task for the MOS. The FAA identifies current taxonomies of vehicles, tasks, conditions, and standards oriented to normal operations, but additional work is required to identify the advanced driving skills needed for unique equipment or operations such as convoy operations. Ongoing work to identify driver training scenarios for the SDT can be applied to different vehicle configurations and provide a start on standardized TCS that are relevant to the COE. However, different proponent schools may have their own additional TCS. An example is the Engineer School, which has additional TCS related to excavating, scraping, and building defensive berms.

- Require payload System Training Plans (STRAP's) and Operational Requirement Document (ORD's) to include by reference driver training requirements for their vehicles. This requirement can be implemented as part of the shift from AR 600-55 to 350-XX. This requirement can be used to ensure that Program Managers (PM's) developing payload systems will create the dynamic behavior models needed for simulation of vehicles carrying the payloads. For example, this would ensure that load models for the HIMARS rocket launcher and support vehicle would be created to augment the basic FMTV scenarios of the CDT for training of FA soldiers.

- Eliminating independent development of separate driving simulators that are not built around the CDT "below the waist" configuration as described in detail in Paragraph 7.2. This approach will ensure that the potential life-cycle cost savings of a CDT are realized.

- Use of ASMIS-1 – POV Risk Assessment Tool as a condition for using vehicles for multi-day passes. The ASMIS-1 – POV Risk Assessment Tool is an interactive Web-based

application set up to compute risk assessments for Soldier travel while providing a tool for documenting and counseling Soldiers before they leave on extended trips. Risk assessment is a critical skill for leaders, and this tool, while relevant to reducing POV accidents, can also help to inculcate an important skill.

6.1.2 Organizational Solutions

The following gaps identified in the FNA have organizational implications:

- Driving training inconsistent with unit driving assignments and COE.
- Missing or inconsistent TCS data.
- Tracking and assigning unit drivers.

The ADTF recommends the creation of a Master Driver position, modeled on the Master Gunner program, in the unit TOE. This position would improve Commanders' management and execution of drivers training, qualification and licensing programs. As the complexity and demands of driver training have increased, so has the need to provide commanders with a trained collateral or dedicated staff member who can assist in the management and execution of the unit's driver training, qualification, and licensing program. An alternative is for this position to be defined as an additional duty to be assigned by the Commander.

6.1.3 Training Solutions

The following gaps identified in the FNA have training implications:

- Driving training inconsistent with unit driving assignments and COE.
- Missing or inconsistent TCS data.
- Driver training implementation inconsistent across the Active Component (AC) and Reserve Component (RC).
- Non optimized mix of LVC Training.
- Tracking and assigning unit drivers.

Four training solutions were presented in the FSA as those that will deliver the training that is enabled by the other DOTMPLF solutions:

- The Army Traffic Safety Training Program, a course modeled after the Air Force Traffic Safety Program to teach individual risk management, personal responsibility, driving hazard awareness, defensive driving techniques, accident avoidance, and motorcycle safety.
- An ADTF-recommended 40-hour basic driver training POI on the HMMWV that should be instituted at six Army Training Centers that conduct basic training for the Army.
- The ASMIS-1 – POV Risk Assessment Tool, described above as an interactive Web-based application set up to compute risk assessments for Soldier travel while providing a tool for documenting and counseling Soldiers before they leave on extended trips.
- An optimized mix of live, virtual, and classroom environments used for driver/operator training. The challenge is to identify the appropriate training conditions and assessment standards with respect to specific skills and implementing a gated strategy with a mix of training environments.

6.1.4 Materiel Solutions

The following gaps identified in the FNA have materiel implications:

- Driving training inconsistent with COE.
- Driver training implementation inconsistent across the AC and RC.
- Lack of simulator commonalities, reconfigurability, and availability.

FSA analyses led to three complementary materiel approaches to resolving the gaps identified in the FNA and described in more detail in Paragraph 6.2:

- Virtual simulators for full-task driver training,
- Part-task trainers for driving skills training.
- Equipment enhancements for live driver training.

6.1.5 Leadership Solutions

All of the gaps identified in the FNA have leadership implications. Commanders are faced with increasing OPTEMPO, more unlicensed drivers, a dangerous COE, land and road restrictions as well as other difficulties in maintaining a properly trained and licensed force. The Army's transition to a modular force means that Commanders are responsible for a more dynamic and varied collection of AMV and have to adapt their training to those changing equipment configurations.

The ADTF recommends that the Army transition leadership of the ADTF from the USACRC to TRADOC to more effectively address vehicle accidents and Soldier losses through better training. The proposed training concept requires transition from an integrating agency to an action agency. TRADOC has the doctrinal structure and processes to mature the program from its current initiative based concept to final resolution. TRADOC has been an integral part of the process as a participant from the beginning, and has been instrumental in the development of the Task Force initiatives.

6.1.6 Personnel Solutions

The following gaps identified in the FNA have personnel implications:

- Driver training implementation inconsistent across the AC and RC.
- Tracking and assigning unit drivers.

The personnel implications of the FNA gaps involve inconsistency of driver training implementation between the AC and RC and driver training inconsistent with unit driving assignments. The RC faces a relative lack of resources, training environments, and control over training time. What driver training is given also largely depends on activities taking place during a consolidated event, as soldiers may practice driving on an often makeshift track while staff are planning and others are conducting fire training. Further, training before deployment is done on what is known at the time regarding Field conditions, but once RC forces are mobilized mission-essential tasks prevail.

The creation of ASI's for drivers who are low density in their current MOS, such as the Infantry 11 series MOS, is a possible personnel solution, but it limits the flexibility of unit Commanders. It imposes significant record-keeping requirements on the Army personnel system and requires new instructors and course development for TRADOC schools with low density of drivers per

MOS. Analysis at the Infantry School has indicated that the return on investment is not justified based on feedback from units in the field.

If the unit Commanders want the flexibility in assignment of drivers from low density MOS, then the training is most efficiently done by the units. One approach to reducing the training burden on the units is the creation of a Master Driver position, modeled on the Master Gunner program, in the unit TOE. If this is implemented as an ASI, then the ASI needs to be tracked and a training course would have to be created for the Master Driver position. These changes present an opportunity for "Train the Trainer" possibilities, such as teaching the Advanced Skills Driver Training (ASDT) to the Master Drivers.

The current Unit Level Logistics System – Ground (ULLS-G) data system is inadequate to keep pace with the Army mission. Soldier driving records must be hand-carried between assignments requiring duplication of training when records are lost or destroyed. A database of record in the Enlisted Personnel Records or Defense Training Management System (DTMS) would more efficiently and accurately document driver training records, and provide a historical record of training. This database is a building block for the other training, organization, leadership, and personnel solutions.

6.1.7 Facilities Solutions

The following gaps identified in the FNA have facilities implications:

- Driving training inconsistent with unit driving assignments and COE.
- Driver training implementation inconsistent across the AC and RC.
- Non optimized mix of LVC Training.
- Lack of simulator commonalities, reconfigurability, and availability.

The advanced driving skills that are now being required of Army Soldiers cannot be fully trained with live equipment on publicly accessible roads. Simulators like the CDT are part of an effective mix of live, virtual, and classroom training, but the essential live training and certification process will require driving-oriented range facilities. The ADTF recommends a DCOE concept consisting of:

- A classroom facility capable of providing computer-based training.
- Simulators (fixed base or mobile).
- A HMMWV driving range.
- An ASDT driving range.
- A designated driving course for day, night and night aided (e.g., driving with NVG).

6.2 Ideas for Materiel Approaches

Live or on-the-job (OJT) training is no longer sufficient as the sole training method for soldiers. Cost effective training requires a mix of LVC simulations to meet the training needs identified in the FNA. In the FSA three materiel approaches are presented:

- **Virtual simulators for full-task driver training**. Training in a simulator is safer than training in an actual vehicle without necessarily giving up realism. The CDT is a materiel solution following this approach. A conceptual diagram for the CDT is shown in Figure 7.2-1, emphasizing the combination of a common core system with reconfigurable components to tailor the training to specific vehicle configurations.

The CDT is a system training device with variants to be procured, to be defined. The CDT variants will be associated with particular AMV and equipment configurations as needed to support training. The current focus is on the training of HMMWV variants and configurations including different load and trailer configurations, since these are the AMV that are most commonly driven and are involved in the most accidents. The CDT is intended to support all AMV, to include tracked and wheeled vehicles and combat, combat service support, and engineering vehicles.

The CDT concept is a system whereby all of the Army's driver/operator simulators will be built upon a common platform that will share approximately 80% commonality. The balance of each trainer (approximately 20%) will comprise the platform-specific driver/operator environment, with its associated functional controls. These platform-specific modules will be rapidly reconfigurable into distinct vehicle variants, or will represent the subtleties in different driver/operator controls, within a variant family.

The CDT support system requirements are based on support concepts already in use with the ODS and support concepts being developed for Stryker Vehicle Training Aids, Devices, Simulators and Simulations (TADSS). As has been demonstrated by the Army Tank Driver Trainer simulators, the CDT will likely reduce operating and maintenance costs on actual vehicles.

The need for a motion platform base derives from the highly interactive psychomotor skills associated with driving. Driving depends on a moment-to-moment reciprocal interplay between information from vehicle motion and other relevant information such as visual, auditory, and proprioceptive information. The way conceptual and psychomotor skills are integrated depends on conditions and vehicles, requiring an ability to implement vehicle-specific conditions for training.

The CDT is currently designed to be housed in a permanent facility. However, mobile variants of the CDT are an option for taking the training to garrisons or armories with lower density of soldiers or to deployed unit locations.

- **Part-task / constructive trainers for driving skills training**. Part-task training is motivated by the finding that beginners are overwhelmed by a whole complex task. Instead, a cognitive task analysis is performed and focused training is designed to enable students to learn parts of the task and to integrate them into the whole task. Soldiers are given the right training to actively construct their learning of skills. Specific examples of interactive video systems and desktop trainers are presented in the FSA, systems that provide quantifiable results at a fraction of the cost of high-end simulators.

Basic vehicle operation training required by AR 600-55 can be implemented via web-downloadable simulations. These operations include vehicle familiarization (including dashboard controls and indicator lights), PMCS, startup, shutdown, and radio communications. Concepts for numerous driving skills, both with and without traffic, may be taught via web-downloadable simulations. These concepts include lane changes, rules for intersections, merging, following safely, passing, recognizing and avoiding potential collisions, recognizing potential hazardous conditions, situation awareness, risk assessment, and decision making under time pressure. Using these types of systems, standards can be specified with respect to numerous driving-related performance measurements, including vehicle motions, driver control responses, motions relative to people and other vehicles

moving and stationary, accidents, violations, speed deviations, course deviations, time to collision, use of safety signals, reaction time, and recognizing high risk situations.

Web-delivered simulations can provide quantifiable assessment of driving-related cognitive and emotional elements at a fraction of the cost of high-end simulators. Also important is assessment of driving-related cognitive and emotional elements. Real-time performance assessment downloaded to low-cost PC-based platforms with results uploaded to an Army Learning Management System (ALMS) has the potential to significantly enhance the Army's knowledge of Soldiers' driving capabilities.

Specialized web-based applications such as the ASMIS-1 – POV Risk Assessment Tool are focused on driver/operator skills not normally associated with driver/operator training, such as computing risk assessment for use in documenting and counseling Soldiers before they drive AMV or POV.

- **Equipment enhancements for live driver training**. Hands-on training with actual vehicles enables training defensive driving techniques such as scanning, maintaining space, road hazards, and maneuvering. Two examples presented in the FSA are a modified vehicle to simulate skids in a variety of environmental conditions and actual vehicles with appropriately configured platforms or weighting.

  For instance, one solution (the Skid Monster) is used to modify POV's to allow the driving instructor to induce skids. It is essentially an apparatus that replaces the back wheels of a front-wheel drive vehicle and can simulate skids in a variety of environmental conditions. To train proper steering and evasive maneuvering, controlled braking, and acceleration techniques, the instructor can control the condition and severity of a skid, with the ability to teach skid control without the use of a wet track. A variation on this equipment is being developed for the HMMWV, as many of the accidents in OEF/OIF are occurring because of skids, drivers having to swerve to avoid obstacles, and drivers not understanding vehicle dynamics changes such as shift in center of gravity caused by speed, towing, or extra weight.

  Another solution would involve using actual vehicles with appropriately configured platforms or weighting for live training. For example, a HIMARS Resupply Vehicle normally tows a trailer with additional rockets, drastically affecting the performance characteristics (acceleration, swaying, braking, etc.) and introducing a new set of parameters in maneuvering (corners, parking, etc.). An additional possibility, given the frequency of accidents involved with the use of trailers, would be to extend the ASDT to include driving with trailers. This would provide an introduction to the skills needed to safely operate a vehicle in both towing and non-towing modes.

  Black box technology may also provide vehicle operators and supervisors with enhanced driver performance, quantitative quality assurance, and improved fleet management.

6.3 Analysis of Materiel Approaches

6.3.1 Virtual Training Approaches

In this paragraph the application of the different virtual training materiel approaches is analyzed in the context of the different training domains: Institutional, Unit, and ARNG.

6.3.1.a Institutional Training

The FNA found that MOS with identified driving critical tasks are not training to TCS that reflect the COE, and that the definition of TCS vary across institutions. The FNA also found that separate procurement of multiple driver trainers was limiting the reusability, reconfigurability, and availability of simulators for Army driver training and wasting resources in terms of logistics contractor support and maintenance.

Meanwhile, the FAA found that MOS without identified driving critical tasks are being trained by their gaining units and not during Initial Entry Training. The increased OPTEMPO and lack of time, facilities, and environments for training are hindering units from training to TCS that reflect the COE. The FNA and USACRC data also found that due to the variation in training and experience of Soldiers and the lack of information available to unit commanders on a Soldiers driving experience and training, the unit's driving assignments were not always consistent with the skills of the selected drivers.

The major focus considered in the FSA for improving driver training for MOS with identified driving critical tasks is enabling them to adapt their training to the COE cost-effectively by leveraging the benefits of a CDT. Part of this transition involves standardizing TCS across the schools to reap the benefits of a CDT simulation. As documented in the FAA, the Transportation School and the Armor School are effectively using simulations as part of their training. The Engineer School has special TCS requirements, but will still be able to benefit from use of simulators and is aggressively seeking them due to the costs of using live devices and the limitations of live device use during inclement weather.

The primary emphasis of the non-materiel approaches to institutional driver training for MOS with identified driving critical tasks is creating the environment and mechanisms for standardizing the TCS across the Army and for updating the TCS to reflect the COE. The mechanism considered in the FSA is the transition from AR 600-55 to 350-XX, which will give TRADOC more control over driving regulations and requirements.

The second non-materiel approach is upgrading the environment for live training to make it safe for live training with respect to conditions and standards reflecting the COE. In particular, this means transitioning the live driving from public roadways to driving ranges which provide a safe driving environment under conditions closer to the COE. The DCOE include ranges that support safe live training.

The FNA found that Soldiers are not able to train, or are not trained, on the variety of vehicles that they will be driving once they leave the training base. The range of vehicles, if or when trained at TRADOC schools, suggest a common, reconfigurable materiel platform for driver training that would maximize reuse and also provide the institutions with flexibility in scheduling the training through the reconfigurability of the simulators. Further, when live operating and maintenance costs are included, as well as the student / instructor ratios, the return on investment for a CDT increases relative to live vehicle training.

6.3.1.b Unit Training

The FNA found that driver training is not consistently implemented in different units. The primary reason for this inconsistency is the difference in resources at the different unit locations. The FNA also found that unit driving assignments are not always consistent with the skills of the drivers.

The FSA considered solutions that would provide Commanders with the information needed to make informed decisions about driving assignments and to help the Commanders do a better job of conducting driver training. Three non-materiel approaches are recommended in the FSA to provide the unit Commander with the information needed to make informed decisions about driving assignments: including a Master Driver Position in the Battalion TOE; providing unit Commanders with additional information on soldier driving records using CAC cards or E-MILPO for data capture, as well as access to black box trip recorder information would help them make more informed decisions about driving assignments; and adopting an Assignment-Oriented Training approach using Web-delivered simulations to provide training on vehicle specific tasks such as vehicle controls familiarization and PMCS, as well as situation awareness in vehicles and trip risk assessment.

For unit and reserve training, CDT systems would be provided at major unit garrisons or Regional Training Sites with a high density of vehicles. Mobile CDT systems could be scheduled for training by units or at ARNG locations as well. These approaches would address training needs relative to COE driving requirements, although they would be insufficient without related doctrinal and training changes.

6.3.1.c Reserve Training

The FNA found that driver training is not consistently implemented in different ARNG units. The primary reason for this inconsistency is the difference in resources at the different ARNG locations. The unique aspect of the ARNG training is less time at installations for training, and an increased need for training that can be done at home or in the Armory or Reserve Center. In ARNG armories, live driver training is not going to be consistent with COE conditions and standards. While ARNG units do have some training time at TRADOC institutions, the time available for this training is even more compressed than for AC units. Current OPTEMPO is making it necessary for some ARNG commanders to use OJT for reclassification of ARNG drivers.

The FNA also found that ARNG unit driving assignments, just like AC driving assignments, are not always consistent with the skills of the drivers.

The FSA considered solutions that would provide the Reserve unit commander with the information needed to make informed decisions about driving assignments and to help him do a better job of conducting driver training. The same non-materiel approaches identified for unit driver training are applicable to ARNG driver training, and development of a CDT simulator and fielding this system at multiple Army garrisons are part of the set of solutions.

6.3.2 Part-task / Constructive Training Solutions

For the web-based and part-task materiel approach, two different gaps are addressed:

- By providing unit and reserve Commanders with additional information on Soldier driving records (e.g., using CAC cards or E-MILPO for data capture), as well as quantifiable assessment of driving-related cognitive and emotional elements, Commanders can make more informed management and execution decisions of driver/operator training, qualification and licensing programs. For example, use of the ASMIS-1 – POV Risk Assessment Tool could be used as a condition for using vehicles for multi-day passes. Similarly, real-time performance assessment downloaded to low-cost, readily-available PC-

based platforms with results uploaded to a learning management system has the potential to significantly enhance the Commander's knowledge of Soldiers' driving capabilities.

- By providing web-downloadable, vehicle-specific simulations for familiarization, PMCS, situation awareness, risk assessment, mission rehearsal training, and local hazard training, as well as implementing related doctrinal and training changes, the Army can better identify the appropriate training conditions and assessment standards for given Soldiers with respect to specific skills, and implement a gated strategy for driving assignments. These part-task simulations represent an integral (cost-effective) component of the right mix of training technologies.

6.3.3 Live Training Solutions

Training using vehicle equipment enhancements, such as the Skid Monster and appropriately configured or weighted vehicle platforms, most directly addresses the identified inconsistencies in TCS to which Soldiers are held for different MOS and for different vehicles. Along with related training and doctrinal changes, these live-training solutions will enable Soldiers to safely acquire and practice skills that may be necessary based on actual driving conditions, but that cannot be fully practiced in simulated environments. Development of DCOE at selected Army Installations would provide the range facilities for the live elements of driving.

7.0 Final Materiel Recommendations

The CDT is a virtual driver training simulator system that leverages technology to fill a need for current and future forces training. The CDT can reduce training costs and risks, provide more experiences on a broader range of driving conditions consistent with the COE, and standardize training across MOS. Designed to follow the proven efficiencies in the SDT series, the CDT is a simulator that is easily reconfigured for multiple vehicles and utilizes a large collection of terrain, weather, and hostile force models developed for the SE Core program. The ability for one simulator to model multiple vehicles reduces the inventory and operating costs of vehicles that now must be dedicated to training, as well as providing economies of scale as compared to the costs of developing and fielding simulators for each vehicle type in the Army fleet. A CDT system that provides a common platform for all of Army's driver/operator full task virtual simulators would share approximately 80% commonality, with approximately 20% involving platform-specific functional controls (see Figure 7.2-1). The need for a motion platform base derives from the highly interactive psychomotor skills associated with driving. Driving depends on a moment-to-moment reciprocal interplay between information from vehicle motion and other relevant information such as visual, auditory, and proprioceptive information. The way conceptual and psychomotor skills are integrated depends on conditions and vehicles, requiring an ability to implement vehicle-specific conditions for training.

The CDT is integral component of a progressive driver training strategy recommended by the ADTF that leverages common simulation technology with flexibility to support appropriate mixtures of live, virtual, and classroom training.

7.1 Non-materiel Recommendation

The following non-materiel recommendations are based on the strategy recommended by the ADTF.

7.1.1 Conversion of AR 600-55 to TRADOC 350-XX

The conversion from AR 600-55 to 350-XX will provide the framework for standardizing TCS across MOS. This would allow TRADOC to use existing training review processes and TCS normalization processes (such as Critical Task Selection Boards) to standardize driver training requirements and methods across the Army. This standardization needs to be implemented in parallel with the definition of a common set of scenarios that reflect the COE, so that the end-state is a CDT that can serve the needs of the widest range of TRADOC proponent schools, Unit sustainment training, and ARNG training with minimal modification. In particular, this doctrinal change would enable TRADOC to develop vehicle configuration models for payload systems that are carried by common vehicles such as the HMMWV and induce unusual vehicle responses that require specialized training.

A related TRADOC effort is identifying "Operate a Vehicle" as a task to be reviewed by all TRADOC Critical Task Selection Boards. This requirement would be consistent with the TRADOC identification of "Operate a Vehicle in a Convoy" as a specified critical Soldier (Warrior) task that is being trained for all soldiers. However, the underlying skill of driving a vehicle is not considered a critical Soldier (Warrior) task.

7.1.2 Inclusion of Driver Training in Basic Training

Inclusion of driving as a basic warrior skill is the most far-reaching recommendation. This recommendation is based on feedback from the ADTF on the most effective way of providing Unit Commanders with the flexibility that they need for choosing drivers given the limitations of OPTEMPO on their ability to train drivers as part of an extended mission.

7.1.3 Driving Centers of Excellence (Recommended for Further Analysis)

The advanced driving skills that are now being required of Army Soldiers cannot be trained with live equipment on publicly accessible roads. The essential live training and certification process will require driving-oriented range facilities. The ADTF recommends selected Installations as Army DCOE, with a Proof of Principle funded in FY06 and tested at FT Leonard Wood using the MP AIT driver training. These DCOE will provide the live practice range, ASDT range, a standardized HMMWV range and virtual simulators for driver training at both AC and RC training locations. The DCOE provide the facilities for tailoring the mix of live, virtual, and classroom training to the needs of an installation.

7.1.4 Increased Use of ASMIS-1 – POV Risk Assessment Tool

While the ASMIS-1 tool itself is web-based, use of the tool has doctrinal implications. A non-materiel approach that will support the materiel development is creation of policies on feedback and record-keeping using ASMIS-1. ASMIS-1 is used as a requirement for obtaining off-post vehicle passes. Only a small percentage of the supervisors are tracking completion of the tool as a requirement for the passes, which reduces the effectiveness of the tool as a training device.

7.1.5 Personnel driver training records.

The current ULLS-G data system is inadequate to keep pace with the Army mission. Soldier driving records must be hand-carried between assignments requiring duplication of training when records are lost or destroyed. A database of record in the Enlisted Personnel Records or DTMS would more efficiently and accurately document driver training records, and provide a historical

record of training, to include training done on the CDT. This database is thus a building block for the other training, organization, leadership, and personnel solutions.

The ADTF suggested using black boxes to provide vehicle operators and supervisors with the means to leverage technology for enhanced driver performance, quantitative quality assurance and improved fleet management (safety, maintenance, cost). Referencing black box usage by the Air Force and by airlines, the ADTF noted that technology currently has the capability for enhancing vehicle operations – and driver safety either passively or actively – through warning devices, interventions, and via accident reconstruction. Though current and legacy fleets would require add-on devices, future vehicle fleets can be expected to have such embedded instrumented devices. Providing unit Commanders with access to black box trip recorder information would help them make more informed decisions about driving assignments.

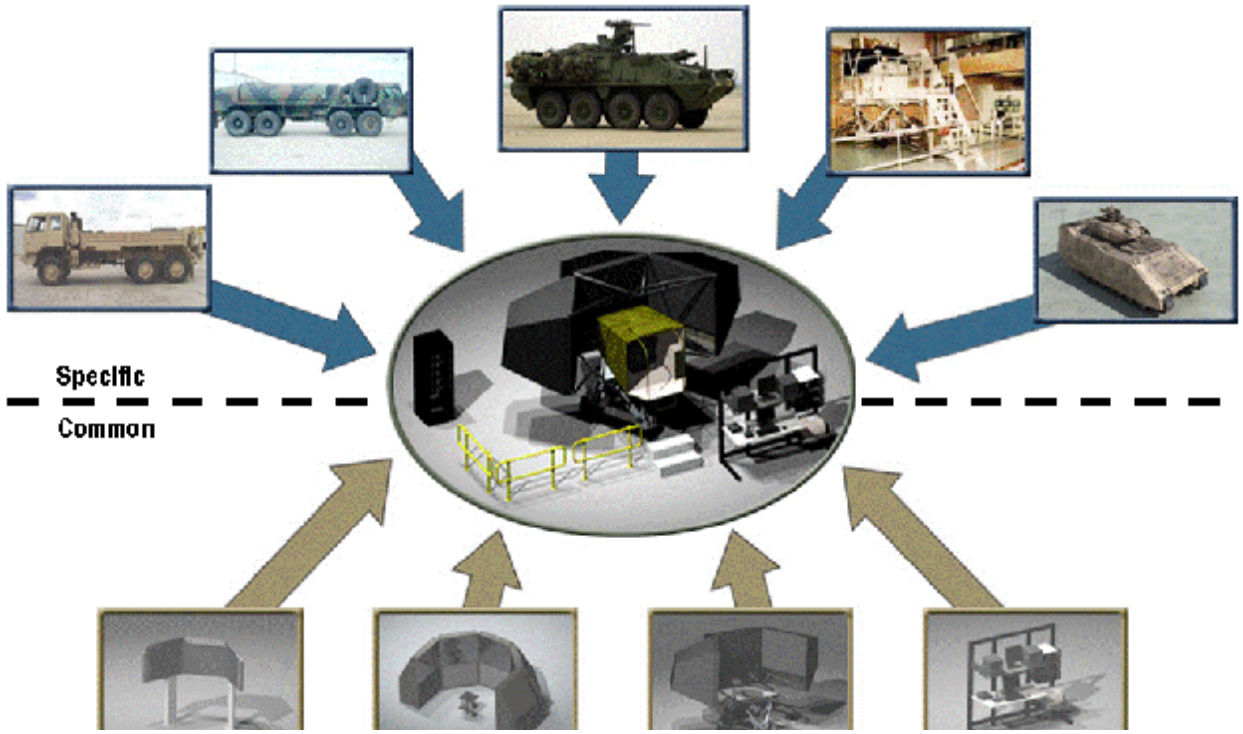
7.2 Materiel Recommendations

The CDT is a key element to providing training that is consistent with the COE and is a primary mechanism for standardizing TCS across TRADOC institutions. The CDT will eliminate the stove-piped development of driving simulators, thus saving the Army significant development and operational costs. The rapid reconfigurability of the CDT will give TRADOC schools and Army installations flexibility in scheduling driver training on multiple vehicles.

As shown in Figure 7.2-1, the CDT will interface to the LVC IA via SE Core and OOS. The CDT will be able to leverage OOS models of the COE as a method for continuous updates to keep it relevant to the COE. Through the OOS interface the CDT can be linked with other HLA-compliant simulations such as CCTT or VCCT to provide individual training in a broader collective training environment.

The reconfigurable nature of the CDT will allow it to be optimized to the training required at the specific site. For example, FT Lewis and FT Wainwright CDT systems may be optimized for Stryker and HMMWV training, while the FT Leonard Wood site may be optimized for Engineer vehicle, Truck, and MP vehicle training.

A coherent cohesive approach to the fielding and use of a CDT is required by the Acquisition,



Training, Combat Development, communities in order to fully realize the potential of this system. The Milestone Decision Authority should recommend an Integrated approach to development and fielding to include an already completed Training and Doctrine Command Implementation Memo and a similar document authored by the Office of the ASA-ALT.

Figure 7.2-1: The reconfigurable design of the Common Driver Trainer provides flexibility for Army Institution, Garrison, and ARNG Armory training.

7.3 Analysis of Alternatives

The analysis of alternatives in the FSA focuses on the appropriate mixtures of live, virtual, and classroom training for institutional, unit home-station, deployed unit, and ARNG training.

The primary strategy recommended for improving Army driver training is to adapt the training to COE cost-effectively by leveraging the benefits of a CDT. Live training on the variety of vehicles and configurations across the range of COE conditions is not safe nor economically feasible at TRADOC institutions, unit garrisons, deployed units, or ARNG armories.

Interactive multimedia products that are downloaded over the Web can provide low-cost familiarization with AMV, driving tasks, and related information (such as risk assessment data for trips) when live vehicles and instructors are not available. The CDT can provide for the acquisition and practice of specific skills for AMV under loading, weather, night driving, and other conditions. The CDT can provide realistic practice of driving skills and, given unit support, validations of certain skills.

Live training has to remain a key element of driver training and licensing. The ADTF recommends a DCOE that includes driving ranges for HMMWV basic skills, ASDT, and day, night and night aided (e.g., using NVG) driving.

7.4 DOTMLPF Implications

Driver training has become a critical skill for the FF as the FF strategy has evolved to a highly mobile expeditionary force that uses the cover of night and bad weather to overcome an asymmetric enemy fighting in urban or otherwise restricted terrain. The need for driver training has been accentuated by the OEF/OIF experience. The current Army driver training approach is designed for a peacetime army, where there is time in the Units for driver training and where Army vehicles can be used as available in the motor pool and on roads within Army installations to provide training and testing. However, changes in FF strategy necessitate training in conditions that are unsafe for live training in tactical vehicles, and current unit OPTEMPO makes it difficult to provide proper driver training as an individual skill in the units.

The FSA solutions together in the right mix lead to cost-effective driver/operator training. To achieve best results using the materiel approaches, though, requires corresponding doctrinal, training, organizational, facilities, and other solutions. The FNA and FSA identify the following examples of mixtures of DOTMLPF approaches:

- **ADTF methodology for standardizing driver training**. The ADTF's proposal involves a Traffic Safety Training Program, standardized training packages utilizing IMI, graduated, simulated scenario-driven exercises, and designated ranges and courses.

  Part of this methodology is doctrinal, particularly for the simulators, as it involves the definition of TCS related to driving across different schools and different equipment

programs, particularly for those MOS where driving is an implied task and has not been identified as a critical task for the MOS. As described in the FAA, there are taxonomies of vehicles, tasks, conditions, and standards oriented to normal operations, but not to the advanced driving skills needed for unique equipment or operations such as convoy operations.

Part of the methodology involves personnel. The FSA analysis reinforces the difficulty of finding the time for driver training for MOS without identified driving critical tasks. Training developers and instructors at the TRADOC institutions are using their experience and professional judgment to weigh driving tasks against other training requirements specific to the MOS. Adopting an Assignment-Oriented Training approach using web-delivered simulations to provide training on vehicle specific tasks such as vehicle controls familiarization and PMCS, as well as situation awareness in vehicles and trip risk assessment can reduce the instructor time burden for units in preparatory training, but does not eliminate the need for live training and hands-on validation of skills for licensing.

The ADTF has also recommended a basic driver training POI on the HMMWV to be instituted at six Army Training Centers that conduct basic training for the Army. The training will address vehicle-related accidents with a standardized driver education program to include individual risk management, personal responsibility, driving hazard awareness, defensive driving techniques, accident avoidance, and motorcycle safety. In order for the materiel solutions to be effective, training POI will have to be adapted to leverage the available TADSS.

- **Multi-phased implementation**. CDT is designed primarily for garrison training facilities to train Soldiers to drive or operate Army vehicles and equipment. CDT will support driver training requirements for combat arms, combat support and combat service support Soldiers and units at all major Army installations, training institutions, as well as the ARNG and Army Reserve.

  A multi-increment development strategy is planned for the CDT. In Increment I, CDT systems will be installed to support the Active force's Institutional training missions based on requirements identified by the proponent TRADOC institutions. These systems will be sized with enough capacity to meet the local TRADOC institution driver training throughput requirements and to support the ARNG and Reserve throughput requirements for those ARNG and Reserve units that use the institution as a regional training site. This increment will also leverage ongoing Stryker vehicle driver training requirements and resources to provide Active Force Operational training missions.

  In Increment II, CDT systems will be installed to additional TRADOC institutions, as well as Active force's Operational training missions based on requirements evolving from Army Modularization and Unit Mission Training Plans (MTPs). If deployed into joint operational areas, CDTs will be located in a secure rear area.

- **Training support system requirements and standards**. All maintenance will be performed by Life Cycle Contracted Support (LCCS). Support equipment and test, measurement, and diagnostic equipment (TMDE) identified by the original equipment manufacturer (OEM) and procured to support the system will be maintainable and supportable by LCCS level operator/maintenance personnel, and maximize commercially equivalent tactical equipment when practical/cost effective. Documentation required to

operate and maintain support equipment, whether commercial or OEM unique equipment, will be provided.

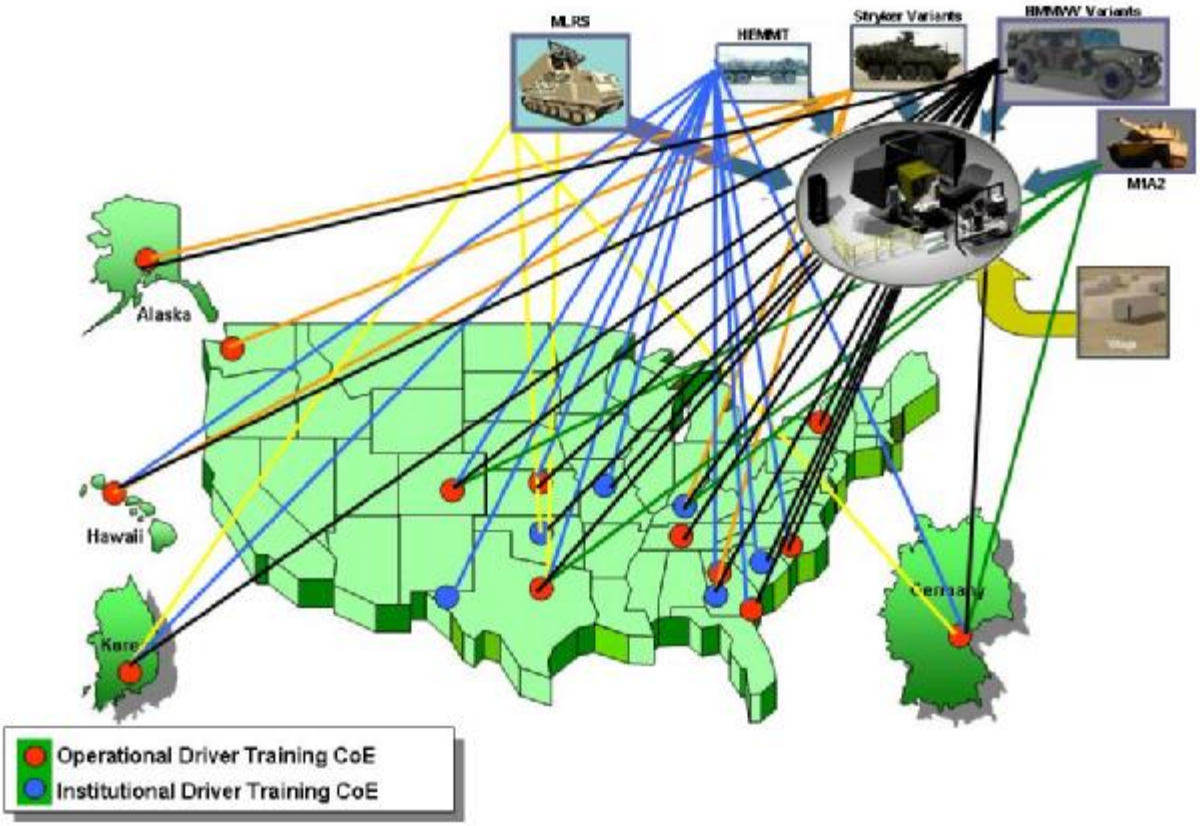
CDT will use SE Core to draw support from or contribute to the Common Virtual Environment (CVE), which will link virtual simulation systems to the LVC Training Environment (TE) through the LVC-IA. CDT will normally operate independent of other virtual systems and reside in a climate controlled fixed or mobile facility/shelter/container. Training will be conducted by Institution, Installation, or unit instructors. CDT shall be operated and maintained by Life Cycle Contracted Support (LCCS). LCCS will include site management, operations, Semi-Automated Forces (SAF) operation, simulation system instruction, and simulation systems maintenance and logistics support.

- **Ensuring that payload STRAPs and JCIDS documents include driver training requirements for the vehicles which carry them**, hence that the PM's include the costs of acquiring simulations like the CDT to reflect the vehicles that are transporting their systems. For programs that are developing systems carried on standard platforms (such as the Phoenix Satellite System, which is developing a payload and a trailer for the HMMWV), the PM would provide the data on weight, center of gravity, etc., that would be used to configure the CDT simulator for that system and fund the CDT software upgrade to simulate that payload.

Appendix A – Integrated Architecture Products

- OV-1.
- STRAP.

OV-1



Notes

The CDT is a key element to providing training that is consistent with the COE and is a primary mechanism for standardizing tasks, conditions, and standards across TRADOC institutions. The CDT will eliminate the stove-piped development of driving simulators, thus saving the US Army significant development and operational costs. The rapid reconfigurability of the CDT will give TRADOC schools and Army installations flexibility in scheduling driver training on multiple vehicles.

The CDT is closely linked with the Synthetic Environment Core project, which is developing Virtual Training for Objective One SAF. The CDT will be able to leverage Objective One SAF models of the Current Operating Environment (COE) as a low-cost method for continuous updates of training to keep it relevant to the COE.

The CDT sites will be located at proposed Driving Centers of Excellence that have been aligned with the primary IET sites where TRADOC institutional training is conducted for soldiers that will be drivers. DCOE are also proposed for key Power Projection Installations to support Unit training. Many of these locations are also the locations of ARNG Regional Training Sites, so they could support Reserve Component training, as well.

The reconfigurable nature of the CDT will allow the DCOE to be optimized to the training required at the specific site. For example, the Ft. Lewis and Ft. Wainwright CDT systems will be

optimized for Stryker and HMMWV training, while the Ft. Leonard Wood site will be optimized for Engineer vehicle, Truck, and Military Police vehicle training.

STRAP

1.0 Capabilities Description

The Common Driver Trainer (CDT) is a system training device with variants to be procured, to be defined. The CDT variants will be associated with particular Army Motorized Vehicle (AMV) and equipment configurations as needed to support training. The current focus is on the training of High Mobility Multi-Wheeled Vehicle (HMMWV) variants and configurations including different load and trailer configurations, since these are the AMV that are most commonly driven and are involved in the most accidents. The CDT is intended to support all AMV, to include tracked and wheeled vehicles and combat, combat service support, and engineering vehicles.

The CDT concept is a system whereby all of the Army's driver/operator simulators will be built upon a common platform that will share approximately 80% commonality. The balance of each trainer (approximately 20%) will comprise the platform-specific driver/operator environment, with its associated functional controls. These platform-specific modules will be rapidly reconfigurable into distinct vehicle variants, or will represent the subtleties in different driver/operator controls, within a variant family.

Driver training has become a critical skill for the Future Force (FF) as the FF strategy has evolved to a highly mobile expeditionary force that uses the cover of night and bad weather to overcome an asymmetric enemy fighting in urban or otherwise restricted terrain. The need for driver training has been accentuated by the OEF/OIF experience. The current Army driver training approach is designed for a peacetime army, where there is time in the Units for driver training and where Army vehicles can be used as available in the motor pool and on roads within Army installations to provide training and testing. However, changes in FF strategy necessitate training in conditions that are unsafe for live training in tactical vehicles, and current Unit OPTEMPO makes it difficult to provide proper driver training as an individual skill in the Units.

The lack of sufficient driver training is evidenced by the rising number of serious injuries and fatalities resulting from vehicle accidents attributed to driver error and skill levels. These losses have become significant enough that they are a detriment to Army force readiness. The U.S. Army Combat Readiness Center (USACRC) formed the Army Driving Task Force (ADTF), which is currently developing a strategy to address this issue. Section 1.2 of the Functional Area Analysis (FAA) provides more narrative detail on driver training needs and the situations which have given rise to these needs.

The driver training strategy is described in Section 1.3 of the FAA, with the following key elements:

- Use the JCIDS process to determine and document CDT requirements.
- Develop and use a reconfigurable driver/operator trainer to minimize implementation costs.
- Leverage ongoing driver training simulator development.
- Develop driver/operator training implementation strategies to benefit MOS that do not currently have documented training requirements.

2.0 Target Audience

The Functional Needs Analysis describes the target audience for the CDT in terms of five groups.

2.1 Institutional Driver Training for MOS with Driving Critical Tasks

TRADOC schools are responsible for identifying critical tasks to be trained and for providing the training as part of the One Station Universal Training (OSUT), or Advanced Individual Training (AIT) for the soldiers in the MOS. For some TRADOC institutions, such as the Transportation School, the Armor School, the MP School, and the Engineer School, driving is considered a critical skill and driver training is integrated into their Program of Instruction (POI) for driving. The Transportation and Armor schools are currently using driver training simulators which need to be upgraded for new vehicle variants and improved simulator capabilities. The Engineer School, MP School, and the Field Artillery School are currently evolving requirements for driver training simulators as a part of a mixture of Live, Virtual, and Classroom driver instruction. However, the development and upgrade of driving simulators for their equipment is done separately by each proponent and/or each Program Manager. The development of simulators for new equipment being introduced to the Army can achieve cost savings through a common simulator platform like the CDT.

2.2 Institutional Driver Training for MOS without Driving Critical Tasks

This category of the training audience is the one that stands to gain the most from the CDT. Many soldiers are trained for MOS where driving a vehicle is a secondary task that is implied but not central to the MOS. An example is the 11-series MOS for Infantryman. In most cases, only a small percentage of the AIT graduates of these MOS will be driving a vehicle, and there is no additional-skill identifier (ASI) or other means for the TRADOC schools to identify those soldiers who will be driving as part of their first assignment. Since no critical tasks have been identified for these MOS that are related to driver training, there is no driver training for these soldiers as part of their OSUT, AIT, or Initial Entry Training (IET).

Most MOS do not have driving general purpose vehicles identified as a critical task. In particular, HMMWVs are the most prevalent vehicles in the OEF/OIF theaters of operation and the vehicles most likely to be involved in an accident, but because of their general purpose nature, they do not have specific MOS assigned as drivers.

The ADTF is recommending that a 40 hour driver training element, with basic HMMWV qualification be included in Basic Training. This training would focus on basic driving skills in the context of general purpose vehicles such as HMMWVs.

2.3 Installation Driver Training for All Soldiers in an Army Installation

Soldiers driving Privately Owned Vehicles (POV) have required training at Army Installations, consisting of classroom training on local hazards and trip risk assessment. Required installation driver training consists of 4 hours of Traffic Safety for POV and Motorcycle Safety Foundation (MSF) for motorcycle riders, both of which are DoD directed. POV driver training is a possible application of the CDT, but not the primary application. Installations that serve as Power Projection Platforms are a target location for CDT facilities as a means of sharing driver training facilities across multiple Units of Action, particularly for MOS that do not have driving critical tasks identified but for which the current environment fails to support traditional driver training and skill sustainment methods.

2.4 Unit Driver Training

Active Component units are a large potential audience for driver training that includes a simulator. AR 600-55 specifies that Battalion commanders are responsible for issuing driver's licenses, and these licenses are specific to the vehicle or class of vehicles. The implementation of these requirements is left to Unit Standard Operating Procedures (SOP). Units are unable to provide training consistent with the Current Operating Environment (COE) across the range of vehicles in their motorpools, and could benefit from access to CDT systems.

2.5 Reserve and National Guard Driver Training

Reserve Component units are another key audience for driver training. Many mobilized Army National Guard (ARNG) soldiers arrive in support of OEF/OIF operations not duty MOS qualified for driving (e.g., 88M MOS) and are often trained through an on-the-job training (OJT) program in order to improve the readiness ratings of transportation and truck Companies and Battalions.

ARNG reserve centers and armories typically provide driver training as part of another event. However, each local (armory) Unit commander has his or her own way of training and, because they are limited resources, vehicles are driven under 'normal' operating conditions that do not allow the soldiers to test the vehicles' mechanical limits and do not reflect driving in the COE.

Regional training sites offer some advantages over armories in that they already provide MOS qualification on wheeled and tracked vehicle maintenance training to Army Reserve, National Guard, and active Army forces. Training is provided on primary Army systems such as the HMMWV, PLS, Bradley Fighting Vehicle, and Abrams M1 series of main battle tanks, and on recovery operations and, at some sites, defensive driving.

3.0 Assumptions

- Acquisition strategies are in place to ensure commonality in the development of driver training simulators
- A 40 hour block of driver training is included in Basic Training. This assumption is not a prerequisite for implementation of the CDT program because there are other driver training requirements beyond basic training. However, this assumption will influence the number and location of CDT systems.
- An implementation strategy is in place that will assess the effectiveness of Driving Centers of Excellence (DCOE) and will fine-tune the mixture of Live, Virtual and Classroom instruction supported by the DCOE. The DCOE are a set of facilities that meet basic standards but are modified to fit the training environment at the locations where they are installed.
- CDT simulators are assumed to provide a best practices Virtual component of training for all audiences.
- TRADOC proponent institutions for driver training will agree upon on training scenarios that reflect the COE in terms of mission, TTPs, (for example convoy driving TTP), environments (with more emphasis on urban environments, and night driving), and vehicle configurations and loads.
- In order for the Materiel solutions described below to be effective, training POI will have to be adapted to leverage the available Training Aids, Devices, Simulators and Simulations (TADSS). This is a low risk, since the Army instructors are highly motivated to provide

good training to the soldiers, but the transition to the use of the potential training aids will take time.

4.0 Training Constraints

Constraint Type	*Probable Impact*	*Mitigating Efforts*
Budgetary restriction	• Preventing standardization of training across TRADOC schools. • Preventing training to COE Standards	• CDT provides standardized scenarios for training • CDT simulator supports training to COE standards
Personnel	• OPTEMPO for AC and RC units makes it impossible for units to train drivers to the same standards across the Army and consistent with COE conditions. • Battalions lack a Master Driver TOE position to manage driver training required by AR 600-55	• CDT simulator increases soldier to instructor ratios from 3:1 (live) to 6:1 (CDT) for basic skills training and from 1:1 (live) to 4:1 (CDT) for advanced skills • Distributed or mobile CDT simulators can provide training at centralized sites or take training to remote units.
Number of personnel to be trained	Unit commanders need flexibility for assigning drivers to vehicles, but drivers may be low density in the field	Make basic driving skills part of basic training
Training equipment	TRADOC schools and units are not resourced to train on all AMV variants, loading conditions, and trailer configurations that the soldiers will face in the COE	A single CDT simulator can be reconfigured for any supported vehicle variant, loading condition, and trailer configuration.
Equipment density	Existing simulators are situated at proponent sites with dedicated facilities, and not shared across TRADOC schools.	• Placing CDT simulators at TRADOC schools conducting Basic Training will maximize CDT effectiveness • TRADOC schools where driving is an identified critical task will benefit from shared development and reduced support costs of CDT systems • Mobile CDT simulators can take training to remote units
Training facility requirements	The full range of COE situations cannot be experienced with live training in a single facility. Driving certain vehicles or vehicles under certain loading conditions is not	The CDT can simulate any COE situation.

	permitted on public roadways.	
Special unit and command-unique requirements	Different units need drivers trained for different vehicles with a variety of loads and trailer configurations in a wide variety of COE environmental conditions	A single CDT simulator can be reconfigured for any supported vehicle variant, loading condition, and trailer configuration, and use the full range of COE scenarios
Safety hazards and restrictions	The full range of COE situations cannot be experienced safely with live training	The CDT can simulate any COE situation safely.
Noise abatement	Primarily a problem for ARNG armori in urban locations.	CDT simulators do not produce the levels of external noise that are produced by live training
Environmental	Live training of operator skills for specialized AMV such as Engineer vehicles causes environmental damage	The CDT use of virtual training greatly reduces environmental damage associated with live training
Support services and support contracts	Support costs for AMV are increasing as the vehicles get more complex	• The 80% commonality of CDT equipment will reduce support service costs vice stove-piped simulators • Simulators cost significantly less per driven mile than live vehicles
Commander's guidance: Modularity	• Battalion commanders are faced with using wider range of vehicles • Units may "fall in" on different equipment than what they used for training in garrison	A CDT simulator can be reconfigured for training on difference expected vehicles and vehicle variants.
Commander's guidance: COE	Drivers need to be trained to drive in COE conditions, such as convoys in hostile territory, at night, and through urban areas.	The CDT can simulate any COE situation.

5.0 Training Concept

a. Concept

5.a.1 Multi-phased Common Driver Trainer Implementation

CDT is designed primarily for garrison training facilities to train Soldiers to drive or operate Army vehicles and equipment. CDT supports driver training requirements for combat arms, combat support and combat service support Soldiers and units at all major Army installations, training institutions, as well as the ARNG and Army Reserve.

A multi-increment development strategy is planned for the CDT. In Increment I, CDT systems will be installed to support the Active force's Institutional training missions based on requirements identified by the proponent TRADOC institutions. These systems will be sized with

enough capacity to meet the local TRADOC institution driver training throughput requirements and to support the ARNG and Reserve throughput requirements for those ARNG and Reserve units that use the institution as a regional training site. This increment will also leverage ongoing Stryker vehicle driver training requirements and resources to provide Active Force Operational training missions.

In Increment II, CDT systems will be installed to additional TRADOC institutions, as well as Active force's Operational training missions based on requirements evolving from Army Modularization and Unit Mission Training Plans (MTPs). If deployed into joint operational areas, CDTs will be located in a secure rear area.

5.a.2 Basic Driver Training

In its 25 August 2005 meeting, the ADTF recommended that a 40-hour basic driver training POI on the HMMWV should be instituted at six Army Training Centers that conduct basic training for the Army. What the POI will consist of remains under consideration, however, the ADTF recommended placement of CDT simulators at the six sites for this purpose.

5.a.3 Driving Center of Excellence Evaluation

In order for the Army to initiate "Driving as a Life Skill" and begin reduction of POV and AMV accident rates, a multi-pronged approach is required. The Driving Center of Excellence concept is one facet of that approach.

FT Leonard Wood (FLW) is seen as the DCOE Initial Operating Capability (IOC) in support of a wider Army Vehicle Accident Reduction strategy. FLW already has on and off road driving ranges, an Advanced Skills Driver Training (ASDT) course, simulation usage expertise and a skilled instructor base. Additional funds of approximately $2.5M are needed to: (1) field a Common Driver Trainer Suite (up-armored HMMWV variant) with Contracted Logistic support for 12 months, (2) purchase additional ASDT equipment (HMMWV Skid Monster), (3) minor modification of the infrastructure (Simulator parking and power), and (4) research funds to track study participants.

The concept would use a sampling of Soldiers trained during the first six months following completion of DCOE facilities. The study will track, analyze and report their driving experience and accident rates for 12 months following their graduation from the driving courses comparing their experiences and accident rates with the larger Army.

The research would answer whether: Standard POIs, ranges, and simulators or what mix of these approaches provides the best driver training strategy for the institutional and operational Army; and whether the current methodologies are sufficient. The test site would refine the objective DCOE in terms of: design for standardized ranges, simulator use, and Training Support Packages (TSP's).

DCOEs are envisioned to provide standardized, comprehensive driving skill development using both simulations and hands-on approaches. Virtual Simulations are focused on driver development, and can include scenario based training not available in the local live environment. Virtual Simulations are based on the Common Driver Trainer platform being developed in conjunction with PEO-STRI. Hands-on training will be in the form of both a challenging HMMWV driving range and Advanced Skills Driver Training, which will provide a

comprehensive, standardized program to develop and enhance both AMV and POV driving skills.

b. Training Support System Requirements

The CDT support system requirements are based on support concepts already in use with the U.S. Army Operational Driving Simulator (ODS) and support concepts being developed for Stryker Vehicle TADSS. The CDT will use common software and hardware components. Any unique support equipment will be provided by Contracted Logistics Support. The CDT, and its separable subsystems, shall operate on available power. All trainer equipment shall incorporate safeguards to prevent damage to equipment or personnel.

All maintenance will be performed by Life Cycle Contracted Support (LCCS). Support equipment and test, measurement, and diagnostic equipment (TMDE) identified by the original equipment manufacturer (OEM) and procured to support the system will be maintainable and supportable by LCCS level operator/maintenance personnel, and maximize commercially equivalent tactical equipment when practical/cost effective. Documentation required to operate and maintain support equipment, whether commercial or OEM unique equipment, will be provided.

6.0 Institutional Training Domain

6.1 Institutional Training Strategies

The FNA identifies two institutional training situations requiring different training:

- The MOS that have identified driving critical tasks, discussed in Paragraph 6.1.1.
- The MOS that do not have identified driving critical tasks face a different situation than those MOS that have identified driving critical tasks. Strategies for their situation are discussed in Paragraph 6.1.2.

6.1.1 Institutional Driver Training for MOS with Driving Critical Tasks

The CDT provides training institutions and units with a highly tailorable, deployable, full-dimensional, individual virtual training system with a robust scenario development sub-system and AAR capability. CDT's movement centric design provides Soldiers the ability to train driving and operating skills repetitively; in simulated weather, Urban Operations and complex virtual terrain environments. CDT will provide cost efficient, frequent and repetitious training designed to meet the increased skill development requirements for Soldiers operating in increasingly complex operations and meets the requirement for a home station trainer that enables "Train-Alert-Deploy" levels of training readiness.

The second non-materiel approach is upgrading the environment for live training to make it safe for live training with respect to conditions and standards reflecting the COE. In particular, this means transitioning the live driving from public roadways on TRADOC institutions to driving ranges which provide a safe environment for driving under COE conditions. The Driving Centers of Excellence include ranges that support safe live training. The proposed DCOE locations have been aligned with the primary IET sites as well as Power Projection Installations to support Unit training.

The range of vehicles, especially at certain schools such as the Field Artillery and Engineer schools, suggest a common, reconfigurable materiel platform for driver training that would

maximize reuse and also provide the institutions with flexibility in scheduling the training through the reconfigurability of the simulators. Further, when operating and maintenance costs are included, as well as the student / instructor ratios, the return on investment for a CDT increases relative to live vehicle training.

6.1.2 Institutional Driver Training for MOS without Driving Critical Tasks

The ADTF is recommending that a 40 hour driver training element be included in Basic Training. This training would focus on basic driving skills in the context of general purpose vehicles such as HMMWVs. This training would allow Unit commanders to assume a basic level of driver training when making assignments, and would reduce the burden on Battalion commanders and staff for driver training other than delta training and licensing on specific types of vehicles.

This approach does not require implementation of ASI's for drivers who are low density in a MOS, nor does it require that TRADOC institutions are required to train AIT students who are unlikely to use their driver training skills.

As described in previous sections, development of a CDT simulator and installation of copies of this system at multiple TRADOC Institutions is part of the set of solutions that are proposed in the Functional Solutions Analysis (FSA) to deal with the need for better driver training. Three materiel approaches are recommended for Institutions that will not get the fixed CDT simulator facilities:

- Mobile configurations of the CDT simulator, described in more detail in Paragraph 7.2
- Web-downloadable simulations, described in more detail in Paragraph 7.2.1.
- Low-cost vehicle add-ons that can recreate the tactical vehicle dynamics on baseline vehicles for reconfigurable live training.

6.1.3 Installation Driver Training

The ADTF emphasizes two major responsibilities for Army Installations as part of the solution for driver training gaps:

- Installations will have the primary responsibility for reducing accidents in POV's involving vehicles driven by soldiers assigned to the Installation.
- Installations will provide the facilities needed for school and Unit driver training. In particular, this includes the Driving Centers of Excellence. This would also include the facilities required to host the CDT simulators.

As described in previous sections, development of a CDT simulator and installation of copies of this system at multiple Army Installations is part of the set of solutions that are proposed in the FSA to deal with the need for better driver training. The same three materiel approaches that are presented in Paragraph 6.1.2 are recommended for Installations that will not get the fixed CDT simulator facilities.

6.1.4 Reserve and National Guard Driver Training

Installation of CDT simulators at ARNG and Reserve Regional Training Sites or allowing their access to other CDT sites (such as FLW, FT Benning, FT Bliss, FT Sill, FT Jackson, and FT Knox that are also Basic Training locations) will allow Reserve and National Guard soldiers to benefit from simulation-based driver training consistent with the COE.

6.2 Architectures & Standards

a. Architectures

The CDT is a key element for providing training at TRADOC institutions. It is consistent with the COE and is a primary mechanism for standardizing tasks, conditions, and standards. The CDT will eliminate the stove-piped development of driving simulators, thus saving the Army significant development and operational costs. The rapid reconfigurability of the CDT will give TRADOC schools and Army installations flexibility in scheduling driver training on multiple vehicles. Figure 6.2-1 shows the operational view of the CDT, indicating how the reconfigurability of the CDT can support the differing driver training needs of the different TRADOC schools and the Unit garrisons. The reconfigurable nature of the CDT will allow it to be optimized to the training required at the specific site. For example, FT Lewis and FT Wainwright CDT systems may be optimized for Stryker and HMMWV training, while the FLW site may be optimized for Engineer vehicles, Truck, and Military Police vehicle training.

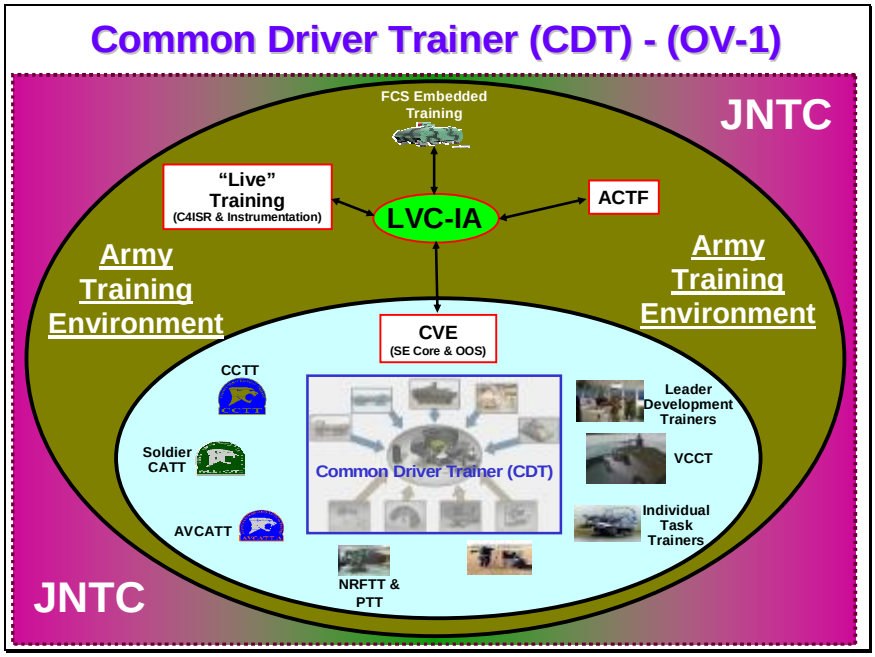


Figure 6.2-1: Common Driver Training Simulation: Operational View

Figure 6.2-2 shows the technical view of the CDT in terms of the reconfiguration approach and the interfaces to the LVC IA via Synthetic Environment (SE) Core and Objective One-SAF (OOS). The CDT will be able to leverage OOS models of the COE as a method for continuous updates to keep it relevant to the COE. The standards underlying the OOS interface include the use of HLA, so that the CDT can be linked with other HLA-compliant simulations such as CCTT or VCCT to provide individual training in a broader collective training environment.

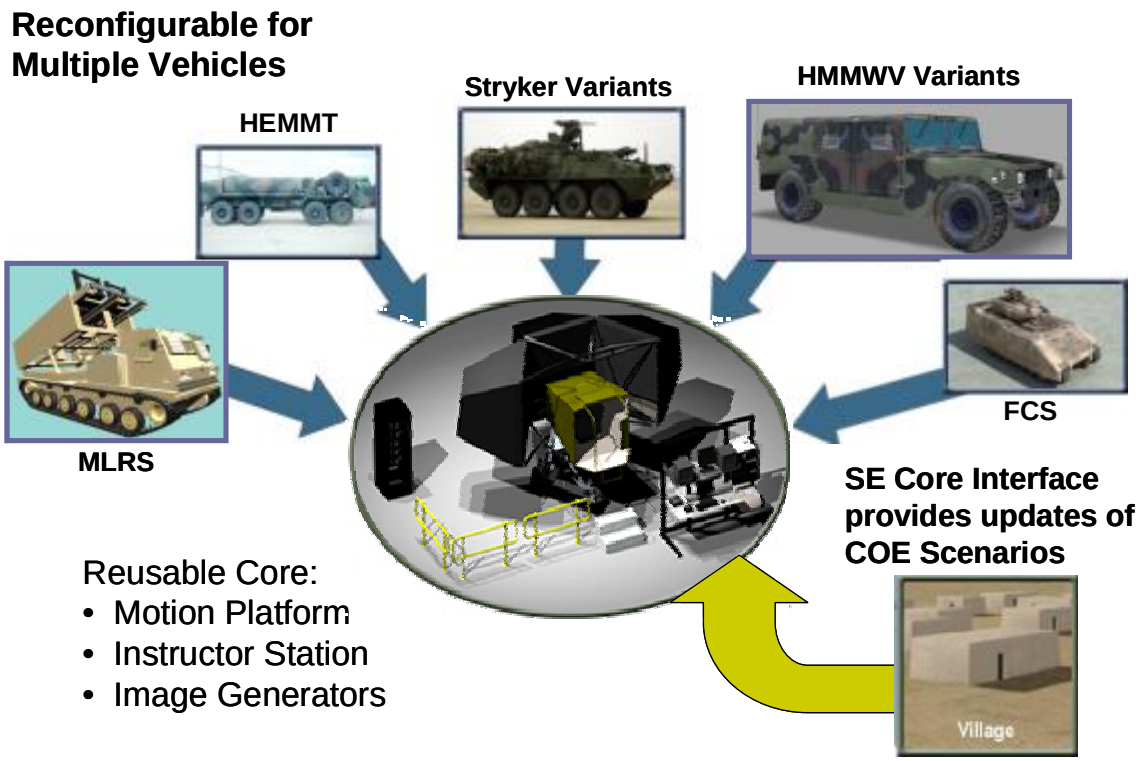


Figure 6.2-2: Common Driver Training Simulation: Technical View

b. Standards

CDT will use SE Core to draw support from or contribute to the Common Virtual Environment (CVE), which will link virtual simulation systems to the LVC TE through the LVC Integrated Architecture (IA). CDT will normally operate independent of other virtual systems and reside in a climate controlled fixed or mobile facility/shelter/container. Training will be conducted by Institution, Installation, or unit instructors. CDT shall be operated and maintained by LCCS. LCCS will include site management, operations, Semi-Automated Forces (SAF) operation, simulation system instruction, and simulation systems maintenance and logistics support.

If required, CDT will exchange information with C4ISR systems through compliance with the Common Training Instrumentation Architecture (CTIA). Interoperability with fielded CATT systems (CCTT and AVCATT-A) and future CATT systems may be required at an undetermined future date.

Technical Rules

- The Live-Virtual-Constructive Integrated Architecture (LVC-IA) identifies relevant standards and specifications for the CDT to ensure interoperability if the CDT is used to support collective training as well as individual training.
- The CTIA identifies relevant standards and specifications for the CDT to allow the CDT to interface with Tactical Systems (such as MSR waypoints extracted from CSS overlays)
- The Army Training Integrated Architecture (ATIA) provides requirements traceability and mechanisms for standardizing tasks, conditions, and standards and linking these to CDT scenarios and the associated TSP's.

Specifications
- SE Core Interface
- Objective One SAF Interface
- HLA Interfaces

6.3 Potential Resource Impacts

Resource Type	*Impact if Not Resourced*	*Efforts in Mitigation of Impact*
Personnel: Instructors and Staff	• OPTEMPO for AC and RC units makes it impossible for units to train drivers to the same standards across the Army and consistent with COE conditions. • Battalions lack a Master Driver TOE position to manage driver training required by AR 600-55	CDT simulator increases soldier to instructor ratios from 3:1 (live) to 6:1 (CDT) for basic skills training and from 1:1 (live) to 4:1 (CDT) for advanced skills LCCS supports operation and Maintenance of systems.
Funds	• Preventing standardization of training across TRADOC schools. • Preventing training to COE Standards and limit miles	• CDT provides standardized scenarios for training CDT simulator supports training to COE standards and supports Unlimited miles and repetitions.
Training Ammunition	Not applicable	Not applicable
Facilities: Classrooms, Ranges, Storage, etc.	• Without driving ranges that can support driving under COE conditions (particularly night driving, and urban day and night driving) drivers will not be trained to COE standards. • Without driving ranges that can support driving under COE conditions, drivers cannot be trained safely to COE standards	• The CDT minimizes the costs and risks of live training by supporting the right mix of live, virtual, and classroom training. The CDT is not a substitute for live training, but extends the range of experiences and reduces the cost of training providing a safe environment for soldiers to learn from their mistakes. • CDT sites need to be supported with classrooms and environmentally conditioned floor space
TADSS	The alternatives to CDT development for driver training are expensive facilities and increased support requirements as well as additional safety risks or not training to COE conditions.	The CDT is the most cost-effective TADSS that meets the need for COE-based driver training.

Support Equipment : Tools, End Items, etc.	To Be Determined	To Be Determined

7.0 Operational Training Domain

7.1 Operational Training Strategy

7.1.1 Unit Training

CDT is designed additionally for garrison training facilities to train Soldiers or maintain their skills to drive or operate Army vehicles and equipment. CDT supports driver training requirements for combat arms, combat support and combat service support Soldiers and units at all major Army installations, training institutions, as well as the ARNG and Army Reserves.

Providing the CDT system at multiple Army garrisons is part of the set of Unit training solutions. Three materiel approaches are recommended for Unit garrisons that are not provided with CDT simulator facilities:

- Access to mobile configurations of the CDT simulator, described in more detail in Paragraph 7.2.
- Web-downloadable simulations, described in more detail in Paragraph 7.2.1.
- Low-cost vehicle add-ons that can recreate the tactical vehicle dynamics on baseline vehicles for reconfigurable live training.

7.1.2 Reserve and National Guard Driver Training

CDT is designed primarily for institutional training facilities to train Soldiers to drive or operate Army vehicles and equipment. CDT supports driver training requirements for combat arms, combat support and combat service support Soldiers and units.

Installation of CDT simulators at Regional Training Sites will allow Reserve and National Guard soldiers to benefit from simulation-based driver training consistent with the COE.

The three materiel approaches described in Section 7.1.1 also address the needs of ARNG and Reserve driver training.

7.2 Architectures & Standards

7.2.1 Interactive Multimedia Instructional (IMI) Products

Web-downloadable simulations for training vehicle familiarization, PMCS procedures, and driving situation awareness skills will provide training in Units using available computer systems. Development of Web-delivered simulations for training on vehicle specific tasks such as control familiarization and PMCS, as well as situation awareness in vehicles and trip risk assessment, would provide the Units with more training options requiring less instructor supervision without adding to the logistics “tail” of the Unit. These simulations can be used in the field without requiring the transportation needed for physical TADSS.

7.2.2 Training Support Packages

The CDT shall fit within a familiarize, acquire, practice, validate approach for operational training. Interactive multimedia (IMI) products will provide familiarization with driving tasks

and relevant information, while simulations will enable acquisition and practice of specific skills for AMV under loading, weather, night driving, and other conditions. The CDT will be available for realistic practice of driving skills and, given Unit support, validations of certain skills.

The CDT shall have the capability to generate training scenarios from the IOS. The IOS shall generate all training scenarios with a degree of randomness that allow the exercises to be different every time they are generated. The training scenarios shall provide an optimum mix of dynamic models, static models and special effects located at random in the visual database to provide a realistic image of the scenario.

7.2.3 The Synthetic Environment Core

SE Core consists of a series of interoperable software and hardware components to enable an Army CVE and integrate virtual simulations to the LVC Training Environment (TE). SE Core is a key element in the Army's Training Transformation plan to link the Future Combat Systems' (FCS) embedded multi-mode (LVC) training capability with Current and Stryker Forces and Joint-Interagency-Multinational (JIM) simulations. It will integrate a common SAF that models the behaviors of Soldiers, units and civilians to approximate the actions/events consistent with the COE. SE Core components are standard virtual visual models, OOS integration, standard rapid terrain database (TDB) generation process, master TDB open format, dynamic terrain, atmospheric effects, Chemical, Biological, Radiological, Nuclear and High Explosive (CBRNE) effects, and integrated AAR. The standard TDB generation process uses automated tools, processes and standard source data to create a non-proprietary, open format, image generator (IG) independent, master TDBs (MTDB) consumable by virtual simulations, within a total development time of 96 hours. Utilizing a read tool and application program interface, the MTDB open format is developed into correlated runtime databases to support the LVC TE and for mission planning/ rehearsal/execution in an operational environment.

7.3 Potential Resource Impacts.

Resource areas considered include:

Type of Resource	*Detailed Information (as Available)*
Personnel (instructors and support staff)	See Paragraph 6.3
Funds	See Paragraph 6.3
Training ammunition	Not applicable
Facilities (classrooms, ranges, storage, maintenance areas)	See Paragraph 6.3
New system's TADSS	See Paragraph 7.1.1 for a description of CDT simulations

8.0 Self Development Training Domain

8.1 Self Development Training Strategy

8.1.1 Web-Downloadable Interactive Multi-Media Driver Training

Basic vehicle operation training required by AR 600-55 can be implemented via web-downloadable simulations like those shown in Figure 8.1-1. These operations include vehicle familiarization (including dashboard controls and indicator lights), PMCS, startup, shutdown, and radio communications. Concepts for numerous driving skills, both with and without traffic, may be taught via web-downloadable simulations. These concepts include lane changes, rules for intersections, merging, following safely, passing, recognizing and avoiding potential collisions, recognizing potential hazardous conditions, situation awareness, risk assessment, and decision making under time pressure. Using these types of systems, standards can be specified with respect to numerous driving-related performance measurements, including vehicle motions, driver control responses, motions relative to people and other vehicles moving and stationary, accidents, violations, speed deviations, course deviations, time to collision, use of safety signals, reaction time, and recognizing high risk situations.

Web-delivered simulations can provide quantifiable assessment of driving-related cognitive and emotional elements at a fraction of the cost of high-end simulators. Real-time performance assessment downloaded to low-cost PC-based platforms with results uploaded to an Army Learning Management System (ALMS) has the potential to significantly enhance the Army's knowledge of Soldiers' driving capabilities.

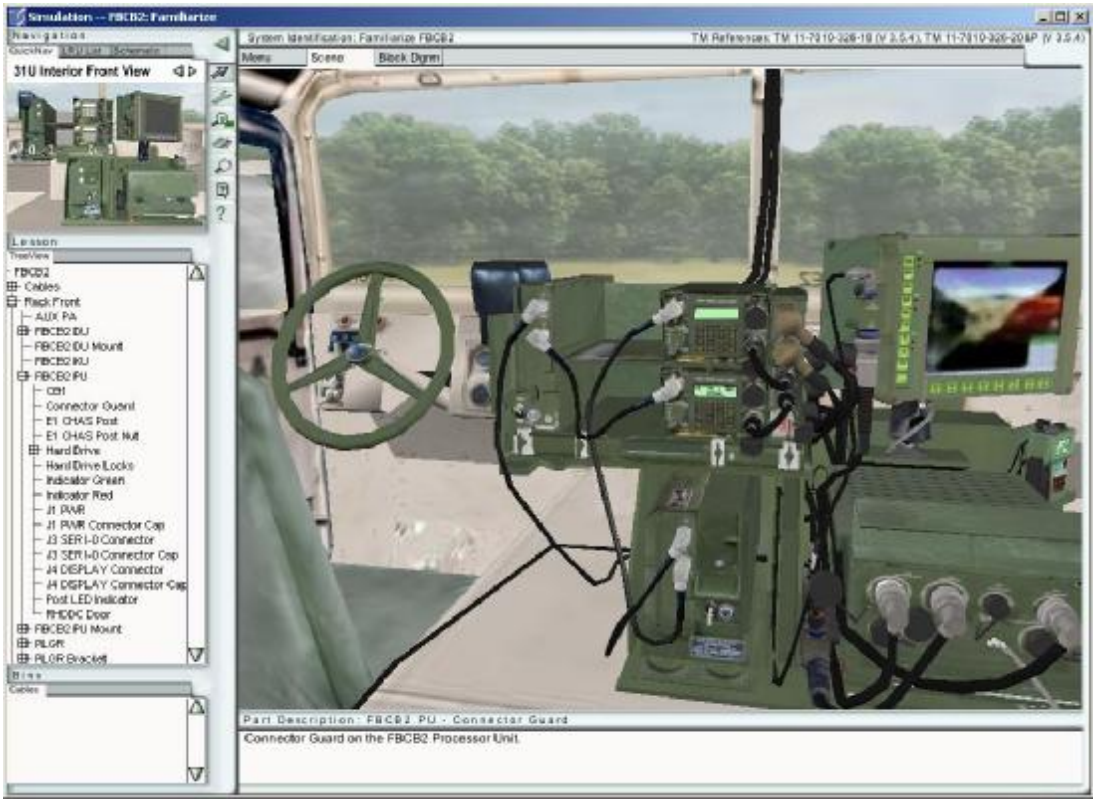


Figure 8.1-1: A Web-delivered Simulation for Vehicle Control Familiarization

An additional advantage of web-downloadable simulations is their ready availability to Soldiers motivated to develop additional skills on their own time at any physical location. The attraction of this approach is borne out by the Army's experience with its University of Information Technology for Signal Soldiers, and with the America's Army game that has been used not only for recruiting but also for training exercises.

8.1.2 Web-Delivered Risk Assessment Tool

The ASMIS-1 – POV Risk Assessment Tool, which is an interactive Web-based application set up to compute risk assessments for Soldier travel while providing a tool for documenting and counseling Soldiers before they leave on extended trips. The tool is integrated with the Army's Risk Management Information System where accident information for similar trips can be presented to the Soldier. More awareness of this tool by supervisors is needed to achieve higher levels of effectiveness of the tool. This tool can also be adapted for Army Motor Vehicles.

8.1.3 CDT Use for Sustainment of Driving Skills

The CDT, and other TADSS as discussed, may also be used by individuals to sustain their skill levels much like pilots do in flight simulators. Possibilities exist to use simulators when vehicles and ranges are not available due to supply, fuel or environment. Simulators may be authorized in the future for annual check rides to maintain licensing in accordance with AR 600-55.

8.2 Architectures & Standards

a. Architectures

The umbrella architecture for self development efforts is the Army Training Information Architecture (ATIA). The following sections highlight relevant components of that architecture that are specifically, but not exclusively, related to self-development training and can be applied to the driver/operator training efforts.

Lifelong Learning Centers:
Army Lifelong Learning Centers (LLC) are a response to that portion of TRADOC's mission to train and educate the Army's soldiers; develop leaders; and support training in units. The LLC serve as a portal into the Army Training Information System Infrastructure, and provide training for self-development and materials that can be used in the units for individual training or to support small group instruction. Access to the LLC is through an Army Knowledge Online (AKO) account; AKO administers the passwords. The LLC are built around four key elements:

- Doctrinal methods for recognizing the learning efforts of LLC users, such as the Assignment-Oriented Learning program.
- The TRADOC School LLC Resource Centers, which manage the Army Learning Management Systems, develop and administer their proponent DL training materials, and provide reach-back from the units for solving both information technology problems with DL materials and technical questions Subject Matter Experts for the proponent school subject areas.
- Virtual Campuses, which are outreach centers into unit garrisons and fixed unit sites to support warfighter training.
- Simulations, which are a key form of training as part of a mixture of Live, Virtual, and Classroom training.

Distributed Learning System (DLS):
The Army Distributed Learning System is a TRADOC Program Integration Office (TPIO) effort to provide standards that will allow the reuse courseware through interactions with ALMS. The functional requirements for DLS are managed by TRADOC. TPIO and the Project Manager, Distributed Learning System (PM DLS) manage program execution, working under the Army Acquisition Executive and through the Army Chief Information Officer/G-6 and the Program Executive Office Enterprise Information Systems (PEO EIS) for Standard Army Management Information Systems. HQ TRADOC is responsible for managing courseware requirements and development. The DLS program follows an evolutionary acquisition strategy based on the following rationale:

- Cost savings can be realized immediately upon implementation of even a limited set of facilities, courseware, and media types.
- Technology insertion in an environment where associated technological advances are progressing at a rapid rate is facilitated.

b. Standards

Standards relevant to the driver self-development training strategy are those derived from the ATIA, including:

- Use of the Sharable Content Reference Model (SCORM) for development of driver training Web-delivered simulations and IMI will allow interfaces with the ALMS as defined in the ATIA.
- The Army Learning Object (ALO) defines specific metadata that will help training supervisors and soldiers doing self-development training to find relevant training materials.
- IEEE Learning Object Metadata provides the syntactic framework for the specific metadata required by the ALO.

8.3 Potential Resource Impacts

Exhibit 8.3-1 describes potential methods for providing self-development related to driving and driver training, and discusses the impact of these resources on delivering training for self-development.

Resource	*Impact*
Internet-Based Training	The use of Internet-delivered driver training packages that can run stand-alone and upload results to an LMS can reduce unit training times.
Exportable Training Packages	The Internet provides a mechanism both for exporting up-to-date training materials as well as providing methods for collecting training results. LLC at the proponent schools support the LMS for delivery of exportable training packages over the Internet.
Embedded Training	FCS is proposed to contain embedded TADSS capabilities but Will not provide the same aural, tactile and visual fidelity that CDT provides.
TADSS	CDTs are high end products and should be closely managed In order to be used effectively and efficiently.

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Appendix C – Acronym List

- ADTF Army Driving Task Force
- AIT Advanced Individual Training
- AKO Army Knowledge Online
- ALMS Army Learning Management System
- ALO Army Learning Object
- AMV Army Motorized Vehicle
- ARNG Army National Guard
- ASDT Advanced Skills Driver Training
- ASI Additional-skill Identifier
- ATIA Army Training Integrated Architecture
- AUTL Army Universal Task List
- AVCATT Aviation Combined Arms Tactical Trainer
- BCT Basic Combat Training
- BSN Brigade Subscriber Node
- C4 Command, Control, Communications and Computers

- C4I Command, Control, Communications, Computers and Intelligence
- CBRN Chemical, Biological, Radiological, and Nuclear
- CBRNE Chemical, Biological, Radiological, Nuclear and High Explosive
- CBT Computer-based Training
- CCP Concept Capability Plan
- CCTT Close Combat Tactical Trainer
- CDT Common Driver Trainer
- CFFT Call for Fire Trainer
- CI Civilian Internee
- CIFFN Combat Identification Friend, Foe, Neutral
- COA Course of Action
- COE Current Operating Environment
- CRC Combat Readiness Center
- CTC Combat Training Center
- CTIA Common Training Instrumentation Architecture
- CVE Common Virtual Environment
- DCOE Driving Centers of Excellence
- DLS Distributed Learning System
- DOF Degrees-of-Freedom
- DOTMLPF Doctrinal, Organizational, Training, Materiel, Leadership, Personnel, Facilities
- DT PC-based interactive video / desktop simulator / trainer
- DTMS Defense Training Management System
- EPW Enemy Prisoner of War
- FAA Functional Area Analysis
- FCS Future Combat Systems
- FF Future Forces
- FLW FT Leonard Wood
- FMTV Family of Medium Tactical Vehicles
- FNA Functional Needs Analysis
- FOC Functional Operating Capabilities
- FSA Functional Solutions Analysis
- HMMWV High Mobility Multipurpose Wheeled Vehicle
- IA Integrated Architecture
- ICD Initial Capabilities Document
- IED Improvised Explosive Devices
- IET Initial Entry Training
- IMI Interactive Multimedia Instruction
- IOC Initial Operating Capability
- IOS Instructor/Operator Station
- ISR Intelligence, Surveillance, and Reconnaissance
- JIM Joint Improvements and Modernization
- JIM Joint-Interagency-Multinational
- JOC Joint Operations Concept
- LCCS Life Cycle Contracted Support

- LLC Lifelong Learning Centers
- LOC Line of Communication
- LVC Live, Virtual, and Constructive
- MOS Military Occupational Specialty
- MOUT Military Operations in Urban Terrain
- MSF Motorcycle Safety Foundation
- MTDB Master Terrain Database
- MTP Mission Training Plan
- NCOIC Non-commissioned Officer in Charge
- NGB National Guard Bureau
- NRE Nonrecurring Engineering
- NVG Night Vision Goggles
- ODS Operator Driving Simulator
- OE Operating Environment
- OEF/OIF Operation Enduring Freedom / Operation Iraqi Freedom
- OEM Original Equipment Manufacturer
- OJT On-the-job Training
- OOS Objective One-SAF
- ORD Operational Requirements Document
- OSUT One Station Unit Training
- PLS Palletized Loading System
- PM Program Manager
- PMCS Preventive Maintenance Checks and Services
- POI Programs of Instruction
- POV Privately Owned Vehicle(s)
- SAF Semi-Automated Forces
- SCORM Sharable Content Reference Model
- SDT Stryker Driver Trainer
- SE Synthetic Environment
- SME Subject Matter Expert
- SOP Standard Operating Procedures
- STRAP System Training Plan
- TADSS Training Aids, Devices, Simulators, and Simulations
- TCS Tasks, Conditions, Standards
- TDB Terrain Database
- TE Training Environment
- TEA Training Effectiveness Analysis
- TMDE Test, Measurement, and Diagnostic Equipment
- TMP Technology Master Planning
- TOE Table of Organization and Equipment
- TPIO TRADOC Program Integration Office
- TRADOC Training and Doctrine Command
- TSP Training Support Package
- UJTL Universal Joint Task List

Appendix D – Functional Area Analysis (FAA)

1.0 Concept/CCP

1.1 Existing Driver Training Concept

The Army Driver and Operator Standardization Program (Army Regulation 600–55) governs the selection, training, testing, and licensing of all U.S. Army motor vehicle drivers and equipment operators. It defines the responsibilities of the TRADOC institutions, the Army installations, and Units with respect to this process. The regulation provides samples of an examination, forms, a road test, and an emergency vehicle driver training program of instruction, and addresses mechanical / ground support equipment, night vision devices, and physical evaluation measures.

1.1.1 Institutional Driver Training for MOS with Driving Critical Tasks

TRADOC schools are responsible for identifying critical tasks to be trained and for providing the training as part of the One Station Universal Training (OSUT), Advanced Individual Training (AIT) for the soldiers in the MOS. A list is available of TRADOC schools that have identified critical tasks related to driver training, as well as the tasks that they have defined.

AR 600-55 specifically calls out emergency vehicle drivers as having specific training and qualification. Appendix H of AR 600-55 provides the outline of the required training course for emergency vehicle drivers. The glossary of Appendix H defines an emergency vehicle.

For tracked vehicles, which have a crew of more than one person, BNCOC/ANCOC typically includes Vehicle Commander training as individual position skill training, not as crew training. Vehicle Commander training and “crew coordination” training are not institutionalized or being taught as an Army standard requirement. In particular, Vehicle Commander training has not been associated with HMMWVs, since these are general purpose vehicles that typically do not have specific MOS assigned as drivers (although MPs are trained using HMMWVs).

1.1.2 Institutional Driver Training for MOS without Driving Critical Tasks

Many soldiers are trained for MOS where driving a vehicle is a secondary task which is implied but not central to the MOS. An example is the 11B MOS for Infantryman. In most cases, only a small percentage of the AIT graduates of these MOS will be driving a vehicle, and there is no additional-skill identifier (ASI) or other means for the TRADOC schools to identify those soldiers who will be driving as part of their first assignment. Since only a small percentage will be driving, it is not cost-effective for the school to train all the soldiers in AIT. This is the case with the 11B MOS. If an ASI is assigned for driving particular vehicles, then the Unit TO&E will specify the drivers and the Unit Commander’s options are limited in assigning drivers. On the other hand, if the Unit Commander is given the option for selecting drivers for vehicles, he has the options but also has the responsibility for training them.

Since no critical tasks have been identified for these MOS that are related to driver training, there is no driver training for these soldiers as part of their OSUT, AIT, or Initial Entry Training (IET) in the schoolhouse. In particular, HMMWVs are the most prevalent vehicles in the OEF/OIF theaters of operation, but because of their general purpose nature, they do not have specific MOS assigned as drivers.

Similarly, operate a vehicle in a convoy is a specified critical Soldier (Warrior) task and is being trained for all soldiers. However, the underlying skill of driving a vehicle is not considered a critical Soldier (Warrior) task.

Required installation driver training consists of 4 hours of Traffic Safety for Privately Owned Vehicles (POV) and Motorcycle Safety Foundation (MSF) for motorcycle riders, both of which are DoD directed.

1.1.3 Unit Driver Training

AR 600-55 specifies that Battalion commanders are responsible for issuing driver's licenses, and these licenses are specific to the vehicle or class of vehicles. The implementation of these requirements is left to Unit Standard Operating Procedures (SOP). Typically, the Battalion will provide training on general purpose vehicles, will conduct the written and road tests, and will issue driver's licenses for these vehicles. The Company commander will typically determine which soldiers are to be licensed on which special purpose vehicles and will provide training on those vehicles. The Company will provide a vehicle Subject Matter Expert (SME) to conduct the training and the license testing, with the Battalion representative supervising the testing and signing the driver's licenses.

Unit Commanders have progressively lost formally trained and qualified MOS drivers from all but selected TOEs. At the same time, Unit Commanders have lost personnel resources to conduct driver training through reduced Technology Master Planning (TMP) support and reductions in motor pool manning. Current deployments do not allow the historical opportunities or time for Units to conduct individual driver qualification. These opportunities were a basic assumption of the current driver training strategy.

1.1.4 Reserve and National Guard Driver Training

Many mobilized ARNG soldiers arrive in support of OEF/OIF operations not duty MOS qualified for driving (e.g., 88M MOS). They are assigned to transportation and truck Companies, which assume the burden of training and licensing these soldiers for their vehicles in the theater of operations. These soldiers are often trained through an on-the-job training (OJT) program, where they are participating in convoy missions in Iraq, Kuwait, and elsewhere and gain combat experience. As part of the OJT program, when they accumulate over 5,000 miles while driving a 5-ton or greater vehicle over varied terrain, often overcoming adverse weather and tactical conditions, they are awarded an 88M MOS. The OJT program is essential to improving the readiness ratings of transportation and truck Companies and Battalions.

At reserve centers and armories, given the need to compress training in comparison to the active Army and hence the lack of time for driver-specific training, driving is done as part of another event. Thus, while staff are planning and tankers shooting using virtual trainers, often a makeshift track is set up for driving whatever vehicles are available, to include standard and up-armored HMMWVs, emergency response vehicles, and material handling equipment. However, each local (armory) Unit commander has his own way of training, and because they are limited resources vehicles are driven under 'normal' operating conditions that do not allow the soldiers to test the vehicles' mechanical limits.

Regional training sites offer some advantages over armories in that they already provide MOS qualification on wheeled and tracked vehicle maintenance training to Army Reserve, National Guard, and active Army forces. Training is provided on primary Army systems such as the

HMMWV, PLS, Bradley Fighting Vehicle, and Abrams M1 series of main battle tanks, and on recovery operations and, at some sites, defensive driving. Also, reconfigurable tactical training devices are planned or already fielded at some of these sites, and may be used for some types of driver training.

1.2 The Need for Change in Army Driver Training

- Increase in mounted missions under difficult conditions that require skilled drivers:
  - 70% of all missions are mounted.
  - Driving conditions and tactics during combat operations call for higher speeds on more degraded routes than are found when driving on stateside installations.
  - 50% of all missions are conducted at night.
  - Asymmetric threat means that support missions are in the combat zone, not behind the Forward Line of Troops.
  - Mounted combat operations in urban terrain are common, rather than an exception.
  - 73% of all soldiers killed by accident in FY 2004 were killed in a vehicle.
  - 31% of accidents reviewed by the Army Readiness Center had skill deficiencies present.
  - Unit commanders have requested combat convoy training as a basic solider skill, and TRADOC has responded by including combat convoy training as part of AIT.
- Decrease in basic driving skills of recruits:
  - Requiring all new recruits to obtain a driver's license before they join would significantly impact the recruiting mission and therefore the end-strength of the Army.
  - The trend in the percentage of recruits who did not have state driver's licenses on accession is 10% in 2002, 19% in 2003, and 25% in 2004. It is not unlikely that this number will increase in future years.
- Restrictions on terrain, time, instructors, equipment, and supplies are preventing the TRADOC schools from providing driver training using performance exercises with live equipment that address the Unit driver training requirements.
  - The terrain required for training the advanced driving skills needed by the troops is not available at all TRADOC schools. Safe training of advanced skills means that trainees should not be training on publicly accessible installation roads or the urban areas of an installation.
  - Army doctrine is focusing on all-weather and night operations (using night vision goggles, or NVG) as a tactical advantage, but these situations cannot be created on demand for driver training.
  - The leading causes of vehicle accidents are rollovers, collisions, and driving off the road. The methods developed by the ADTF for training drivers skills to reduce these accidents cannot be trained safely on publicly accessible installation roads.
- Increase in Unit OPTEMPO is making it difficult for Unit leaders to provide appropriate driver training.
  - There is no clear skills development strategy for non-MOS drivers, so this is a Battalion training burden.
  - Individual driver qualification is being overcome by collective training for deployment. Configuring Units of Action for specific missions means that Combined Arms and Combined Support teams will be working together with little opportunity to train

together as a team before a mission. In these situations, leaders must focus on collective training to build effective teams with less time available for individual training.
  - Units no longer have the time or training events to "grow" drivers before deployment.

- Army Transformation and Modularity is making driver training more difficult for the units.
  - The evolving Modular Force organization are pushing the level of combined arms operations lower and lower in the force structure. As a result, there are more different types of vehicles in the battalions, each requiring specialized training to deal with the different load configurations and the increasingly specialized sensor systems. The current driver training strategy pushes this training out to the units. The battalion commander and the battalion NCOIC for driving must rely on the expertise of the current operators in the field to provide this specialized training, although the battalion commander, working with the battalion NCOIC for driving, issues the licenses.
  - The focus on Force Projection as part of the Army Transformation and Modularity is developing new equipment strategies where troops fall in on the equipment pre-positioned in the field or being used by the previous force as part of a rotation just prior to a mission. This strategy may save logistics costs, but it eliminates the ability for troops to train on the equipment they will be using during the mission before they are deployed. As is noted elsewhere, many of the driving accidents (such as rollovers) have been caused by soldiers not understanding the limits of their vehicles in the mission configurations.

1.3 Driver Trainer Strategy

1.3.1 Use the JCIDS Process to Determine and Document CDT Requirements, Benefits, and Costs

This FAA is one element of an Initial Capabilities Document for a Common Driver Trainer to capture requirements, show how gaps have developed between current doctrine and training strategies, and determine if a CDT is a cost-effective method for addressing Army driver training needs, reducing Army risk, and improving Army driver training and safety.

Experience with the Tank Driver Trainers at Ft. Knox has demonstrated significant operational savings as compared with the use of tactical vehicles. Similar savings are expected for TRADOC schools using more complex and expensive vehicles such as the Stryker variants, the FOX NBC Recon Vehicle, Engineer Vehicles, and the Future Combat Systems.

1.3.2 Develop and Use a Reconfigurable Driver Trainer to Minimize Development and Operation Costs

A Common Driver Trainer may allow the development costs to be amortized across multiple Program Managers (PMs) so that no PM has to bear the full cost of developing a complete driver training simulator. Configurable driver trainers will use different software loads and vehicle behavior models to simulate different vehicles. This approach has already been used successfully with the Operator Driving Simulator (ODS) program. In many cases, the equipment operation tasks and driving tasks overlap, particularly in areas like Preventive Maintenance Checks and Services (PMCS). The CDT program will leverage ongoing training and simulation efforts by the PM with the common driver training environment.

1.3.3 Leverage Ongoing Driver Trainer Simulator Development

The Common Driver Trainer concept will leverage existing driver simulators such as the Army's ODS used for training 88M and ongoing developments, such as the Stryker Driver Trainer. These existing driving simulators provide a mature starting point which can be evolved with additional functionality to satisfy both general purpose driving and vehicle-specific requirements. The CDT will be designed to provide backward compatibility with installed systems, as well as support migration of on-going developments both commercial and military.

1.3.4 Develop Implementation Strategies to Benefit MOS without Driving Critical Tasks

Driver training simulators are being used to train the primary MOS that have identified driving critical tasks, namely the 88M Motor Transport Operators, the 19K Abrams Armor Crewman, and the 31B Military Police. The primary potential beneficiaries of a CDT development will be those soldiers whose MOS do not currently provide driver training. However, this may require changes in their Institution training schedules or a change in training strategy in Units across the Army.

2.0 Functional Area

This section includes excerpts from relevant approved Functional Operating Capabilities (FOC) (Ref. 1). The narratives were written for this FAA to describe how those FOC are relevant to driver training. The linkages from the FOC to the UJTL and AUTL were taken from approved FOC descriptions, but have been filtered to identify the essential links for driver training.

2.1 FOC 03-01 Mobility

a. Capstone Capabilities. Future Force units will possess superior tactical mobility. Platforms will negotiate the majority of surfaces—road, off-road, trails, CBRN contaminated terrain, water crossing, and narrow gaps. Mounted units must move at greatly improved speeds (at least 50 kilometers per hour). The Future Force must provide organic capabilities to cross narrow gaps, such as streams and irrigation ditches, without loss in operational momentum, and enable dismounted assaults in urban terrain. Future Forces must incorporate a full spectrum of CBRN sensors, detectors, analyzers, and classification devices into ground and air vehicles.

b. Implications for Driver Training: This FOC identifies key environmental conditions and specific tasks for driver training. This FOC indicates the higher speeds to be expected of manned ground vehicles, which defines conditions for training. This FOC also identifies the growing complexity of vehicles and the resulting increases in cognitive load on the driver, which must be addressed by the driver training.

c. Linkage to AUTL: ART 2.2 (Conduct Tactical Maneuver); ART 2.3 (Conduct Tactical Troop Movements); ART 8.0 (Conduct Tactical Mission Tasks and Operations); ART 8.1 (Conduct Offensive Operations); ART 8.2.2 (Conduct a Mobile Defense); ART 8.5 (Conduct Tactical Mission Tasks).

d. Linkage to UJTL: ST 1 (Deploy, Concentrate, and Maneuver Theater Forces); OP 1 (Conduct Operational Movement and Maneuver); TA 1 (Develop/Conduct Maneuver).

2.2 FOC 03-02 Operations in Urban and Complex Terrain

a. Capstone Capabilities: There are several characteristics that define complex terrain and urban operations, and make them far different than operations on less restrictive terrain. These

differences include short ranges of intervisibility, presence of manmade structures, multidimensional battlespace, difficult target identification in limited engagement areas, restrictive maneuver space, toxic industrial material (TIM), and the presence of noncombatants. Additionally, some complex terrain is densely vegetated, providing numerous positions for enemy concealment. Urban operations are made even more difficult due to the restrictive rules of engagement (ROE). Urban battles of the future will continue to challenge the joint force commander and staff to avoid excessive collateral damage, and limit the number of noncombatant casualties.

The Future Force must have the ability to move under limited visibility conditions. This will require the development of advanced optical capabilities, which will allow Future Forces to move under all weather and light conditions, regardless of ambient lighting conditions. These systems must have the ability to adjust rapidly to changes in lighting conditions, negating 'white out' effects normally experienced during close quarter urban operations.

Future Force systems must have the ability to move rapidly across open areas, and be highly maneuverable within the confines of the urban battlespace. Systems must have the ability to rapidly negotiate rubble, and reduce/negotiate obstacles, while on the move, and provide in-stride or rapid detection and protection against TIM in the battlespace.

To enable the Force to conduct decisive operations, the Future Force will require several enabling technologies and capabilities, including the ability to conduct decisive operations under all weather and light conditions. All systems and capabilities within the Future Force must be capable of functioning at full potential, without degradation resulting from environmental effects.

b. Implications for Driver Training: This FOC identifies key environmental conditions and specific tasks for driver training, particularly in the area of urban terrain and in negotiating and/or removing obstacles that are likely in urban terrain. This FOC indicates evolving sensor technology and sensor technology issues (e.g., urban operations at night with both bright light and deep darkness) that will add to the cognitive burden on the driver. This FOC also emphasizes the requirement to minimize urban infrastructure and property damage which restricts the driver's options, making driving skill and expertise even more important.

c. Linkage to AUTL: ART 2.2 (Conduct Tactical Maneuver); ART 2.3 (Conduct Tactical Troop Movements); ART 8.0 (Conduct Tactical Mission Tasks and Operations); ART 8.1 (Conduct Offensive Operations); ART 8.2.2 (Conduct a Mobile Defense); ART 8.5 (Conduct Tactical Mission Tasks).

d. Linkage to UJTL: ST 1 (Deploy, Concentrate, and Maneuver Theater Forces); OP 1 (Conduct Operational Movement and Maneuver); TA 1 (Develop/Conduct Maneuver).

2.3 FOC-05-01 LOS/BLOS Lethality

a. Capstone Capabilities: The Future Force will possess a wide range of organic and highly deployable fire support systems that are able to deliver advanced and fused fire support effects out to operational distances. Together with joint fires, these organic fire support capabilities will generate an efficient and dominant suppression umbrella of multieffects (e.g., nonlethals, EW, fire support, counter IO, etc.) that maneuver elements can exploit to gain positional advantage. This fusion of fire support effects will permit the Future Force to conduct decisive maneuver, and cause the rapid disintegration and destruction of enemy forces of significantly larger size, without having to employ attrition techniques. These same advanced fire support capabilities will have

the range, versatility, and flexibility to protect combat support and combat service support elements, throughout the depth of the extended and nonlinear battlespace, to include protection from enemy long-range precision missiles.

b. Implications for Driver Training: A key part of the capstone capabilities is the requirement for highly deployable LOS/BLOS fire support capabilities must permit the Future Force to conduct decisive maneuver to achieve positional gain, which implies that ground vehicles be able to move rapidly throughout the extended and nonlinear battlespace in all weather and terrain conditions. These conditions required highly skilled vehicle drivers to exploit the capabilities of their equipment.

c. Linkage to AUTL: ART 8.0 (Conduct Tactical Mission Tasks and Operations); ART 8.1 (Conduct Offensive Operations); ART 8.2 (Conduct Defensive Operations); ART 8.5 (Conduct Tactical Mission Tasks)

d. Linkage to UJTL: OP 1 (Conduct Operational Movement and Maneuver); OP 3 (Employ Operational Firepower); TA 3 (Employ Firepower).

2.4 FOC-05-02: NLOS Lethality

a. Capstone Capabilities: Fires must be reliable, timely, and accurate—able to sustain rates of fire and rates of kill continuously—and available in all weather and terrain conditions. Future Force organic fires must be able to deliver effects, at extended ranges beyond 40 km, to deny sanctuary in the OA. They must provide mutual support from dispersed locations, rapidly shift striking power across the battlefield, and apply the full range of effects—from precision discrete to area—to assure mission end state. Fire support must be agile to support forces in contact. It must provide greater target location, and weapon delivery accuracy and rates of fire, to get the job done quicker, with smaller firing teams, and with less exposure; as well as rapidly deliver scaleable munitions effects to destroy, disintegrate, or dislocate enemy forces. Fire support must have the ability to shift fires and mission types very quickly (destructive, protective and suppressive, and special purpose).

Non-line of sight fires must provide responsive—immediately available on demand, timely, continuous, unhampered by terrain, 24 hours a day, all weather—fire support. These fires must be agile and flexible enough to fire on multiple, disparate, disconnected, point, and area targets, simultaneously. The most demanding role for NLOS fires is support for the close fight, where forces are in immediate contact with the enemy, and the fighting between the committed forces and readily available tactical reserves of both combatants is occurring. The dynamic nature of the close fight demands very responsive and agile fires, to ensure maneuver and fires remain synchronized. The Future Force must orchestrate and synchronize a diverse and versatile mix of fires and fused effects capabilities in real time. It must rapidly set the conditions to overwhelmingly defeat enemy conventional forces and asymmetrical threats, in all environments and dimensions, including austere theaters of operations.

b. Implications for Driver Training: A key part of the capstone capabilities is the requirement that fire support capabilities must permit the Future Force to conduct decisive maneuver, which implies that the fire support elements must be able to travel at the same rate and over the same terrain with the same agility as the maneuver forces. Thus the driving tasks and requirements facing the Maneuver units will also apply to the NLOS Fire Support units. Furthermore, the NLOS Fire Support units will have different vehicles with more emphasis on supply, meteorological support, and the command, control, and communications required for joint fires

linking sensors to shooters. The FOC identifies the need for NLOS fires to provide on demand, timely, and continuous fires unhampered by terrain, 24 hours a day, in all weather. These needs define conditions for the maneuver of NLOS fire support systems, which in turn identify conditions for training of drivers for NLOS fire support systems.

c. Linkage to AUTL: ART 3.3 (Employ Fires to Influence the Will and Destroy, Neutralize, or Suppress Enemy Forces); ART 7.2 (Manage Tactical Information); ART 8.0 (Conduct Tactical Mission Tasks and Operations); ART 8.1 (Conduct Offensive Operations); ART 8.2 (Conduct Defensive Operations); ART 8.5.2 (Block an Enemy Force); ART 8.5.10 (Defeat an Enemy Force); ART 8.5.11 (Destroy a Designated Enemy Force/Position).

d. Linkage to UJTL: OP 1 (Conduct Operational Movement and Maneuver); OP 3 (Employ Operational Firepower); TA 3 (Employ Firepower).

2.5 FOC 06-01 Provide Assured Mobility

a. Capstone Capabilities: Assured Mobility includes all those actions that guarantee the force commander the ability to deploy, move, and maneuver, by ground or vertical means, where and when desired, without interruption or delay, to achieve the intent. Required capabilities to achieve Assured Mobility include:

- Means to provide early warning for soldiers, platforms, and forces, focusing on avoidance (i.e., mines and other obstacles, NBC hazards, missiles, and air threats).
- Means to rapidly ‘breach ahead’ in open, restricted, and urban terrain.
- Means to rapidly cross wet and dry gaps.
- Embedded, standoff, forward- and side-looking remote detection, and neutralization of hazards such as mines, booby traps, and improvised explosive devices (IEDs).
- Detection from other platforms, at tactical and operational ranges.
- Route security and clearance (route reconnaissance and surveillance, line of communication (LOC) / main supply route (MSR) regulation enforcement; river and obstacle crossings, and passage of lines) to include control and maintenance of LOCs to, and within, the AO.
- Circulation/traffic control measures.
- Visual and virtual obstacle marking system for point and area Chemical, Biological, Radiological, and Nuclear (CBRN) / hazardous material detection, decontamination, and hazard area marking.
- Area/route clearance at operating speeds.
- Rapid construction and repair of routes and trails.
- Trafficability enhancers.
- Ability to differentiate between IED explosive fillers and CBRN fillers at standoff distances.
- Ability to deploy and detect full spectrum CBRN markers during daylight, darkness, and adverse weather conditions.

b. Implications for Driver Training: A key part of the capstone capabilities is the requirement that Assured Mobility capabilities must permit the Future Force to conduct decisive maneuver, implying that combat engineer systems must be able to travel at the same rate and over the same terrain with the same agility as the maneuver forces. Not all Assured Mobility systems will require this speed, agility, and protection. The FOC defines conditions for the maneuver of

engineer systems, which in turn identify conditions for training of the drivers for engineer systems. This FOC also highlights the need to detect and avoid or otherwise defeat IEDs and the need to secure supply routes. This requirement is difficult, if not impossible, to train in a live environment safely and effectively.

c. Linkage to AUTL: ART 5.1 (Conduct Mobility Operations); ART 5.1.1 (Overcome Barriers/Obstacles/Mines); ART 5.1.1.1 (Conduct Breaching Operations); ART 5.1.1.2 (Clear Obstacles); ART 5.1.1.2.1 (Conduct Area Clearance); ART 5.1.1.2.2 (Conduct Route Clearance); ART 5.1.1.3 (Conduct River Crossing Operations); ART 5.1.2 (Enhance Movement and Maneuver); ART 5.1.2.1 (Construct/Maintain Combat Roads and Trails); ART 5.1.2.2 (Construct/Maintain Forward Airfields and Landing Zones); ART 5.2.2 (Construct, Emplace, or Detonate Obstacles); ART 5.2.3 (Mark, Report, and Record Obstacles); ART 5.2.4 (Maintain Obstacle Integration); ART 5.3.5 (Conduct Security Operations); ART 6.3.1.3 (Conduct Maneuver and Mobility Support Operations); ART 8.5.4 (Bypass Enemy Obstacles/Forces/Positions).

d. Linkage to UJTL: OP 1 (Conduct Operational Movement and Maneuver); OP 1.3.1 (Overcome Operationally Significant Barriers, Obstacles, and Mines); OP 1.3.2. (Enhance Movement of Operational Forces); OP 1.4 (Provide Operational Countermobility); OP 6.2.13 (Conduct Countermine Activities); ST 1 (Deploy, Concentrate, and Maneuver Theater Forces); TA 1 (Develop/Conduct Maneuver); TA 1.3 (Conduct Countermine Operations); TA 1.4 (Conduct Mine Operations).

2.6 FOC-06-02: Deny Enemy Freedom of Action

a. Capstone Capabilities: Denying the enemy freedom of action includes proactive measures to leverage the physical environment to isolate enemy forces, deny key terrain, and deny, impede, or canalize enemy movement, in order to protect friendly forces and their freedom of action, and to place enemy forces in positions of disadvantage. Required capabilities include:

- Countermobility means to reinforce friendly fires (intelligent sensor/munitions fields, and the means to employ them).
- Terrain modification/obstacle emplacement capability, to fix enemy forces, or disrupt enemy operations.
- Effective isolation during Military Operations in Urban Terrain (MOUT), and operations in complex terrain, to shield friendly forces, or fix enemy forces.
- Autonomous minefield/mine emplacement and/or recovery.
- Dynamic, self-healing minefields, and other ‘obstacles on demand’.
- Nonlethal capabilities for point and area denial, trafficability, and traction reduction and counter-materiel.

b. Implications for Driver Training: This FOC implies a requirement that Countermobility capabilities must permit the Future Force to conduct decisive maneuver, implying that combat engineer systems must be able to travel at the same rate and over the same terrain with the same agility as the maneuver forces. This FOC also highlights the need to detect and emplace and/or recover minefields and the need to operate effectively in MOUT scenarios.

c. Linkage to AUTL: ART 2.4.2 (Conduct Nonlethal Direct Fire Against a Surface Target); ART 3.0 (The Fire Support Battlefield Operating System); ART 3.1 (Decide Surface Targets to Attack); ART 3.2 (Detect and Locate Surface Targets); ART 3.3 (Employ Fires to Influence the

Will and Destroy, Neutralize, or Suppress Enemy Forces); ART 5.3.5 (Conduct Security Operations); ART 5.3.5.7 (Employ Obscurants); ART 8.5 (Conduct Tactical Mission Tasks); ART 8.5.2 (Block an Enemy Force); ART 8.5.3 (Breach Enemy Defensive Positions); ART 8.5.5. (Canalize Enemy Movement); ART 8.5.8 (Contain an Enemy Force); ART 8.5.9 (Control an Area); ART 8.5.13 (Disrupt a Designated Enemy Force's Formation/Tempo/Timetable); ART 8.5.15 (Fix an Enemy Force); ART 8.5.18 (Interdict an Area/Route to Prevent/Disrupt/Delay its Use by an Enemy Force); ART 8.5.19 (Isolate an Enemy Force); ART 8.5.20 (Neutralize an Enemy Force); ART 8.5.21 (Occupy an Area); ART 8.5.28 (Turn an Enemy Force).

d. Linkage to UJTL: OP 1 (Conduct Operational Movement and Maneuver); OP 3 (Employ Operational Firepower); TA 3 (Employ Firepower).

2.7 FOC-06-03: Engage and Control Populations

a. Capstone Capabilities: Population engagement is the ability to proactively provide the necessary control, over demographically diverse populations, to ensure maneuver, maneuver support, and maneuver sustainment forces are unencumbered in the conduct of their respective operations. Therefore, employment concepts will include leveraging technology to influence and control populations, maximizing use of ISR sensors and CIFFN to differentiate between combatants and noncombatants, and friendly forces from threat forces, evacuating and resettling enemy prisoners of war (EPWs) and civilian internees (CIs), and conclusively transitioning humanitarian assistance operations to other functional agencies. Capabilities must facilitate the Future Force commander's ability to conduct rapid and decisive combat operations; deter, mitigate, and defeat threats to populations that may result in conflict; reverse conditions of human suffering; and build the capacity of a foreign government to effectively care for, and govern, its population. Required capabilities include:

- Population movement, collection, evacuation, and resettlement controls.
- Means to shelter, sustain, guard, protect, and account for EPWs, CIs, retained personnel, and other detainees.
- General engineering support to construct, maintain, and repair camps, facilities, and/or (necessary or essential) infrastructure for varying populations.
- Means to assist civil authorities to restore basic services, and critical infrastructure (e.g., 'prime power,' security, safety, utilities, etc.).

b. Implications for Driver Training: This FOC highlights the need for maneuver, maneuver support, and maneuver sustainment forces to operate in highly populated environments with constraints designed to deter, mitigate, and defeat threats that may result in conflict. This FOC implies that Future Forces must be able to maneuver with minimum likelihood of death, injury, or property damage to foreign populations. This requirement is difficult, if not impossible, to train in a live environment safely and effectively.

c. Linkage to AUTL: ART 2.4.2 (Conduct Nonlethal Direct Fire Against a Surface Target); ART 6.10.3 (Provide Engineer Construction Support); ART 6.13 (Conduct Internment and Resettlement Activities); ART 6.14.6.7 (Provide Public Safety Support).

d. Linkage to UJTL: OP 4.6.4 (Provide Law Enforcement and Prisoner Control); SN 8.1.10 (Coordinate Actions to Combat Terrorism); ST 4.4.3 (Coordinate Law Enforcement and Prisoner Control); ST 6.2.6.3 (Establish and Coordinate Protection of Theater Air, Land, and Sea LOCs); ST 6.2.6.4 (Establish and Coordinate Theater-Wide Counterintelligence Requirements); ST 8.4.1

(Advise and Support Counter-drug Operations in Theater); ST 8.4.2 (Assist in Combating Terrorism); TA 1.2.4 (Conduct Counterdrug Operations); TA 6.3 (Conduct Rear Area Security).

2.8 FOC-09-01: Sustainability

a. Capstone Capabilities: The warfighting support apparatus must be capable of maintaining the same OPTEMPO as maneuver forces, in all weather and battlespace conditions. Sustainment must become an integral part of the maneuver commander's battle rhythm, vice an adjunct appendage. Efficiencies are also required in providing designated support to other services within the joint warfighting team, and to other lead federal agencies, when conducting interagency operations. To achieve reductions in logistics demand and footprint, mechanisms developed for the Future Force by the Army must be migrated to other supported Services and federal agencies to achieve similar reductions.

b. Implications for Driver Training: This FOC highlights the need for support systems to operate at the same OPTEMPO as maneuver forces. This implies that driving tasks and conditions should be consistent with maneuver force requirements and Operating Environments (OEs).

c. Linkage to AUTL: ART 6.1 (Provide Supplies); ART 6.2 (Provide Maintenance); ART 6.5 (Provide Force Health Protection in a Global Environment); ART 6.12 (Provide Distribution Management).

d. Linkage to UJTL: SN 4 (Provide Sustainment); ST 4 (Sustain Theater Forces); OP 4 (Provide Operational Logistics and Personnel Support); TA 4 (Perform Logistics and Combat Service Support).

2.9 FOC-09-02: Global Precision Delivery

a. Capstone Capabilities: Equip the Future Force with distribution enablers that allow rapid transit of multiple classes of supply over vast distances (both surface and air); equip the distribution assets with sufficient situational awareness capability as to allow "right time, right place" sustainment flow anywhere on the battlespace; standardize sustainment packaging to maximize configuration and reconfiguration of loads, limit off-system material handling equipment, and speed the movement of sustainment through the distribution system. Speed and precision are replacing sustainment by mass. Velocity, coupled with managed distribution and responsive transportation, is replacing stockpiles of supplies and lessening needed services. Reducing the 'logistics footprint' will give way to rightsizing the 'sustainment footprint' in the Future Force. The transactions-based environment of today may be replaced by instantaneous, query-based, 'web-based' systems, enabling the force to carry fewer supplies, and streamlining overly complex and duplicative organizational structures. Supply inventory will be moving in the pipeline with definite time delivery goals. Customer wait time will be significantly reduced. Stock levels will be measured in relevant operational parameters, not hours or days of supply. Likewise, human resource support will be directed by task organizing and tailoring from the national provider level.

b. Implications for Driver Training: This FOC highlights the need for support systems to speed the movement of sustainment through the distribution system while limiting off-system material handling equipment. This implies an increasing OPTEMPO for distribution and transportation systems. This FOC also emphasizes the need for sustainment flow anywhere in the battlespace, which implies tasks and conditions for driver training.

c. Linkage to AUTL ART 6.1 (Provide Supplies); ART 6.3 (Provide Transportation Support); ART 6.12 (Provide Distribution Management).

d. Linkage to UJTL: SN 4 (Provide Sustainment); ST 4 (Sustain Theater Forces); OP 4 (Provide Operational Logistics and Personnel Support); TA 4 (Perform Logistics and Combat Service Support).

2.10 FOC 09-07 Global Casualty Prevention

a. Capstone Capabilities: Improve both strategic responsiveness and core warfighting abilities, to effectively fight as an integral component of a joint, interdependent, full spectrum, mission-tailored force, through the prevention of casualties.

b. Implications for Driver Training: This FOC highlights the need for preventive training to reduce Army Vehicle and POV accidents and increase readiness through the prevention of accidental casualties.

c. Linkage to AUTL: ART 6.5 (Provide Force Health Protection in a Global Environment).

d. Linkage to UJTL: SN 4 (Provide Sustainment); ST 4 (Sustain Theater Forces); OP 4 (Provide Operational Logistics and Personnel Support); TA 4 (Perform Logistics and Combat Service Support).

2.11 FOC 10-02 Accessible Training

a. Capstone Capabilities. Training for the FF will capitalize on emerging technologies to make training readily accessible to soldiers any place, any time. Dispersed soldiers and Units will be linked with one another and with the training institutions through distributed training and integrated live, virtual, and constructive (LVC) training environments. Embedding training in equipment will enable more cost effective training and mission rehearsal on-demand, whether at home station or deployed. New training technologies will be employed to provide a universal training support capability that extends to Active Army, National Guard, and Reserve units and ensures that training capabilities keep pace with advancements in warfighting technologies. Soldiers and leaders will have quick access through reach back to the training opportunities and the knowledge relevant to their immediate mission or required as part of their career development plan. The accessible training capability will be characterized by:

- Effective distributed individual and collective training available globally, on- demand.
- Ability for soldiers to train and commanders to train Units without significant external support through enhanced embedded training.
- Reach back to knowledge and training repositories.

b. Implications for Driver Training: This FOC emphasizes the key role of technologies (such as simulations) to support training (to include driver training) through the use of integrated live, virtual, and constructive training environments supporting both Unit training and institutional training. This FOC emphasizes the need for employing training technologies to support Active Army, National Guard, and Reserve units in line with strategies developed by the Army Driving Task Force and AR 600-55.

c. Linkage to AUTL: ART 7.7.3 (Train Subordinates and Units).

d. Linkage to UJTL: SN 4.1.2 (Procure, Train, Supply, Transport, and Maintain Personnel); ST 4.2.4 (Establish and Coordinate Training of Joint and Combined Forces and

Conditions/Standards); SN 3.1.4 (Coordinate Joint/Multinational Training Events); SN 6.3.2 (Conduct Specified Training); SN 6.5.4 (Train Units and Individuals to Minimum Operationally Ready/POR Status); SN 7.4 (Educate and Train the Force).

2.12 FOC 10-03 Realistic Training

a. Capstone Capabilities: FF training capabilities must, to the maximum extent possible, replicate the OE. This capability must include live training at home station and during deployments to combat training centers (CTCs) and theaters. Training support capabilities must complement the fielding of current and new warfighter technologies and provide the human performance development applications that enable realistic Army and joint training and supporting education. Further, the virtual and constructive environments must provide the realism and feel needed to train individuals, teams, and Units effectively across the spectrum. The following capabilities are critical to achieve this FOC:

- Training that provides realistic replication of weapons and battlespace effects.
- Models and simulations that enable training and mission rehearsal for the full spectrum of operations in a Joint Improvements and Modernization (JIM) environment.
- A synthetic training environment that accommodates training the full spectrum of operations.

b. Discussion: Live training will remain a cornerstone requirement for FF soldiers and units, but constrained resources and training environments will continue to create pressure to limit live training. FF training must provide realistic, real time replication of weapons and battlespace effects, embedded into all training environments with commonality at the institution, home station, and deployed (operational theater and CTC). In addition to the replication of weapons employment and effects, to be realistic, FF training must also replicate employment of C4 capabilities, employment of ISR resources/ information, survivability capabilities, sustainment capabilities, and replication of the effects of the environment on the battlefield. Training Support must universally enable realistic training in the operational arts of war constructs of: Move, Shoot, Communicate, See the Battlefield, Survive, and Sustain, all within a JIM environment.

FF training requires models and simulations that enable training and mission rehearsal for the full spectrum of operations within a JIM environment. Models and simulations must be flexible and adaptable, replicating the OE, emerging weapons systems, human factors, and robot behaviors. The successful execution of training for the Future Force will also require the capability to link live, virtual, and constructive simulations seamlessly, to present the best environment for training individuals, leaders, staffs, and Units on the right tasks, at the right place and time. To create this interactive ‘synthetic training environment’, all simulation systems, instrumentation systems, C4I, and weapons systems must operate and interoperate, using common databases that accurately represent human and group behaviors, atmospheric and ground effects, and include virtual terrain that replicates the actual theater of operation. This synthetic training environment must be able to accommodate the full spectrum of operations within the JIM environment, from special operations to logistics to combat, and be sufficiently interactive to allow combined training of the different elements. This capability must also allow leaders to choose from a range of available operational environments, for precisely training their soldiers, staffs, and Units on specific shortcomings, or tasks relevant to an upcoming mission.

c. Implications for Driver Training: This FOC emphasizes the key role of models and simulations with the necessary realism to support effective training for both Unit training and

institutional education. The models and simulations must replicate the OE and the "weapon systems." For driver training, the "weapon systems" are interpreted as the vehicles being driven along with any towed equipment. This FOC reasserts that live training is a cornerstone of training doctrine, but that simulations must be used to deal with the constraints of limited resources, safe training for hazardous tasks, and limited training environments.

2.13 FOC-10-04: Responsive Training Development

a. Capstone Capabilities: The end state training development system must have the capability to support shorter cycle times by rapidly capturing and integrating garnered insights and changes, leading to timely and effective training products needed for both individual and collective training for FF jobs. A responsive training development system must be capable of:

- Producing soldiers who can perform a wide range of tasks.
- Conducting comprehensive analysis of Future Force functions, jobs, skills, and knowledge requirements.
- Using skill decay models and decision tools that enable trainers to determine how, when, and where to deliver training and performance support most effectively and efficiently, and that facilitate efficient and effective training development and delivery.
- Enabling trainers and training developers to work collaboratively in a distributed environment to rapidly develop training tailored to individual or Unit needs.
- Ensuring, through quality assurance and other feedback mechanisms, that training planning and development address the most critical FF training requirements.

b. Narrative:

(1) Many FF jobs and tasks will be complex and/or difficult to train, thus creating a significant technical and intellectual challenge to the training development system. Comprehensive analysis of FF functions, jobs, tasks, skill, and knowledge requirements will be a crucial early phase of training development for the FF. As many of the FF soldier skill sets are not yet well defined, it will be important to maintain an ongoing program of comprehensive analyses of FF functions, jobs, tasks, skills, and knowledge requirements to fuel the training and leader development process for Unit and individual training. The FF will incorporate sophisticated technologies such as robotic vehicles, advanced sensors, and information technologies into the Future Force equipment systems. Changes in force designs and missions executed in a JIM environment, will introduce more collective/team tasks, and increase task performance requirements. Similarly, the multi-skilled soldier, a cornerstone human dimension concept for the FF soldier, will introduce a training development challenge. FF soldiers will need to be 'multi-skilled', meaning soldiers capable of performing a wide range of tasks. The concept directly supports FF operational requirements by broadening individual skills for greater depth and redundancy within a Unit. This allows smaller footprints without loss of capability and drives the training system to prepare soldiers to be more adaptable and skilled relative to mission performance. The training developed for multiskilled soldiers must be based on a complete understanding of skills sets needed and their interplay with the OE.

(2) Responsiveness must characterize FF training development, as well as training execution. Skill decay models and decision tools that enable trainers to determine when, where, and how to deliver training and performance support most effectively and efficiently are essential capabilities. The training system must also provide training developers the tools and decision

support systems needed to analyze, design, develop, and execute training efficiently and effectively.

(3) FF training must be sufficiently responsive and robust, to ensure that Units accommodate rapid changes in doctrine, organization, and equipment, while maintaining readiness and meeting current operational requirements. This will necessitate links between Units, schools, and training centers, to enable collaborative training development, delivery, testing, and evaluation in a distributed mode, as well as rapid feedback on training requirements. All Army trainers, regardless of component or location, must have the capability to prepare, produce, and rapidly reconfigure individual soldier and Unit performance-oriented, standards-based, and realistic multi-echelon training. Quality assurance mechanisms and other feedback capabilities will be critical to ensure that training planning and development addresses the most critical FF training requirements. All aspects of the training system must be 'user friendly.' To achieve this end, a formal and accountable 'Usability Engineering' process must be incorporated into the developmental process for training products and systems.

c. Implications for Driver Training: This FOC emphasizes the need for Army driver training to respond to the changes in driving conditions, both in terms of the increasing complexity of the vehicles and sensor and protection systems used by drivers, the increased complexity of situation awareness and decision-making by drivers, and the environment (including night, bad weather driving, and MOUT).

3.0 Concept of Operation

3.1 Use Simulations to Expand the Range of Driving Experience and Reduce Training Costs

The emerging driving tasks, conditions, and standards are more dangerous and difficult and expensive to train with real equipment in the garrison or in the operational environment. The plan is to use simulations to allow driving to be trained as it is fought. The potential savings and distributed capabilities of simulations must be used to make the required changes in training feasible.

3.2 Use a Reconfigurable Simulator System Which Can Simulate Training Multiple Vehicles

The Common Driver Trainer concept has been developed to support both initial and sustainment driver training for multiple vehicles. The same simulator software, motion platform, and scenario databases can be used for training multiple vehicles operating in multiple environments. Changing between vehicles can be accomplished by changing vehicle cab configurations and selecting the appropriate simulation software.

A typical student station configuration consists of a simulated vehicle cab, a visual system, an aural/audio system and a computer system. The student station may have a fixed platform, a 3 Degrees-of-Freedom (DOF) motion platform, or a 6 DOF motion platform integrated with a common simulation computer. Multiple student stations can be supervised from a single the Instructor/Operator Station (IOS). The instructor, via the IOS, will be capable of selecting a visual scene, viewing the visual scene, monitoring each trainee's performance and introducing malfunctions and emergency control situations.

3.3 Use a Modular Simulator System to Support Flexible Blended Training

A modular simulator system, including desktop trainers, fixed platform trainers, 3 DOF simulators, and 6 DOF simulators, is easily adapted to a blended learning method that combines classroom instruction, virtual and live training, and virtual and live performance examinations for certification. A facility with a large number of CDT simulators where vehicle characteristics and scenarios are easily changed by the instructor provides valuable surge capacity. So if there is a need to train an extraordinarily large class for a particular vehicle, the CDT simulators can be quickly reconfigured for the surge. The CDT reduces the number of vehicle-specific spares and provides economies of scale for support.

3.4 Plan for a Life Cycle Support Strategy that Converges Existing Driver Trainers to a Common Simulation Base

There are existing driver training simulation platforms. As these platforms become obsolete, they can be upgraded to the common platform. It is estimated that the CDT can be developed to share up to 80% of its parts with the current ODS simulators. Furthermore, CDT will leverage the OneSAF terrain databases and environmental simulations.

4.0 Analysis Process

The input to an FAA is a concept of capabilities, how the Army will perform a particular military function to selected METT-TC conditions across the full range of military operations in the future. The inputs must identify those tasks that must be performed, the conditions of task performance, and the required performance standards. Its output is the tasks, conditions, and standards mapped to each required capability against which current and programmed capabilities are evaluated.

This FAA required data collection from TRADOC schools that train soldiers who will be drivers. In particular, face-to-face discussions and data collection were conducted at the following schools:

- Engineer, Military Police, and Chemical Schools at FT Leonard Wood (02-03 May);
- Transportation and Ordnance Schools at FT Eustis (04-05 May);
- Armor School at FT Knox (17-18 May);
- Field Artillery School at FT Sill (19-20 May);
- Infantry School at FT Benning (26-27 May).

The schools provided direct data in terms of programs of instruction (POI), tasks lists, training analyses, and responses to a structured questionnaire, as well as indirect data through formal meetings and informal discussions. Data were also collected from the:

- Combat Readiness Center at FT Rucker (25-26 April);
- National Guard Bureau at Arlington Hall (12 May);
- Unit of Action Maneuver Battle Lab at FT Knox (17 May).

At each site data were collected of the following nature: task, throughput, and OPTEMPO requirements; common and unique driver training requirements; driver training approaches and concepts; vehicle safety training; MOS and critical tasks; TADSS; conditions; and sensory training. Documented sources include POI's, training circulars, accident data documented by the Army Combat Readiness Center, U.S. Army Regulation 600-55, presentations given by

schoolhouse instructors, white papers, Training Effectiveness Analysis reports, and Army and Joint task lists. Informal sources included comments, concerns, and gaps noted by schoolhouse instructors, driver training specialists, and Unit master drivers and commanders, from both Active and Reserve Components.

The FAA was performed in accordance with TRADOC Pam 71-20.

DOTMLPF Question Architecture

Doctrinal Implications

The Army Driving Training Task Force (ADTF) recommends converting AR 600-55 to AR 350-XX. As the basis for such a conversion, the ADTF has been developing a holistic methodology for standardizing driver training in the Army to meet present and future Soldier skill requirements. This methodology will establish driving core competencies by weaving education, skill development and risk management awareness.

This methodology is based upon:

- A Traffic Safety Training Program that extends the existing driver training
- Standardized Training Packages (21-305 Series) leveraging interactive CBT
- Graduated scenario driven exercises in a synthetic environment (simulators)
- Progressive skill development utilizing designated ranges and courses

Part of this holistic methodology involves the alignment of the definition of Tasks, Conditions, and Standards related to driving across different schools and different equipment programs, particularly for those MOS where driving is an implied task and has not been identified as a critical task for the MOS. DA Form 6125-R provides a taxonomy of tasks oriented to normal operations, not the advanced driving skills needed for convoy operations; the AUTL provides the starting point for a common taxonomy of Conditions for driving tasks; and an initial taxonomy of Standards in the form of Performance Measures can be extracted from DA 6125-R, but needs to be updated to be consistent with current Tactics, Techniques, and Procedures (TTP) such as convoy operations. Appendix C of 600-55 provides a taxonomy of Army Wheeled Vehicles. These taxonomies should be extended and then adapted for the unique driving and equipment operation needs of the different TRADOC schools. For example, the Engineer School will have special operational needs related to using the equipment for moving earth or removing obstacles. An analysis of these tasks, conditions, and standards will be included in the associated Functional Needs Analysis.

Another doctrinal issue relates to the distinction between driving tasks and equipment operation tasks. As indicated in the Functional Area descriptions given above, driving tasks are related to the mobility of weapon systems, but these weapon systems have other capabilities besides moving. Equipment operation tasks are associated with these other capabilities, and are typically included in the critical task lists. Some of these tasks overlap, such as PMCS, which may include checks and services related to the mobility of the system as well as the primary functions of the system.

The ADTF recommends that the Army G3 direct “operate a vehicle” be included in the next critical task survey, with the SCP to monitor the task review. This recommendation is based in part on the fact that “Operate a vehicle in a convoy” is a specified critical Soldier (Warrior) task, but the underlying “operate a vehicle” task is not a basic Soldier task.

Organizational Implications

The ADTF recommends the creation of a Master Driver position in the Unit Table of Organization and Equipment. This position would improve commanders management and execution of drivers training, qualification and licensing programs. As the complexity and demands of driver training have increased, so has the need to provide commanders with a trained collateral or dedicated staff member who can assist in the management and execution of the Unit's driver training, qualification and licensing program.

If this position is defined as an MOS or ASI, then these soldiers will have special training. The Army Master Gunner program is a model for this, and the ADTF recommends that this position be specified as part of the AR 350-XX.

An alternative is for this position to be defined as an additional duty to be assigned by the Commander. Typical Field Artillery Battalions have their Master Gunner managing the driver training as well as gunnery qualifications. Similar programs have been developed and executed in Transportation units. Both of these approaches provide models for developing an effective program for Units throughout the Army.

Training Implications

A key problem for efficient training is identifying drivers so that they can be trained before their first duty station. For those MOS that have critical driving tasks, this is not a problem. The problem is for those MOS where driving is an implied task, not a MOS-specific critical task. In most cases, only a small fraction of these soldiers will be drivers at any point in time. Assigning a MOS or ASI makes it possible for the TRADOC schools to undertake efficient driver training, but limits the flexibility of the Unit Commander in selecting drivers in the field. The current approach provides the Unit Commander with flexibility in selecting drivers, but gives the Unit Commander a responsibility for driver training. However, as noted above, the current OPTEMPO does not allow the time and resources for appropriate driver training.

An alternative is for the TRADOC schools to provide universal driver training. The ADTF recommends development and enhancement of driving skills through a hands-on driving skills improvement program. The hands-on component of the program would be accomplished through the Advance Skill Driver Training (ASDT) program or similar developed and qualified hands-on model. The ADTF has developed a prototype course model based on automobile industry training. The prototype course includes proven driving industry skill improvement maneuvers that parallel the maneuvers in TC 21-305-4. These in-vehicle maneuvers attack both skill deficiencies in our POV drivers and in our Army vehicle drivers, and address specific situations that cause rollovers. The prototype course leverages technology to enhance training (skid monster) and can be quickly tailored to address emerging driver skill deficiencies. The course can be executed in non-tactical and tactical vehicles.

The ADTF has requested that:

- TRADOC as lead supported by FORSCOM, ANGB, IMA and USACRC develop and deploy a "hands-on" driver training pilot program at selected installations.
- TRADOC in conjunction with the USACRC develop a parallel assessment program to measure pilot program effectiveness in improving specific Soldier driving skills. This model must measure all training initiatives)

This universal driver training would attack vehicle-related accidents with a standardized driver education program called the Army Traffic Safety Training Program (ATSTP). This program builds upon and enhances Defensive Driving and Accident Avoidance training as directed in DoD 6055.4 and AR 600-55. The ADTF recommends that all soldiers under the age of 26 who possess a drivers license complete at least four-hours of classroom instruction in traffic safety, and that all personnel who are required to drive Army motor vehicles receive classroom instruction in Army motor vehicles, including platform instruction with interactive classroom participation. This course is modeled after the Air Force Traffic Safety Program as 5-module training course that teaches individual risk management, personal responsibility, driving hazard awareness, defensive driving techniques, accident avoidance, and motorcycle safety, as shown in the following Table:

Training Module	Course Title	Target Audience	Timeline	Fielding Schedule
Course I	Intro to Traffic Safety	Soldiers	Advanced Individual Training	Summer 05
Course II	Local Traffic Hazard Conditions	Soldiers and civilians	Provided at all duty station	ECD Jun 05
Course IIIA	Intermediate Traffic Safety	Soldiers	In combination with, or following Course II	Pending completion of Air Force Module
Course IIIB	Advanced Traffic Safety	Soldiers	12-18 months after Course IIIA	Under review
Course IV	Supervisor's Safety Course	Supervisors	Frequency TBD for all new Supervisors	Pending completion of base modules

Materiel Implications

A Common Driver Trainer simulator is the materiel solution part of the ADTF recommendations. The CDT will bridge the gap between knowledge based and hands-on performance oriented training, and will enhance core competencies and experience by exposing operators to dangerous driving hazards and scenarios in a virtual, controlled environment. The CDT will expose students to hazardous road, environmental, traffic, and emergency situations in virtual environment too dangerous to replicate in real environment. As has been demonstrated by the Army Tank Driver Trainer simulators, the CDT will reduce operating and maintenance costs on actual vehicles.

The CDT will provide the ability to objectively evaluate task performance and target training toward specific skill deficiencies. It will provide the ability to capture and replay the students' performance to quality assure training, test students, identify Soldier training deficiencies and retrain to standard. The CDT provides objective scoring of mission or task-based scenarios.

A Functional Solution Analysis (FSA) is being developed as part of the CDT ICD program to provide a return-on-investment analysis for the use of a CDT simulator. The FSA will address the savings in operating and maintenance costs on actual vehicles, and the potential for increasing the student/instructor ratio as compared with live training. The use of simulators for driver training has been proven effective. Through simulation, the German Army reports 19% decrease in

accidents, North American Van Lines reports 22% decrease in accidents, New York City Transit reports 43% reduction in preventable accidents.

Leadership Implications

The ADTF recommends that the USACRC, which is responsible for identifying losses and loss trends, transition leadership of the ADTF to TRADOC, which is responsible for developing the Army's solution sets, in order to more effectively attack our vehicle accidents and Soldier losses. TRADOC is the Army's designated agent for training Soldiers on operating Army tactical vehicles and equipment, developing a training program focused on the safe operation of tactical vehicles during normal operations, training exercises and war-time missions for the Army.

USACRC has chaired the Army Driving Task Force and matured potential initiatives but the proposed training concept requires transition from an integrating agency to an action agency. TRADOC has the doctrinal structure and processes to mature the program from its current initiative based concept to final resolution. TRADOC has been an integral part of the process as a participant from the beginning, and has been instrumental in the development of the Task Force initiatives.

Include Vehicle Command and vehicle crew training for driving-related tasks as crew-level tasks to be initially trained at the AIT level and sustained at the Unit level, following the training approaches being used for the combat convoy training that has been introduced at the institutional and Unit level. Develop a consistent Army-wide program that can be used in institutional or Unit training programs to standardize and improve internal functioning and crew coordination among vehicle "crews."

Personnel Implications

Change in the balance of responsibilities as stated in 600-55, and shifting from 600-55 to 350-XX, particularly for basic driving skills and certifications. The Unit commander should be able to assume a basic level of driving skills for all soldiers to give him or her the flexibility needed for adaptive command of expeditionary forces.

Facilities Implications

As noted above, the advanced driving skills that are now being required of Army soldiers cannot be trained with live equipment on publicly accessible roads. The essential live training and certification process will require driving-oriented range facilities. The ADTF recommends TRADOC in coordination with FORSCOM, ANGB, and IMA develop a proposal to designate, resource and establish selected installations as Army Driver Centers of Excellence (ADCOE). One or more prototype ADCOE are recommended to develop, implement, test, and measure the effectiveness and cost of integrated driver training initiatives and inform driver skill development strategy. ADCOE will deliver an Initial Operating Capability now, and will provide "Proof of Principles" for Larger Army applications. Possible ADCOE sites have been selected to leverage existing infrastructure, training devices and instructor cadres.

The ADCOE concept is an Integrated Training Range consisting of:

- Classroom Facility capable of providing Computer Based Training (CBT)
- Simulators (Fixed Base or Mobile)
- HMMWV Driving Range

- ASDT Driving Range
- Designated Driving Course for Day, Night and Night aided (e.g., driving with NVG)

Appendix E – Functional Needs Analysis (FNA)

1.0 Concept/CCP

The concept is a Common Driver Trainer (CDT), a system whereby all of the Army's driver/operator trainers will be built upon a common platform that will share approximately 80% commonality. The balance of each trainer (approximately 20%) will comprise the platform-specific driver/operator environment, with its associated functional controls. These platform-specific modules will be rapidly reconfigurable into distinct vehicle variants, or will represent the subtleties in different driver/operator controls, within a variant family.

Driver training has become a critical skill for the Future Force (FF) as the FF strategy has evolved to a highly mobile expeditionary force that uses the cover of night and bad weather to overcome an asymmetric enemy fighting in urban or otherwise restricted terrain. The need for driver training has been accentuated by the OEF/OIF experience. The current Army driver training approach is designed for a peacetime army, where there is time in the Units for driver training and where Army vehicles can be used as available in the motor pool and on roads within Army installations to provide training and testing. However, changes in FF strategy necessitate training in conditions that are unsafe for live training in tactical vehicles, and current Unit OPTEMPO makes it difficult to provide proper driver training as an individual skill in the Units.

The lack of sufficient driver training is evidenced by the rising number of serious injuries and fatalities resulting from vehicle accidents. These losses have become significant enough that they are a detriment to Army force readiness. Accordingly, the Army's senior leadership directed the U.S. Army Combat Readiness Center (CRC) to form a task force to investigate how the Army can reduce vehicle accidents, particularly those resulting in fatalities. The CRC formed the Army Driving Task Force (ADTF), which is currently developing a strategy to address this issue. Section 1.2 of the Functional Area Analysis (FAA) provides more narrative detail on driver training needs and the situations which have given rise to these needs.

The driver training strategy is described in Section 1.3 of the FAA, with the following key elements:

- Use the JCIDS process to determine and document CDT requirements.
- Develop and use a reconfigurable driver/operator trainer to minimize implementation costs.
- Leverage ongoing driver training simulator development.
- Develop driver/operator training implementation strategies to benefit MOS that do not currently have documented training requirements.

2.0 Functional Area Analysis Output

The FAA delivered to TPIO-Virtual on 14 June 2005 included excerpts from relevant approved Functional Operating Capabilities (FOC); presented a concept of operations to include use of simulation to expand the range of driving experience and reduce training costs, use of a reconfigurable simulator system to simulate training with multiple vehicles, use of a modular simulator system to support flexible blended training, and a plan for a life cycle support strategy that converges existing driver trainers to a common simulation base; and contained two databases

breaking down driving tasks, a Tasks-Conditions-Standards matrix and a Capabilities-to-Tasks matrix.

3.0 Force Capabilities

The existing force capabilities for driver training are described in Section 1.1 of the FAA. Section 1.1.1 of that document describes current Institutional driver training capabilities, methods, and limitations, Section 1.1.2 describes current Installation driver training capabilities, methods, and limitations, Section 1.1.3 describes current Unit driver training capabilities, methods, and limitations, and Section 1.1.4 describes current National Guard (NG) and Reserve Component (RC) driver training capabilities, methods, and limitations.

4.0 Operational Architecture

An overall approach towards a modified operational architecture for Army driver training that is better adapted to FF needs is described in the DOTMLPF Question Architecture section of the FAA. The key elements of this architecture are:

- Shifting the driver training burden from the Unit to the TRADOC schools using a combination of live, virtual, and instructor-led training. The ADTF has identified four courses that should be supported to provide this training. This shift will require an increase in basic and/or AIT/OSUT training time or other changes in training priorities for TRADOC schools.
- Development and fielding of a CDT simulator as a means of amortizing the cost of simulator development across driver training for multiple vehicles and multiple MOS. The simulator would benefit from common hardware, software, and virtual training environments.
- Conversion of AR 600-55 to AR 350-XX. This would allow TRADOC to use existing processes to standardize training requirements and methods across the Army.
- Defining a Master Driver position in the Battalion Table of Organization and Equipment to manage the driver licensing, training, and skill sustainment efforts.
- Development of Driving Centers of Excellence (DCOE) at selected Army Installations. These DCOE will provide the range facilities for the live elements of driver training for both AC and RC Institutional training.

5.0 Analysis Process

This Functional Needs Analysis (FNA) assesses the ability of the current and programmed Joint and Army capabilities to accomplish the driving tasks that the FAA identified under the full range of operating conditions and to the designated standards.

Using the tasks identified in the FAA as primary input, an FNA produces as output a list of capability gaps or shortcomings that require solutions and the risk posed by those gaps. The FNA determines which tasks identified in the FAA cannot be performed, performed to standard, performed in some conditions, or performed in the manner that the concept requires using the current or programmed force, and which of these gaps in capability pose sufficient operational risk to constitute needs that require a solution. The capability gaps in this FNA were derived from Army-provided training documentation and from operational lessons learned, as noted within the

descriptions below. Exhibit 5.1 presents summary results of the FNA gap and risk assignment analysis.

This FNA was performed in accordance with TRADOC Pam 71-20.

Exhibit 5.1 FNA Gap Analysis

ID	Gap	Description	Type of Gap (DOTMLPF)	Risk
5.1	**Missing Tasks-Conditions-Standards Data**	No driving tasks are identified for certain MOS.	O,T	High
5.2	**Inconsistent Tasks-Conditions-Standards Data**	For some driving tasks, conditions and/or standards are ill-defined and often differ in level of condition and standards detail provided.	O,T	High
5.3	**Inconsistency of Driver Training Requirements**	Requirements documents focus on system tasks and largely exclude driving-related implications of the systems.	D,O,T	High
5.4	**Driving Training Inconsistent with COE**	Unit commanders often require soldiers to drive under conditions that are not trained or cannot be trained safely using traditional techniques at the Institutions.	D,T,M	High
5.5	**Unit Driving Assignments**	A commander may not have information on a soldier's driving experience, or may not take the soldier's experience into consideration when assigning driving tasks.	D,O,T,L	Med
5.6	**Inconsistency of Driver Training Implementation**	Reserve and Guard Components face a lack of resources, training environments, and control over training time relative to the AC.	O,T,M,P,F	High
5.7	**Lack of Reusability/Reconfigurability**	The costs associated with vehicle-specific driver training systems rise with the number of systems needed.	T,M,F	High

5.1 Missing Task-Conditions-Standards Data

According to tasks, conditions, standards identified as part of the FAA, there are MOS for which no driving tasks are identified but for which at least some soldiers in Units are in fact required by commanders to drive vehicles. Examples are the 13 series (Field Artillery School) and 31 series (Signal Center). Leaders at these TRADOC schools, as well as at the Infantry School, do realize that certain soldiers will be required to drive in their Units, however they view their responsibility as training warfighting skills first.

Until recently the majority of soldiers entering the Army were licensed drivers and therefore the Army did not consider driving to be a basic task in need of training for all soldiers. The trend is rising, however, for soldiers entering the Army without driving licensure. Conducting basic driver qualification training during BCT/OSUT is not feasible as the priority for training there is on warrior tasks and battle drills. Yet conducting driver training during IET is also not feasible because CG TRADOC has put a limit on course growth, hence the Institutions are only able to focus their training on primary skills specific to their MOS, (and different Institutions identify

driving skills as more or less relevant to their functioning), so that driving becomes essentially a secondary skill that can end up not getting trained at the Institution.

5.2 Inconsistent Task-Conditions-Standards Data

There are tasks for which the conditions and/or standards fields are unfilled. For instance, a set of tasks for the 88M (Transportation School) involve driving vehicles with different properties and under different conditions, but no specifics as to vehicles or standards are given. Similar gaps appear for the 31B (Military Police School).

Further, the level of detail provided within task, condition, and standard cells varies considerably between MOS and TRADOC schools. The risk that might be assigned to this variability in detail depends on several factors. For instance, a given task might need to be performed under different conditions than were trained (described below as a gap involving the Contemporary Operating Environment, or COE). If these different conditions can seriously impact performance of the task, then the risk associated with not being detailed in the conditions for this task is high, because soldiers are being sent into conditions for which different training would make them better prepared (safer and/or more effective). Similarly, if the conditions and standards do not take into account the need to retain knowledge and skills, the importance of accuracy in performing the task, the importance of speed in performing the task, or the importance of safety in performing the task, then the risk associated with not including those details is high, because there is the potential for endangering the driver/operator who may not understand how quickly or accurately the task needs to be performed in these conditions.

The risk level should also consider the number of soldiers who need the training. Certainly there is some correlation between the number of soldiers to be trained and the number of miles driven. For schools like Infantry and Field Artillery, the number of soldiers who are actually driving is much smaller than the number of soldiers trained for that MOS, yet the skills that must be demonstrated by drivers with that MOS should be considered important. Hence, inconsistency in driver training across Institutions, and inconsistent tasks, conditions, and standards for driving skills, should be considered important (high-level) risks.

5.3 Inconsistency of Driver Training Requirements

While some inconsistencies result from differences in the way that tasks are defined, most driver training inconsistencies result from no driving-related training requirements being identified in the ORDs and in the STRAPs. The issue appears to be one of inconsistency of training requirements rather than inconsistency in training approaches to the requirements. For instance, the training section of the ORD for a particular payload system (e.g., the Brigade Subscriber Node, or BSN) focuses on skills that (Signal) soldiers need to acquire on that system. The ORD does not specify, however, driving requirements that are associated with carrying the system (i.e., how the driving dynamics of a HMMWV change when transporting the BSN).

In the Units, the soldier's experience level is not the primary consideration for determining which soldier drives which vehicle. As an example, in a HIMARS crew, the senior crew member will usually drive the launcher vehicle and will setup, aim, and fire the missiles, while a less experienced soldier will drive the support vehicle. However, the HIMARS support vehicles are those with payloads and pulling trailers and are more difficult to drive. The Army has not routinely identified how changing Unit and Field driving needs change potential training requirements.

5.4 Driving Training Inconsistent with COE

Unit commanders often require drivers to drive under conditions that are not trained or cannot be trained safely using traditional techniques at the Institutions. Examples include driving at greater speeds than recommended but necessary due to the COE, driving in different kinds of terrain or road types or weather conditions, driving different vehicles or vehicle variants than were trained on, and driving with payloads or while towing which fundamentally change the handling characteristics of the vehicle. Accident data from the CRC bear this out; the top causes of OIF vehicle fatalities include rollovers, misreading of road conditions, and accidents while towing. Training needs to be geared toward current tactical environments and threat; not just safety and shared across the Army (mission rehearsals, convoy operations). Training for drivers/operators needs to be METT-TC dependent and available at multiple locations to eliminate training deficiencies in soldiers when found.

The CRC provided data on the causes of accidents include factors such as characteristics of the individual soldier (fear/excitement, time pressure, overconfidence, poor attitude), leader error (improper supervision, lack of awareness of soldier capabilities), inadequate Institution or Unit training or lack of OJT experience, and inadequate standard operating procedures. Soldiers are trained on individual driving skills, but rarely under conditions that replicate the excitement, time pressure, or the like of actual operations. These conditions, as well as others such as convoy operations and poor weather, are difficult or unsafe to mimic in the Institution. However, as these conditions are shown to lead to accidents, the gap between Unit and Field driving needs and Institutional training is important (a high-level risk).

The focus on Force Projection as part of the Army Transformation and Modularity is developing new equipment strategies where troops fall in on the equipment pre-positioned in the Field or being used by the previous force as part of a rotation just prior to a mission. This strategy may save logistics costs, but it eliminates the ability for troops to train on the equipment they will be using during the mission before they are deployed. As is noted elsewhere, many of the driving accidents (such as rollovers) have been caused by soldiers not understanding the limits of their vehicles in the mission configurations.

Since driving vehicles with different payloads and equipment leads to accidents, the inconsistency of driver training requirements is an important gap (a high-level risk). The CRC has already broken out the accident data by vehicle types, although that data has not been normalized by miles driven. HMMWV variants were most often the vehicle involved in an accident, for reasons of excessive speed, misjudged clearance, failure to take precautions due to environmental conditions, and failure to use required safety equipment. These reasons are partly due to OPTEMPO, partly due to leadership failure, and partly due to training failure (e.g., not understanding the impact of the center-of-gravity shift on an up-armored HMMWV). For other vehicles, the reasons and causes for accidents are similar. Training requirements are focused on system-level skills but not driving skills.

5.5 Unit Driving Assignments

In Units, commanders making driving assignments may not have sufficient information on a soldier’s driving experience to determine what vehicle(s) that soldier is qualified to drive. As already suggested, due to COE, it may not matter; mission success may depend on the commander finding a given soldier to drive a given vehicle under given conditions. In addition, a soldier’s driving experience may not even be the primary consideration for determining which

soldier drives which vehicle. The HIMARS example applies here, where the senior crew member will usually drive the launcher vehicle whereas a less experienced soldier will be tasked to drive a support vehicle with payload and/or a trailer. These can be doctrinal and organizational considerations as well as training.

In addition, the Army Transformation and the Modular Force organization concepts being developed are pushing the level of combined arms operations lower and lower in the force structure. As a result, there are more different types of vehicles in the battalions, each requiring specialized training to deal with the different load configurations and the increasingly specialized sensor systems. The current driver training strategy pushes this training out to the Units. The battalion commander and the battalion NCOIC for driving must rely on the expertise of the current operators in the Field to provide this specialized training, although the battalion commander, working with the battalion NCOIC for driving, issues the licenses.

5.6 Inconsistency of Driver Training Implementation

AC and RC training differs. The RC faces a relative lack of resources, training environments, and control over training time. Armory and Reserve Center locations dictate the types of training available (e.g., an armory in an urban environment cannot handle night blackout driving training on city streets). The NG focuses on training 80% of the task conditions that the AC tries to achieve, in a fraction of the time.

What driver training is given also largely depends on activities taking place during a consolidated event; soldiers may practice driving on an often makeshift track while staff are planning and others are conducting fire training. Further, training before deployment is done on what is known at the time regarding Field conditions, but once RC forces are mobilized mission-essential tasks prevail. These are issues of organization, personnel, and facilities, as well as materiel available for training.

5.7 Lack of Reusability/Reconfigurability

The Army currently has fielded, will field, or has considered fielding a series of vehicle-specific training systems. Examples include the Tank Driver Trainer fielded at the Armor School, the Stryker Driver Trainer, and the Tactical Wheeled Vehicle simulator advocated in a TRAC-WSMR Training Effectiveness Analysis report. CRC data show an even broader range in Army vehicles involved in accidents, though, to include the HMMWV, FMTV, M1, and M2/3, suggesting the need for driver training systems for a range of vehicles. Further, these data are separate from privately owned vehicle (POV) data that also show upward accident trends. The CRC has proposed a number of DCOE that would include a simulation suite along with classroom-based, computer-based, and course-based training and assessment.

In addition to lack of reuse of driver trainer systems, the Army incurs administrative costs of procuring and producing separate devices. Without commonality of design, software, databases, and hardware configuration, overall acquisition costs may be expected to rise. Nonrecurring engineering (NRE), maintenance, and lifecycle support costs can be reduced through the use of a CDT integrated into the existing training environments as a planned replacement system for existing simulators as they become obsolete.

Appendix F – Functional Solution Analysis (FSA)

1.0 Concept/CCP

Driver training has become a critical skill for the Future Force (FF) as the FF strategy has evolved to a highly mobile expeditionary force that uses the cover of night and bad weather to overcome an asymmetric enemy fighting in urban or otherwise restricted terrain. The need for driver training has been accentuated by the OEF/OIF experience. The current Army driver training approach is designed for a peacetime army, where there is time for driver training and where Army vehicles can be used within Army installations to provide training and testing. However, changes in FF strategy necessitate training in conditions that are unsafe for live training in tactical vehicles, and current unit OPTEMPO makes it difficult to provide proper driver training as an individual skill in the units.

Changes in driving ability among the recruiting base and the lack of sufficient driver training is evidenced by the rising number of serious injuries and fatalities from vehicle accidents. These losses have become significant enough to be a detriment to Army force readiness. Accordingly, the Army's senior leadership directed the U.S. Army Combat Readiness Center (USACRC) to investigate how the Army can reduce vehicle accidents, particularly those resulting in fatalities. The USACRC formed the Army Driving Task Force (ADTF), which is currently developing a strategy to address this issue.[2] Section 1.2 of the Functional Area Analysis (FAA) provides more narrative detail on driver training needs and the situations which have given rise to these needs.

The driver training strategy is described in Section 1.3 of the FAA, with the following key elements relating to a Common Driver Trainer (CDT):

- Use the JCIDS process to determine and document CDT requirements.
- Develop and use a reconfigurable driver/operator trainer to minimize implementation costs.
- Leverage ongoing driver training simulator development.
- Develop driver/operator training implementation strategies to benefit Military Occupational Specialties (MOS) that do not currently have documented training requirements.

The concept is a CDT, a system whereby all of the Army's driver/operator trainers will be built upon a common platform that will share approximately 80% commonality. The balance of each trainer (approximately 20%) will comprise the platform-specific driver/operator environment, with its associated functional controls. These platform-specific modules will be rapidly reconfigurable into distinct vehicle variants, or will represent the subtleties in different driver/operator controls, within a variant family.[3]

1.1 Force Capabilities

The existing force capabilities for driver training are described in Section 1.1 of the FAA. Section 1.1.1 of that document describes current institutional driver training capabilities, methods, and limitations, Section 1.1.2 describes current installation driver training capabilities, methods, and limitations, Section 1.1.3 describes current unit driver training capabilities, methods, and limitations, and Section 1.1.4 describes current National Guard (NG) and Reserve Component (RC) driver training capabilities, methods, and limitations.

[2] Army Driving Task Force Charter.
[3] Stryker Driver Trainer Design Review Presentation.

1.2 Operational Architecture

An overall approach towards a modified operational architecture for Army driver/operator training that is better adapted to FF needs is described in the DOTMLPF Question Architecture section of the FAA. The key elements of this architecture are:

- Shifting the initial driver/operator training burden from the unit to TRADOC schools using a combination of live, virtual, and instructor-led training. The ADTF has identified four levels of courses that should be supported to provide this training.[4] This shift will require an increase in basic and/or AIT/OSUT training time or other changes in training priorities for TRADOC schools.
- Development and fielding of a CDT simulator as a means of amortizing the cost of simulator development across driver/operator training for multiple vehicles and multiple MOS. The simulator would benefit from common hardware, software, and virtual training environments based on the COE.
- Conversion of AR 600-55 to AR 350-XX. This would allow TRADOC to use existing processes to standardize training requirements and methods across the Army.
- Defining a Master Driver position in all Battalion Tables of Organization and Equipment (TOE) to manage the driver licensing, training, and skill sustainment efforts.
- Development of Driving Centers of Excellence (DCOE) at selected Army installations. These DCOE will provide the live practice range, Advanced Skills Training range, a standardized HMMWV range and virtual simulators for driver training at both Active Component (AC) and RC training locations.

2.0 Functional Area Analysis Output

The FAA delivered to TPIO-Virtual on 14 June 2005 included excerpts from relevant approved Functional Operating Capabilities (FOC); presented a concept of operations to include use of simulation to expand the range of driving experience and reduce training costs, use of a reconfigurable simulator system to simulate training with multiple vehicles, use of a modular simulator system to support flexible blended training, and a plan for a life cycle support strategy that converges existing driver trainers to a common simulation base; and contained two databases breaking down driving tasks, a Tasks-Conditions-Standards (TCS) matrix and a Capabilities-to-Tasks matrix.

3.0 Functional Needs Analysis Output

Exhibit 3.1 shows the results of the Functional Needs Analysis (FNA) gap analysis that was delivered 20 July 2005.

[4] Army Driving Task Force Presentation, April 2005.

Exhibit 3.1 FNA Gap Analysis

ID	Gap	Description	Type of Gap (DOTMLPF)	Risk
1	Driving Training Inconsistent with COE	In the COE unit commanders often require Soldiers to drive under conditions that are not trained or cannot be trained safely using traditional techniques at the Institutions or Installations.	D,T,M,L,F	High
2	Missing Tasks-Conditions-Standards Data	No driving tasks are identified for most MOS.	D,T,L	High
3	Inconsistent Tasks-Conditions-Standards Data	For some driving tasks, conditions and/or standards are ill-defined and often differ in level of condition and standards detail provided.	D,T,L	High
4	Inconsistency of Driver Training Requirements	Requirements documents focus on system tasks and largely exclude driving-related implications of the systems carried on their prime mover.	D,O,T,M,L	High
5	Unit Driving Assignments	A commander may not have information on a Soldier's driving experience, or may not take the Soldier's experience into consideration when assigning driving tasks.	D,O,T,L,P	Med
6	Inconsistency of Driver Training Implementation	Reserve and Guard Components face a lack of resources, training environments, and control over training time relative to the AC.	O,T,M,L,P,F	High
7	Lack of Simulator Commonalities/Reconfigurability and Availability	Expenses associated with research, development, bidding, and acquiring separate simulators for each vehicle type is expensive and redundant in many areas. A driver simulator is not available to large portions of our Institutional, Operational, and Reserve forces	M,L,F	High
8	Non-optimized Mix of Live, Virtual, and Constructive (LVC) Training	Because virtual training tools like simulators have not been available to large portions of Institutional, Operational, and Reserve forces, a less than optimal mix of training techniques has been used (i.e., the instructors have built their training around what is available). The appropriate mix of LVC training will differ from one training situation to another.	D,O,T,M,L,F	Med

4.0 DOTMLPF Analysis

This Functional Solutions Analysis (FSA) presents approaches to overcome capability gaps. It follows the FNA that assessed the ability of the current and programmed Joint and Army capabilities to accomplish the driving tasks that the FAA identified under the full range of operating conditions and to the designated standards. Doctrinal, Organizational, Training, Materiel, Leadership, Personnel, and Facilities (DOTMLPF) implications are all considered.

This FSA was performed in accordance with TRADOC Pam 71-20.

4.1 Doctrinal Solutions

Some of the gaps identified in the FNA have doctrinal implications:

- Driving training inconsistent with unit driving assignments and COE.
- Missing or inconsistent TCS data.
- Tracking and assigning unit drivers.

- Non optimized mix of Live, Virtual and Constructive Training.

The ADTF has been developing a methodology for standardizing driver training in the Army to meet present and future Soldier skill requirements. This methodology is based upon:

- A Traffic Safety Training Program that extends the existing driver training.
- Standardized Training Packages (21-305 Series) leveraging interactive CBT.
- Graduated scenario-driven exercises in a synthetic environment (simulators).
- Progressive skill development utilizing designated ranges and courses.[5]

Part of this methodology involves the definition of TCS related to driving across different schools and different equipment programs, particularly for those MOS where driving is an implied task and has not been identified as a critical task for the MOS. As described in the FAA, there are taxonomies of vehicles, tasks, conditions, and standards oriented to normal operations, but not to the advanced driving skills needed for unique equipment or operations such as convoy operations.

Another doctrinal issue relates to the distinction between driving tasks and equipment operation tasks. Driving tasks are related to the mobility of weapon systems, but these weapon systems have other capabilities besides moving, including equipment operation tasks. The ADTF recommends that "Operate a vehicle" be considered a critical driving-related task in many MOS.

4.2 Organizational Solutions

Some of the gaps identified in the FNA have organizational implications:

- Driving training inconsistent with unit driving assignments and COE.
- Driver training implementation inconsistent across the AC and RC.
- Lack of simulator commonalities, reconfigurability, and availability.
- Non optimized mix of Live, Virtual and Constructive Training.

The ADTF recommends the creation of a Master Driver position, modeled on the Master Gunner program, in the unit TOE. This position would improve Commanders' management and execution of drivers training, qualification and licensing programs. As the complexity and demands of driver training have increased, so has the need to provide commanders with a trained collateral or dedicated staff member who can assist in the management and execution of the unit's driver training, qualification, and licensing program.[6] An alternative is for this position to be defined as an additional duty to be assigned by the Commander.[7]

Inconsistent implementation and lack of trainers are addressed in the Materiel section below.

4.3 Training Solutions

Nearly all of the gaps identified in the FNA have training implications. Three training solutions are included as those that will deliver the training that is enabled by the other solutions.

[5] Army Driving Task Force Presentation, April 2005.
[6] Army Driving Task Force Presentation, April 2005.
[7] FT Sill Driver Training Data Collection Meeting.

4.3.1 Army Traffic Safety Training Program

Exhibit 4.1 describes a course structure recommended by the ADTF for training on the operation of Army motor vehicles, including platform instruction with interactive classroom participation. This course is modeled after the Air Force Traffic Safety Program as 5-module training course that teaches individual risk management, personal responsibility, driving hazard awareness, defensive driving techniques, accident avoidance, and motorcycle safety.[8]

Exhibit 4.1 Army Traffic Safety Training Program

Course	Title	Instructional Method	Target Audience	ECD	Assessment Completion	Fielding Date
	Accident Avoidance Course (30 min)	Web-based on AKO Learning Management Server	All Soldiers and drivers of Army motor vehicles / GSA fleet	13 Jun 05	01 Jul 05	01 Aug 05
1	Introduction to Driver's Training (1 hr)	AIT Classroom instruction	AIT students	13 Jun 05	01 Jul 05	01 Aug 05
2	Local Hazards (30 min)	Classroom	Installation	13 Jun 05	01 Jul 05	01 Aug 05
3a	Intermediate Driver's Training (2.5 hrs)	Classroom	Installation	13 Jun 05	01 Jul 05	01 Aug 05
3b	Advanced Driver's Training (1 hr)	Classroom	Installation	15 Jul 05	30 Jul 05	01 Sep 05
4	Supervisor's Traffic Safety Training (1 hr)	Classroom	Installation	30 Jul 05	15 Aug 05	01 Sep 05

As described in the FAA, a potential approach is for TRADOC to provide universal driver training either before or during AIT and to attack vehicle-related accidents with a standardized driver education program to include individual risk management, personal responsibility, driving hazard awareness, defensive driving techniques, accident avoidance, and motorcycle safety.

In order for the Materiel solutions described below to be effective, training programs of instruction (POI) will have to be adapted to leverage the available Training Aids, Devices, Simulators and Simulations (TADSS). This is a low risk, since the Army instructors are highly motivated to provide good training to the soldiers, but the transition to the use of the potential training aids will take time.

4.3.2 Basic Driver Training

In its 25 August 2005 meeting, the ADTF recommended that a 40-hour basic driver training POI on the HMMWV should be instituted at six Army Training Centers that conduct basic training for the Army. What the POI will consist of remains under consideration, however, the ADTF recommended placement of CDT simulators at the six sites for this purpose.

[8] Army Driving Task Force Presentation, April 2005.

4.3.3 Driving Risk Assessment Tools

The ASMIS-1 – POV Risk Assessment Tool, which is an interactive Web-based application set up to compute risk assessments for Soldier travel while providing a tool for documenting and counseling Soldiers before they leave on extended trips. The tool is integrated with the Army's Risk Management Information System where accident information for similar trips can be presented to the Soldier. More awareness of this tool by supervisors is needed to achieve higher levels of effectiveness of the tool. This tool can also be adapted for Army Motor Vehicles.

4.3.4 Optimized Mixes of Live, Virtual, and Constructive Training

There is a relationship between the level of proficiency for a student and the relative amount of time spent in live, virtual, and constructive (LVC) environments. Becoming familiarized, the lowest level of proficiency, implies acquiring knowledge about components (e.g., machinery and equipment, or the rules of the road), their capabilities, and their characteristics. Familiarization is relatively passive; knowledge can be gained, for instance, by absorbing a presentation or through reading. Acquiring a skill, the next level of proficiency, is learning techniques and procedures. Students must actually perform the skills to truly acquire them. However, acquisition can normally be achieved in PC-based and part-task (i.e., virtual) environments. Practice is an extension of acquisition. During practice (often called proceduralization), the student internalizes techniques and procedures by performing the skill. Practice can begin in a PC-based environment, extended practice can occur in a constructive environment, and focused practice can occur in a live environment, when available.[9] Skills are validated, the highest level of proficiency, when students are tested on their ability to perform the skills. The more realistic the setting in which skills are validated, the more confidence both instructor and student will have in their applicability on the job.

A whole task approach would be to put Soldiers in their actual vehicles from the beginning to the end of training. Practical disadvantages of this approach are related to the expense of acquiring and maintaining the vehicles, filling instructor positions, and giving Soldiers adequate practice time in the vehicles. Theoretical disadvantages relate to Soldiers being required to implement a skill in the actual vehicle before they can practice strategies for meeting required standards in required conditions, with potential safety consequences.

In contrast, a part-task training approach would teach component skills in TADSS before the Soldiers practiced in the actual vehicles. The simulators would range in complexity from low fidelity desk-top trainers (DT's) to high fidelity virtual systems with motion platforms. Practical advantages of this approach relate to being able to distribute multiple simulators geographically. Theoretical advantages relate to Soldiers being able to gain a richer understanding of what they have to do before they know how to implement the skills. For example, before mastering the complex psychomotor skill for controlling military vehicles, Soldiers could learn in simulators basic vehicle operations, safety rules, and risk assessment. The challenge for this part-task approach is to identify the appropriate training conditions and assessment standards for each of the parts with respect to specific skills and implementing a gated strategy with a mix of virtual and live training.

[9] Mills, K.C., & Hubal, R.C. (2001). Correlational Data that Support a Constructive Assessment of Driving Skills. Proceedings of the Interservice/Industry Training, Simulation and Education Conference, Orlando, FL.

4.4 Materiel Solutions

Some of the gaps identified in the FNA have materiel implications:

- Driving training inconsistent with COE.
- Driver training implementation inconsistent across the AC and RC.
- Lack of simulator commonalities, reconfigurability, and availability.

A CDT simulator is the materiel solution part of the ADTF recommendations. The CDT will bridge the gap between knowledge based and hands-on performance oriented training, and will enhance core competencies and experience by exposing operators to dangerous driving hazards and scenarios in a safe, virtual, and controlled environment. The CDT can expose Soldiers to hazardous road, environmental, traffic, and emergency situations in virtual environments too dangerous to replicate in real environment.[10] As has been demonstrated by the Army Tank Driver Trainer simulators, the CDT will likely reduce operating and maintenance costs on actual vehicles.[11]

The CDT will provide the ability to objectively evaluate task performance and target training toward specific skill deficiencies. It will provide the ability to capture and replay the Soldiers' performance to assure quality training, test Soldiers, identify Soldier training deficiencies and retrain to standard. The CDT provides objective scoring of mission or task-based scenarios.[12]

4.5 Leadership Solutions

All of the gaps identified in the FNA have leadership implications. Commanders are faced with increasing OPTEMPO, more unlicensed drivers, a dangerous COE, land and road restrictions as well as other difficulties in maintaining a properly trained and licensed force.

The ADTF recommends that the Army transition leadership of the ADTF from the USACRC to TRADOC to more effectively address vehicle accidents and Soldier losses. The proposed training concept requires transition from an integrating agency to an action agency. TRADOC has the doctrinal structure and processes to mature the program from its current initiative based concept to final resolution. TRADOC has been an integral part of the process as a participant from the beginning, and has been instrumental in the development of the Task Force initiatives.[13]

4.6 Personnel Solutions

The personnel implications of the FNA gaps involve inconsistency of driver training implementation between the AC and RC and driver training inconsistent with unit driving assignments.

This analysis reinforces the difficulty of finding the time for driver training for MOS without identified driving critical tasks. Training developers and instructors at the TRADOC institutions are using their experience and professional judgment to weigh driving tasks against other training requirements specific to the MOS.

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[10] Army Training: Improvements Are Needed in 5-Ton Truck Driver Training and Supervision (GAO-01-436, April 2001).
[11] Armor School Report.
[12] Stryker Driver Trainer System Requirements Document.
[13] Army Driving Task Force Presentation, April 2005.

The creation of ASI's for drivers who are low density in their current MOS, such as the Infantry 11 series MOS, is a possible personnel solution, but it limits the flexibility of unit Commanders. It imposes significant record-keeping requirements on the Army personnel system and requires new instructors and course development for TRADOC schools with low density of drivers per MOS. Analysis at the Infantry School has indicated that the return on investment is not justified based on feedback from units in the field.

If the unit Commanders want the flexibility in assignment of drivers from low density MOS, then the training is most efficiently done by the units. One approach to reducing the training burden on the units is the creation of a Master Driver position, modeled on the Master Gunner program, in the unit TOE.[14] If this is implemented as an ASI, then the ASI needs to be tracked and a training course would have to be created for the Master Driver position. These changes present an opportunity for "Train the Trainer" possibilities, such as teaching the Advanced Skills Driver Training (ASDT) to the Master Drivers, as well as having them study the level 4 Supervisor's Safety Course indicated in Exhibit 4.1.

The current Unit Level Logistics System – Ground (ULLS-G) data system is inadequate to keep pace with the Army mission. Soldier driving records must be hand-carried between assignments requiring duplication of training when records are lost or destroyed. A database of record in the Enlisted Personnel Records or Defense Training Management System (DTMS) would more efficiently and accurately document driver training records, and provide a historical record of training. This database is a building block for the other training, organization, leadership, and personnel solutions. The database of record would be used to:

- Record Soldier civilian driver license records and military driving records.
- Allow commanders to make accurate assessments of Soldier's driving experience in accordance with AR 600-55.
- Record driver simulation training and privately owned vehicle (POV) skill related training.
- Link ULLS-G record system to the Enlisted Personnel Records system to allow transfer and storage of driver training record data.
- Establish a storage record on the Common Access Card (CAC) to store enough driver training record information to reconstruct lost Army driver licenses or to be used as an access tool to driver training database.

4.7 Facilities Solutions

The advanced driving skills that are now being required of Army Soldiers cannot be trained with live equipment on publicly accessible roads. The essential live training and certification process will require driving-oriented range facilities like the one shown in Figure 4.2. The ADTF recommends TRADOC in coordination with FORSCOM, NGB, and IMA develop a proposal to designate, resource, and establish selected Installations as Army DCOE, with a Proof of Principle funded in FY06 and tested at FT Leonard Wood using the MP AIT driver training. The DCOE concept is an Integrated Training Range consisting of:

[14] Army Driving Task Force Presentation, April 2005.

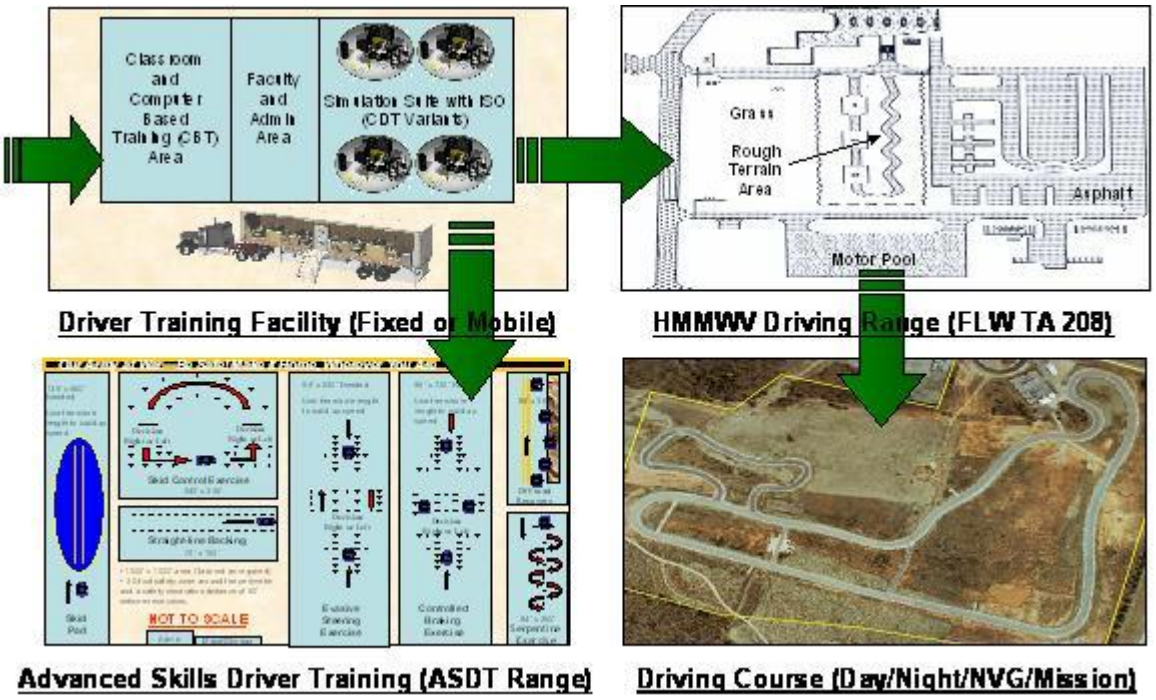

Figure 4.2 Driving Center of Excellence Concept

- A classroom facility capable of providing Computer Based Training (CBT).
- Simulators (fixed base or mobile).
- A HMMWV driving range.
- An Advanced Skills Driver Training ASDT driving range.
- A designated driving course for day, night and night aided (e.g., driving with NVG).[15]

5.0 Ideas for Materiel Approaches

Analysis conducted for this FSA has led to three complementary materiel approaches to resolving the gaps identified in Section 4.4:

- Virtual simulators for full-task driver training.
- Part-task trainers for driving skills training.
- Equipment enhancements for live driver training.

5.1 Virtual Simulators for Driver Training

Simulation is an essential element of the solution space presented in this report, because simulation is necessary to providing safe training for driving in the Current Operating Environment (COE).

Training in a simulator is safer than training in an actual vehicle without necessarily giving up realism. For instance, in a tank the driver is physically separated from the rest of the crew and from the driving instructor or Tank Commander (TC). Consequently, the TC cannot take control of the tank in an emergency. Similarly, because of the tank's size and power, driving errors can lead to injury or death of the tank crew members or bystanders, damage to the tank and to other

[15] Army Driving Task Force Presentation, April 2005.

equipment or facilities. Additionally, a 6 degree-of-freedom (DOF) (pitch, roll, yaw, heave, surge, and sway) simulator enables simulation as realistic as possible before Soldiers drive an actual tank.

5.1.1 The Common Driver Trainer Concept

The CDT is a virtual driver training simulator system that leverages technology to fill a need for current and future forces training. The CDT can reduce training costs and risks, provide more experiences on a broader range of driving conditions, and standardize training across MOS. Designed to follow the proven efficiencies in the Stryker Driver Trainer series, the CDT is a simulator that is easily reconfigured for multiple vehicles and utilizes a large collection of terrain, weather, and hostile force models developed for the Synthetic Environment Core program. The ability for one simulator to model multiple vehicles reduces the inventory and operating costs of vehicles that now must be dedicated to training, as well as providing economies of scale as compared to the costs of developing and fielding simulators for each vehicle type in the Army fleet. A CDT system that provides a common platform for all of Army's driver/operator full task virtual simulators would share approximately 80% commonality, with approximately 20% involving platform-specific functional controls (see Figure 5.1). The CDT is an integral component of a progressive driver training strategy recommended by the ADTF that leverages common simulation technology with flexibility to support appropriate mixtures of live, virtual, and classroom training.

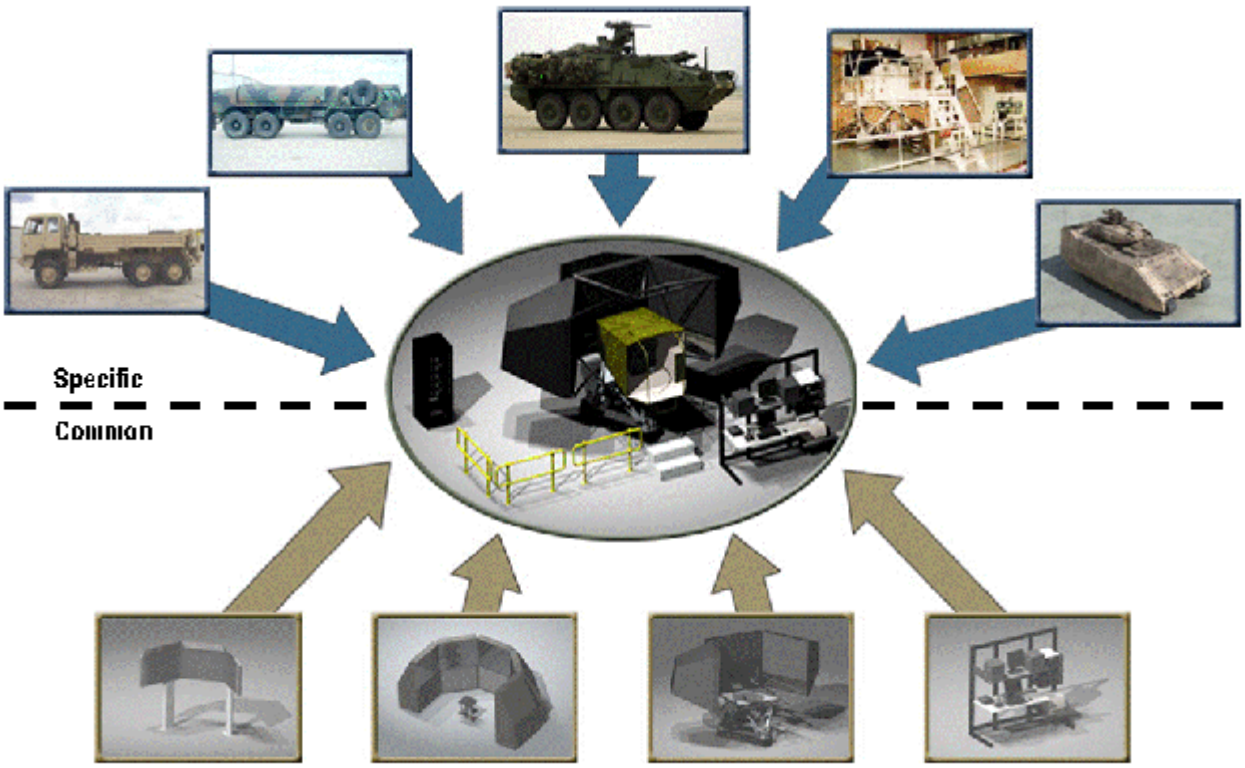

Figure 5.1 Common Driver Trainer Concept

The need for a motion platform base derives from the highly interactive psychomotor skills associated with driving. Driving depends on a moment-to-moment reciprocal interplay between information from vehicle motion and other relevant information such as visual, auditory, and proprioceptive information.[16] The way conceptual skills (that might be gained from DT's as discussed below) and psychomotor skills are integrated depends on conditions and vehicles, requiring an ability to implement vehicle-specific conditions for training.

5.1.2 CDT Configuration Options

Research suggests a principled approach to associating the right training environments with training conditions and assessment standards.[17] The CDT can be configured with different levels of platform motion: 0-DOF, 3-DOF, and 6-DOF. Increasing levels of freedom provide more realism but at increasing levels of complexity, equipment cost, and floor space per device. Different degrees of movement may be recommended for a given task, ranging from 0-DOF to 3-DOF to 6-DOF. For instance, Soldiers may use a 0-DOF movement platform to learn to work vehicle controls for the turret, gun positioning and towing. However, they may use a 6-DOF platform to automate their skills for turret, gun positioning, and towing during daylight, night, and adverse conditions. Similarly, Soldiers may use a 3-DOF movement platform to automate their skills for braking and skid avoidance during daylight, night, and adverse conditions, or for smooth starting, slowing, and stopping. The three DOF that would be critical for this training would be pitch (as when the vehicle dips during braking), roll (as when the vehicle rolls over), and yaw (as when the vehicle fish tails). A 6-DOF platform might be added for some hazardous conditions such as driving on unpaved mountain roads where a driving error could cause a driver to plunge to certain death. These roads have extreme bumps, dips, pot holes, and slopes. Such roads are currently used heavily in OEF/OIF where war has destroyed main paved highways.

5.2 Part-task Training Devices

Part-task training is motivated by the finding that beginners are overwhelmed by a whole complex task. Instead, a cognitive task analysis is performed and focused training is designed to enable students to learn parts of the task and to integrate them into the whole task. Examples include hierarchical part-task training, multiple emphasis on components, and active interlocked modeling.[18] All of these approaches define parts and sequence them according to a model of the process components and the relationships among them. A global level analysis of military driving skills includes the development of concepts, psychomotor skills, and the coordinated interplay of conceptual and psychomotor skills. Military driving, like all complex skills, requires Soldiers to develop through iterative stages of learning what to do (declarative knowledge), how to do it (procedural knowledge), and how to do it automatically (automated skills).[19]

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[16] Ness, J.W., Tepe, V., & Ritzer, D.R. (2004). The Science and Simulation of Human Performance. Boston: Elsevier.

[17] Frank, G.A., Helms, R. & Voor, D. (2000). Determining the Right Mix of Live, Virtual, and Constructive Training, Proceedings of the Interservice/Industry Training Systems and Education Conference, Orlando, FL.

[18] Shebilske, W.L., Goettl, B., & Regian, J.W. (1999). Executive control and automatic processes as complex skills develop in laboratory and applied settings. In D. Gopher & A. Koriat (Eds.) Attention and Performance XVII: Cognitive Regulation of Performance: Interaction of Theory and Application (pp. 401-426). Hillsdale, NJ: Erlbaum.

[19] Shebilske, et al. (1999).

5.2.1 Conceptual and Motor Skills

It is generally possible to work backwards from USACRC accident data (e.g., rolling over, running into a ditch, and being involved in a single-vehicle collision) to identify the conceptual and motor skills components for critical tasks. Conceptual components are related to single-vehicle accidents. When approaching an intersection, for example, a driver needs a good mental model of the possible directions from which traffic can come, and needs a good attention management strategy to observe and be aware of the traffic. Conceptual skills can be developed on a PC simulator as a foundation for integrating them with motor skills. Relevant motor skills would include steering and braking skills as they relate to sudden lane changes at speed, hard braking and then lane change at speed, slalom driving, running off the road, and functioning on a "skid pad" course.

Interactions across conceptual and motor categories are also reciprocal. On the one hand, for instance, poor awareness about traffic could create the need to make a sudden lane changes at high speed, or to hard brake and then lane change at high speed, or to swerve as in slalom driving, or to run off the road, or to skid. On the other hand, any of these actions would create the need for new awareness dimensions related to traffic during these actions. Traffic situations that had not seemed risky before the actions may become risky during the actions as when a lane change to avoid one collision results in another collision or in near collisions avoided by other evasive actions. Drivers could learn about these risks by observing other drivers have real or simulated collisions or near collisions during these actions. These observations could be done on a low-end PC simulator. Drivers could also adapt to a novel situation by integrating their cognitive and motor skills in unique ways during the events.

5.2.2 Part-task Training Examples

The following examples for interactive videos and DT's for driving automobiles in civilian conditions have been implemented successfully for several systems.[20] Some of the examples apply directly to driving military vehicles on community roadways. Many of the examples could also be extended to driving military vehicles in military conditions. Basic vehicle operations may be presented via interactive videos. These operations include vehicle maintenance, dashboard controls, indicator lights, the pre-drive check, and radio communications. Concepts for numerous driving skills, both with and without traffic, may be taught via low fidelity desk top trainers. These concepts include lane changes, rules for intersections, merging, following safely, passing, recognizing and avoiding potential collisions, recognizing potential hazardous conditions, situation awareness, risk assessment, and decision making under time pressure. Using these types of systems, standards can be specified with respect to numerous driving-related performance measurements, including vehicle motions, driver control responses, motions relative to people and other vehicles moving and stationary, accidents, violations, speed deviations, course deviations, time to collision, use of safety signals, reaction time, and recognizing high risk situations.

Also important is assessment of driving-related cognitive and emotional elements. The following systems provide quantifiable results at a fraction of the cost of high-end simulators. Real-time performance assessment on a low-cost PC-based platform has the potential to significantly enhance the Army's knowledge of Soldiers' driving capabilities.

[20] For low fidelity desk top trainer examples, see simulatorsystems.com, drivesafety.com, and systemstech.com. for interactive videos, see driveredinabox.com and trafficschool.com.

- The Profiler interactive software gathers data on drivers' scanning and divided-attention (multi-tasking, stress management, distractibility) skills during a multi-level 30-minute driving simulation, and also identifies specific tendencies toward tunnel vision under stress.[21]

- The driVR system provides a tool for clinicians and driving instructors to evaluate driving skills in the safety of the clinic setting.[22] driVR provides the opportunity for off-road driver training, affordable driving simulation for use in rehabilitation settings to evaluate functional driving skills, and an immersive driving experience, allowing a participant to enter into and travel around in a realistic three-dimensional artificial world.

5.3 Vehicle-based Materiel Solutions

The ADTF has been piloting an Advanced Skills Driver Training course which focuses on hands-on training with actual vehicles. Topics covered by this training include road-based defensive driving techniques such as scanning, maintaining space, road hazards, and maneuvering.

5.3.1 Skid Control

The Skid Monster (see Figure 5.2) is used to modify POV's to allow the driving instructor to induce skids. It is essentially an apparatus that replaces the back wheels of a front-wheel drive vehicle and can simulate skids in a variety of environmental conditions.[23] To train proper steering and evasive maneuvering, controlled braking, and acceleration techniques, the instructor can control the condition and severity of a skid, with the ability to teach skid control without the use of a wet track. A variation on this equipment is being developed for the HMMWV, as many of the accidents in OEF/OIF are occurring because of skids, drivers having to swerve to avoid obstacles, and drivers not understanding vehicle dynamics changes such as shift in center of gravity caused by speed, towing, or extra weight. Other approaches to skid control training involve modifying vehicles to have 'sneaky' brakes, placing sand on asphalt, or using a slick track of polished concrete.[24]

[21] See profiler-vr.com.
[22] See drivr.com.
[23] Joseph, A. (2005, May). Safe driver, safe soldier. Soldiers Magazine.
[24] Evasive Driving Track Analysis presentation to the MP School.

Figure 5.2 Skid Monster

5.3.2 Live Vehicle Configuration

Another materiel solution would involve using actual vehicles with appropriately configured platforms or weighting for live training. For example, a HIMARS Resupply Vehicle normally tows a trailer with additional rockets, drastically affecting the performance characteristics (acceleration, swaying, braking, etc.) and introducing a new set of parameters in maneuvering (corners, parking, etc.). An additional possibility, given the frequency of accidents involved with the use of trailers, would be to extend the ASDT to include driving with trailers. This would provide an introduction to the skills needed to safely operate a vehicle in both towing and non-towing modes. There are several critical skills that need to be mastered for safe trailer towing to include but not limited to:

- Sway avoidance and recognition.
- Turning radius recognition.
- Load effects on braking.
- Reverse operations with a trailer.
- Tire dynamics of the trailer (low pressure and/or blowouts).
- Mirror usage.

5.3.3 Black Box Technology

The ADTF put forth a suggestion to use black boxes to provide vehicle operators and supervisors with the means to leverage technology for enhanced driver performance, quantitative quality assurance and improved fleet management (safety, maintenance, cost).[25] Referencing black box usage by the Air Force and by airlines, the ADTF noted that technology currently has the capability for enhancing vehicle operations – and driver safety either passively or actively –

[25] Army Driving Task Force Presentation, April 2005.

through warning devices, interventions, and via accident reconstruction. Though current and legacy fleets would require add-on devices, future vehicle fleets can be expected to have such embedded instrumented devices.

6.0 Analysis of Materiel / non-Materiel Approaches

The FNA gaps do not apply uniformly to the different training situations identified in the FAA. For example, the MOS that do not have identified driving critical tasks face a different situation than those MOS that do have identified driving critical tasks. In this section the CIDS summary analysis worksheet is separated in terms of the different situations identified in the FAA, and then the gaps and solutions in those contexts are described.

6.1 Institutional Driver Training for MOS with Driving Critical Tasks

The FNA found that MOS with identified driving critical tasks are not training to tasks, conditions, and standards that reflect the COE, and that the definition of TCS vary across institutions. The FNA also found that separate procurement of multiple driver trainers was limiting the reusability, reconfigurability, and availability of simulators for Army driver training and wasting resources in terms of logistics contractor support and maintenance.

The major focus considered in this FSA for improving driver training for MOS with identified driving critical tasks is enabling them to adapt their training to the COE cost-effectively by leveraging the benefits of a CDT. Part of this transition involves standardizing TCS across the schools to reap the benefits of a CDT simulation. As documented in the FAA, the Transportation School and the Armor School are effectively using simulations as part of their training. The Engineer School has special TCS requirements, but will still be able to benefit from use of simulators and is aggressively seeking them due to the costs of using live devices and the limitations of live device use during inclement weather.

6.1.1 Non-Materiel Approaches

The primary emphasis of the non-materiel approaches to institutional driver training for MOS with identified driving critical tasks is creating the environment and mechanisms for standardizing the TCS across the Army and for updating the TCS to reflect the COE. The mechanism considered in this FSA is the transition from AR 600-55 to 350-XX, which will give TRADOC more control over driving regulations and requirements.

The second non-materiel approach is upgrading the environment for live training to make it safe for live training with respect to conditions and standards reflecting the COE. In particular, this means transitioning the live driving from public roadways to driving ranges which provide a safe driving environment under conditions closer to the COE. The Driving Centers of Excellence include ranges that support safe live training.

Exhibit 6.1 shows selected annual student throughput from AIT and advanced courses. As the table shows, for those MOS that have critical driving tasks, many Soldiers need to be trained and the risk for accidents or mishaps increases accordingly.

Exhibit 6.1 Annual Student Throughput by MOS[26]

MOS	Throughput
11B	130 (Stryker ICV only)*
11H	11 (Stryker ATGM only)*
13B	3620 (BCT/AIT/OSUT/IET) + 464 (ANCOC/BNCOC)
13D	1000 (advanced skills training) + 160 (ANCOC/BNCOC) + 1800 (sustainment)
13M	888 (BCT/AIT/OSUT/IET) + 192 (ANCOC/BNCOC)
13P	500 (AIT/IET) + 83 (ANCOC/BNCOC) + 2500 (sustainment)
13W	126 (BCT/AIT/OSUT/IET) + 12 (ANCOC/BNCOC)
19D	288 (OSUT) + 58 (Stryker RSTA only)*
19K	33 (Stryker MGS only)*
21E	985
21F	185
21J	480
21N	192
31B	5000 +/-
88M	> 3700

* Note: These throughput numbers provide an estimate of 'density' of drivers relative to the total number of Soldiers trained at that MOS.

6.1.2 Materiel Approaches

The FNA found that Soldiers are not able to train, or are not trained, on the variety of vehicles that they will be driving once they leave the training base. Exhibit 6.2 shows how many different vehicles are utilized by different branches. The range of vehicles, if or when trained at TRADOC schools, suggest a common, reconfigurable materiel platform for driver training that would maximize reuse and also provide the institutions with flexibility in scheduling the training through the reconfigurability of the simulators. Further, when live operating and maintenance costs are included, as well as the student / instructor ratios, the return on investment for a CDT increases relative to live vehicle training.[27]

[26] Data derives from TRADOC school questionnaire responses and from the report "Front End Analysis of Driver and Maintenance Training for the Interim Armored Vehicle", delivered 27 February 2002.

[27] The operation of an actual tank costs about $92 per mile. The total operating costs of high-end 6-DOF simulator is less than $6 per mile including salaries for instructors and operators as well as maintenance and electricity.

Exhibit 6.2 Sample of Different Vehicle Type Simulations Required by Location

Proponent	Vehicle
Air Defense Artillery	M1068 SICPS; M730 Chaparral
Armor	HMMWV; M1 Abrams; M3 Bradley CFV; M4 C2V; M551 Sheridan; M8 Buford AGS; MGS; Motorcycle; Stryker RV
Chemical	M93 Fox NBCRS
Engineer	ATEC; D7 Bulldozer; Family of Loaders; Family of Route Clearance Vehicles; HEMTT, Cargo; Hydraulic Excavator; M104 Wolverine; M60 AVLB; M9 ACE; M945 BT; Motor Grader; Motor Scraper; Pile Driver; SEE; Stryker ESV; Tractor Trailer
Field Artillery	5-ton; FMTV; FMTV (HIMARS); HEMTT, Cargo; HMMWV; HMMWV, Up-armored; M1068 SICPS; M1084 MTV; M109A5 Howitzer; M109A6 Paladin; M113 APC; M270 MLRS; M270A1 MLRS; M3 Bradley CFV; M577 CPC; M7 FIST; M707 Knight; M981 FISTV; M992A2 CAT/FAASV; PLS; Stryker FSV
Infantry	M1064 120mm; M113 family of vehicles; M2 Bradley IFV; M901 ITV; Stryker ATGM; Stryker C2V; Stryker ICV
Military Police	HMMWV, Up-Armored; M1117 ASV; Military Sedan
Transportation	ATLAS; HEMMT; HMMWV;RTCC; RTCH; FMTV; M1070 HET; M900 series of Truck; PLS

6.1.3 Non-Materiel Approaches Needed to Implement Materiel Approaches

The CIDS Summary Table indicates that achieving the desired effects for materiel development for MOS with identified driving critical tasks includes related doctrinal, training, and facilities changes. The changes include:

- Obtaining TRADOC school consensus on CDT scenarios to be implemented. These scenarios need to reflect the current operational environment.
- Updating POI and lesson plans to leverage the availability of materiel solutions, primarily the CDT. The updated lesson plans should reflect an optimized mix of live, virtual, and constructive (platform) instruction. The POI and lesson plans should be updated to reflect the collection of vehicles and the load configurations of those vehicles that can be trained through the capabilities of the CDT.

6.2 Institutional Driver Training for MOS without Driving Critical Tasks

The FAA found that MOS without identified driving critical tasks are being trained by their gaining units and not during IET. The increased OPTEMPO and lack of time, facilities, and environments for training are hindering units from training to task, conditions, and standards that reflect the COE. The FNA and USACRC data also found that due to the variation in training and experience of Soldiers and the lack of information available to unit commanders on a Soldiers driving experience and training, the unit's driving assignments were not always consistent with the skills of the selected drivers.

A suggestion of the Army Driving Task Force is to shift the training burden from units to the institutions. This is particularly important now with the unit's increased OPTEMPO caused by the current military operations. A combined solution of training, materiel, and facilities changes

is required to address these gaps. Two possible courses of action (COA) were discussed during this analysis.

The first COA would include 40 hours of driver training as part of Basic Training. This would recognize basic driving skills as basic warrior skills. In order to implement this COA, the Army would have to:

- Provide the time for driver training at the at six Army Training Centers that conduct basic training
- Procure the CDT simulators in sufficient numbers to provide the driver training.
- Construct the facilities required to house the CDT simulators.

As discussed in Section 4.6, driver training for situations where drivers are a low density in the units could be solved by creating ASI's for the drivers and developing the courses for those ASI's. These courses would take advantage of available TADSS like part-task trainers, the CDT for virtual training, and the driving courses of the DCOE for live training.

The second COA would provide additional TADDS to the units for driver training by constructing facilities and procuring CDT simulators to be managed and resourced by the Installation Management Agency on every Army installation with sufficient personnel and vehicle density that makes fiscal sense. This COA would give the units better facilities for training to conditions and standards consistent with the COE, would provide a common set of scenarios for training, and would ensure standardized training across the units to all Army drivers/equipment operators.

6.2.1 Non-Materiel Approaches

The primary non-materiel approaches are provide TRADOC schools with the time and instructor resources needed to train drivers. These approaches include:

- Providing driver training as part of Basic Training.
- Creating ASI's for drivers as discussed in Section 4.6.
- Implementation of the Army Traffic Safety Training Program, described in Section 4.3.1

6.2.2 Materiel Approaches

As described in the previous section, development of a CDT simulator and fielding of this system at a combination of TRADOC schools and unit garrisons is part of both COA.

The CDT should be used as part of the right combination of Live, Virtual, and Constructive training. Adapting the Advanced Skills Driver Training (ASDT) TADSS, particularly modification of the Skid Monster to support HMMWV training, would increase the value of the system for training Army drivers on military vehicles.

6.2.3 Non-Materiel Approaches Needed to Implement Materiel Approaches

The CIDS Summary Table indicates that achieving the desired effects that are the basis for materiel development for MOS without identified driving critical tasks will include related doctrinal, training, and facilities changes. The changes include:

- Shifting from AR 600-55 to 350-XX in order to provide the framework for standardizing tasks, conditions, and standards across MOS.

- Adding "Operate a Vehicle" as a task to be reviewed by all TRADOC Critical Task Selection Boards.
- Ensuring that payload STRAPs and JCIDS documents include driver training requirements for the vehicles which carry them.
- Ensuring that the Program Managers (PM's) include the costs of acquiring simulations like the CDT to reflect the vehicles that are transporting their systems. For programs that are developing systems carried on standard platforms (such as the Phoenix Satellite System, which is developing a payload and a trailer for the HMMWV), the PM would provide the data on weight, center of gravity, etc., that would be used to configure the CDT simulator for that system and fund the CDT software upgrade to simulate that payload.
- Obtaining TRADOC school consensus on CDT common scenarios to be implemented. These scenarios need to reflect the current operational environment.

6.3 Installation Driver Training

The FNA found that driver training is not consistently implemented at different installations. The primary reason for this inconsistency is the difference in resources at the different installations.

The ADTF emphasizes two major responsibilities for Army installations as part of the solution for driver training gaps:

- Installations will have the primary responsibility for reducing accidents in POV's involving vehicles driven by soldiers assigned to the installation.
- Installations will provide the facilities needed for school and unit driver training. In particular, this includes the Driving Centers of Excellence, like those shown in Figure 4.2.

6.3.1 Non-Materiel Approaches

One non-materiel part of the solution to gaps in installation driver training is increased use of the ASMIS-1 – POV Risk Assessment Tool.

The Army Traffic Safety Program in USACRC described in Section 4.3.1, includes two modules that are designed for installation driver training.

6.3.2 Materiel Approaches

As described in previous sections, development of a CDT simulator and fielding this system at multiple Army installations are part of the set of solutions. Three materiel approaches are recommended for installations that do not meet full DCOE configurations:

- CDT simulators would provide a solution for installations without sufficient range or road space dedicated to driver training. Korea is an example of an area with limited ability to conduct driver training in a live environment.
- Web-downloadable simulations for training vehicle familiarization, PMCS procedures, and driving situation awareness skills will provide training at installations using available computer systems. Development of web-delivered simulations for training on vehicle specific tasks such as control familiarization and PMCS, as well as situation awareness in vehicles and trip risk assessment, would provide the installations with more training options requiring less instructor supervision.
- Low-cost vehicle add-ons described in Section 5.3 for reconfigurable live training.

6.3.3 Non-Materiel Approaches Needed to Implement Materiel Approaches

A non-materiel approach that will support the materiel development is creation of policies on feedback and record-keeping using ASMIS-1. ASMIS-1 is used as a requirement for obtaining off-post vehicle passes. Only a small percentage of the supervisors are tracking completion of the tool as a requirement for the passes, which reduces the effectiveness of the tool as a training device.

A non-materiel approach that will support the materiel solution of black box trip recorders is the development of policies to collect and use the information produced by the black boxes both in the unit and by the USACRC.

6.4 Unit Driver Training

The FNA found that driver training is not consistently implemented in different units. The primary reason for this inconsistency is the difference in resources at the different unit locations.

The FNA also found that unit driving assignments are not always consistent with the skills of the drivers.

This FSA considered solutions that would provide Commanders with the information needed to make informed decisions about driving assignments and to help the Commanders do a better job of conducting driver training.

6.4.1 Non-Materiel Approaches

Three non-materiel approaches are recommended to provide the unit Commander with the information needed to make informed decisions about driving assignments and to help the unit Commander do a better job of conducting driver training:

- Include a Master Driver Position in the Battalion TOE, as described in Section 4.2.
- Provide unit Commanders with additional information on soldier driving records using CAC cards or E-MILPO for data capture, as described in Section 4.6. Similarly, providing unit Commanders with access to black box trip recorder information would help them make more informed decisions about driving assignments.
- Adopt an Assignment-Oriented Training approach using Web-delivered simulations to provide training on vehicle specific tasks such as vehicle controls familiarization and PMCS, as well as situation awareness in vehicles and trip risk assessment.[28] This approach can reduce the instructor time burden for units in preparatory training, but does not eliminate the need for live training and hands-on validation of skills for licensing. However, this approach is an example of optimizing the mix of live, virtual, and constructive training.

6.4.2 Materiel Approaches

As described in previous sections, development of a CDT simulator and fielding this system at multiple Army garrisons are part of the set of solutions. Three materiel approaches are recommended for unit garrisons that cannot achieve full DCOE configuration; they are the same approaches that were described in Section 6.3.2 for Army installations.

[28] Senior Leaders Training Support Conference, 25-26 February 2002: Panel 1 Enlisted MOSQ and Lifelong Learning MG Cavenaugh, FT Gordon, MG Barno, FT Jackson, Mr. Helms, RTI panel chairs.

6.4.3 Non-Materiel Approaches Needed to Implement Materiel Approaches

The same supportive non-materiel approaches identified in Section 6.2.3 are applicable to supporting unit driver training. As described in Section 6.3.3, the development of policies to use the information produced by the black boxes is needed.

6.5 Reserve and National Guard Driver Training

The FNA found that driver training is not consistently implemented in different ARNG units. The primary reason for this inconsistency is the difference in resources at the different ARNG locations. The unique aspect of the ARNG training is less time at installations for training, and an increased need for training that can be done at home or in the Armory or Reserve Center. In ARNG armories, live driver training is not going to be consistent with COE conditions and standards. While ARNG units do have some training time at TRADOC institutions, the time available for this training is even more compressed than for AC units. Current OPTEMPO is making it necessary for some ARNG commanders to use OJT for reclassification of ARNG drivers.

The FNA also found that ARNG unit driving assignments, just like AC driving assignments, are not always consistent with the skills of the drivers.

This FSA considered solutions that would provide the Reserve unit commander with the information needed to make informed decisions about driving assignments and to help him do a better job of conducting driver training.

6.5.1 Non-Materiel Approaches

The same non-materiel approaches identified for unit driver training are applicable to ARNG driver training.

6.5.2 Materiel Approaches

As described in previous sections, development of a CDT simulator and fielding this system at multiple Army garrisons are part of the set of solutions. Three materiel approaches are recommended for unit garrisons that cannot achieve full DCOE configuration; they are the same approaches that were described in Section 6.3.2 for Army installations.

6.5.3 Non-Materiel Approaches Needed to Implement Materiel Approaches

The same supportive non-materiel approaches identified in Section 6.2.3 are applicable to supporting Reserve and ARNG driver training. As described in Section 6.3.3, the development of policies to use the information produced by the black boxes is needed.

CIDS Analysis Summary

Exhibit B.1 Institutional Driver Training for MOS with Driving Critical Tasks

Gap Description	Solution Type	Solution Description	Sufficiency
Driving Training Inconsistent with COE	Doctrine	Update Task Conditions & Standards to Reflect COE conditions and requirements	Insufficient without related training, materiel, and facilities changes
Inconsistent Task-Conditions-Standards Data	Doctrine	Shift from AR 600-55 to 350-XX will provide the framework for standardizing tasks, conditions, and standards across MOS	Insufficient without related training and materiel changes
Inconsistent Task-Conditions-Standards Data	Doctrine	Update Task Conditions & Standards to reference common conditions and requirements.	Insufficient without related doctrinal and materiel changes
Inconsistent Task-Conditions-Standards Data	Training	Obtain TRADOC School consensus on Common Driver Trainer scenarios to be developed. Some schools, e.g. Engineering school, will have special training scenarios due to the interactions of “Operate Vehicle” critical tasks and “Drive Vehicle” critical tasks.	Insufficient without related materiel changes
Driving Training Inconsistent with COE	Materiel	Common Driver Trainer with Scenarios based on COE conditions and requirements reusing SE Core Environments developed for tactical training.	Insufficient without related training and doctrinal changes
Driving Training Inconsistent with COE	Materiel	Develop additional scenarios based on evolving COE and distribute electronically to all the CDT training sites.	Insufficient without related training and materiel changes
Inconsistent Task-Conditions-Standards Data	Materiel	Common Driver Trainer with Common Scenarios and Assessments	Insufficient without related training and doctrinal changes
Lack of Reusability/Reconfigurability	Materiel	Common Driver Trainer with common “Below the Waist” Hardware, Software, and IOS	Sufficient for this gap
Driving Training Inconsistent with COE	Facilities	Use of Driving Centers of Excellence to provide live driving experience consistent with COE conditions.	Insufficient without related doctrinal, training, and materiel changes

Exhibit B.2 Institutional Driver Training for MOS without Driving Critical Tasks

Gap Description	Solution Type	Solution Description	Sufficiency
Inconsistency of Driver Training Requirements	Doctrine	Require payload STRAPs and ORDs to include by reference driver training requirements for their vehicles.	Insufficient without related training and materiel changes
Inconsistency of Driver Training Requirements	Doctrine	Shift from AR 600-55 to 350-XX will provide the framework for standardizing tasks, conditions, and standards across MOS	Insufficient without related training and materiel changes
Missing Task-Conditions-Standards Data	Doctrine	Include "Operate a Vehicle" as a task to be reviewed by all TRADOC Critical Task Selection Boards.	Insufficient without related training changes
Inconsistency of Driver Training Implementation	Training	Institute a standard 5-module training course using platform instruction with interactive classroom participation.	Insufficient without related facilities and materiel changes
Driving Training Inconsistent with COE	Materiel	Provide CDT systems at major AIT/OSUT/IET TRADOC Schools.	Insufficient without related training and doctrinal changes
Inconsistency of Driver Training Requirements	Materiel	Require payload/shelter PM's to provide data and/or simulation package for Common Driver Trainer to model their payload on its vehicle	Insufficient without related training and materiel changes
Suboptimal Mix of Live, Virtual, and Constructive Training	Materiel	Provide CDT systems at major AIT/OSUT/IET TRADOC Schools.	Insufficient without related training and doctrinal changes
Suboptimal Mix of Live, Virtual, and Constructive Training	Materiel	Provide Web-downloadable, vehicle specific simulations for familiarization, situation awareness, risk assessment, and local hazard training.	Insufficient without related training and doctrinal changes
Unit Driving Assignments Inconsistent with Skills	Personnel	Create ASI's for driving where there is a low density of drivers in the MOS.	Insufficient without related training changes
Driving Training Inconsistent with COE	Facilities	Provide Driving Centers of Excellence at major AIT/OSUT/IET TRADOC Schools.	Insufficient without related training and doctrinal changes

Exhibit B.3 Installation Driver Training for All Soldiers in an Army Installation

Gap Description	Solution Type	Solution Description	Sufficiency
Inconsistency of Driver Training Implementation	Doctrine	Use of ASMIS-1:POV Risk Assessment Tool as a condition for using vehicles for multi-day passes.	
Inconsistency of Driver Training Implementation	Training	Institute Modules II and IIIa of a standard 5-module training course using platform instruction with interactive classroom participation.	

Exhibit B.4 Unit Driver Training

Gap Description	Solution Type	Solution Description	Sufficiency
Inconsistency of Driver Training Implementation	Organization	Include a Master Driver Position in the Battalion TOE	Insufficient without related training and doctrinal changes
Inconsistency of Driver Training Implementation	Training	Have the Master Driver ASI course include "Train the Trainer" instruction on the Advanced Skills Driver Training	Insufficient without related training and doctrinal changes
Driving Training Inconsistent with COE	Materiel	Provide CDT systems at major unit garrisons with a high density of vehicles.	Insufficient without related training and doctrinal changes
Driving Training Inconsistent with COE	Materiel	Provide mobile CDT systems that can be scheduled for training by units preparing for rotations.	Insufficient without related training and doctrinal changes
Inconsistent Task-Conditions-Standards Data	Materiel	Provide easily-deployed vehicle add-ons to allow live training with appropriate loads.	Insufficient without related training and doctrinal changes
Suboptimal Mix of Live, Virtual, and Constructive Training	Materiel	Provide Web-downloadable, vehicle specific simulations for familiarization, situation awareness, risk assessment, and mission rehearsal training on computers available in units.	Insufficient without related training and materiel changes
Unit Driving Assignments Inconsistent with Skills	Materiel	Provide unit Commanders with additional information on soldier driving records using CAC cards or E-MILPO for data capture.	
Unit Driving Assignments Inconsistent with Skills	Leadership	Transition leadership of the ADTF from the USACRC to TRADOC to more effectively address vehicle accidents and Soldier losses.	Insufficient without related training and doctrinal changes
Inconsistency of Driver Training Implementation	Personnel	Institute a Master Driver ASI	Insufficient without related training and doctrinal changes
Driving Training Inconsistent with COE	Facilities	Provide Driving Centers of Excellence at major unit garrisons with a high density of vehicles.	Insufficient without related training and doctrinal changes

Exhibit B.5 Reserve and National Guard Driver Training

Gap Description	Solution Type	Solution Description	Sufficiency
Inconsistency of Driver Training Implementation	Organization	Include a Master Driver Position in the Battalion TOE	Insufficient without related training and doctrinal changes
Inconsistency of Driver Training Implementation	Training	Have the Master Driver ASI course include "Train the Trainer" instruction on the Advanced Skills Driver Training	Insufficient without related training and doctrinal changes
Driving Training Inconsistent with COE	Materiel	Provide CDT systems at Regional Training Sites.	Insufficient without related training and doctrinal changes
Driving Training Inconsistent with COE	Materiel	Provide mobile CDT systems that can be scheduled for training at ARNG locations.	Insufficient without related training and doctrinal changes
Inconsistent Task-Conditions-Standards Data	Materiel	Provide easily-deployed vehicle add-ons to allow live training with appropriate loads.	Insufficient without related training and doctrinal changes
Suboptimal Mix of Live, Virtual, and Constructive Training	Materiel	Provide Web-downloadable, vehicle specific simulations for familiarization, risk assessment, and mission rehearsal training on computers available at home or in Armories.	Insufficient without related training and materiel changes
Unit Driving Assignments Inconsistent with Skills	Materiel	Provide unit Commanders with additional information on soldier driving records using CAC cards or E-MILPO for data capture	
Inconsistency of Driver Training Implementation	Personnel	Institute a Master Driver ASI	Insufficient without related training and doctrinal changes
Driving Training Inconsistent with COE	Facilities	Provide Driving Centers of Excellence at Regional Training Sites.	Insufficient without related training and doctrinal changes