



August 2016

# ARMY TRAINING

## Efforts to Adjust Training Requirements Should Consider the Use of Virtual Training Devices

# GAO Highlights

Highlights of [GAO-16-636](#), a report to congressional committees

## Why GAO Did This Study

For more than a decade, the Army focused its training on supporting operations in the Middle East. The Army is reassessing its training programs to ensure that its forces are able to perform a broader range of operations and has established training priority areas and sought to expand its use of virtual training.

Both the Senate and House Reports accompanying bills for the Fiscal Year 2016 National Defense Authorization Act included provisions for GAO to review the Army's training plans and its use of virtual training. This report (1) describes the Army's efforts to adjust its training requirements and resources to prepare units for a broader range of military operations and (2) evaluates the extent to which the Army has integrated virtual training devices into operational training. GAO analyzed Army training priorities and initiatives; interviewed officials, including those with four brigade combat teams that were selected based on their training plans; reviewed documentation on Army virtual training devices; and selected a non-generalizable sample of nine devices to review in detail. GAO selected devices to review based on factors including total acquisition costs, which were about \$535 million for the selected devices.

## What GAO Recommends

GAO recommends that the Army update its policies for virtual training devices to conduct additional front-end planning; define the process for analyzing the effectiveness of its devices; and better integrate the devices in training strategies. DOD generally concurred with the recommendations.

View [GAO-16-636](#). For more information, contact Cary B. Russell at (202) 512-5431 or [russellc@gao.gov](mailto:russellc@gao.gov).

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# Efforts to Adjust Training Requirements Should Consider the Use of Virtual Training Devices

## What GAO Found

In 2010, the Army began modifying its training priorities and goals to support a broader range of military operations and is currently implementing five initiatives intended to further define training requirements and resources. GAO identified nine Army training priorities, such as training in an environment that replicates the complex battlefield that its units would experience during combat. Army-wide goals for some training priority areas have also been established. The Army is making progress against the goals, and the priority areas have been incorporated into unit-level training plans based on the units' assessment of their planned missions and readiness, among other factors. The five ongoing Army initiatives to change training processes may, collectively, better define requirements and resources and enable more objective measurement of training accomplished for the priorities. The results of the five initiatives will not be realized at least until fiscal year 2017.

The Army has taken some steps to improve the integration of virtual training devices into operational training, but gaps in this process remain. Specifically,

- **Front-end analysis:** The Army calculated expected usage rates for some virtual training devices after the devices had been fielded. Determining the mix of live and virtual training should be based on factors such as soldiers' available training time, training tasks and objectives, and expected usage rates to accomplish training tasks and required proficiency. Documenting these factors during the front-end planning process would provide the Army with information to evaluate the amount of virtual training capabilities needed to achieve training tasks and proficiency goals during operational training.
- **Effectiveness analysis:** Army policies assign responsibilities for analyzing the effectiveness of new virtual training devices, but the policies do not define how the effectiveness of the devices should be analyzed or what criteria to use to select devices for analysis. GAO found that for the seven analyses of virtual training devices the Army completed since 2012, the objectives and approaches used differed and the criteria used to select devices for analysis were not defined. A better-defined process for conducting post-fielding training effectiveness analyses would help prioritize limited Army resources in determining the value of its virtual training devices for operational training.
- **Linkage with training strategies:** An Army regulation requires training developers to incorporate virtual training devices into training strategies, but GAO found differences in the extent to which virtual training devices had been incorporated into training strategies. For example, GAO reviewed a sample of training strategies and found they did not describe how training tasks could be accomplished or evaluated when performed with a virtual training device. Army organizations had taken steps to create more detailed training strategies that further incorporated virtual training devices, but these efforts were inconsistent across organizations or were incomplete. Without more fully incorporating virtual devices in its training strategies, the Army risks missing opportunities to increase usage of the devices during training.

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## Abbreviations

AR	Army Regulation
DOD	Department of Defense
TRADOC	Training and Doctrine Command
TP	Training and Doctrine Command Pamphlet

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August 16, 2016

### Congressional Committees

For more than a decade, the Army focused the training of its forces on counterinsurgency and stability operations as commanders established training requirements deemed necessary to support operations in the Middle East, including Iraq and Afghanistan. According to reports, in the coming years the Army will confront an increasingly complex security environment that will demand a wider range of skill sets and different capabilities than those used during operations in the Middle East.<sup>1</sup> However, according to these reports, the recent focus on counterinsurgency operations has resulted in large numbers of soldiers who have not experienced or trained thoroughly on the tasks required to perform a broader range of military operations.<sup>2</sup> For example, according to the Army, from 2004 to 2010 all of its major training exercises were focused on counterinsurgency and stability operations.

To provide realistic, operationally-focused training, the Army relies on a combination of live, virtual, constructive, and gaming training.<sup>3</sup> According to the Army, virtual training is used to hone individual and units skills in tactics, techniques, and procedures prior to live training. Virtual training also replicates conditions that are not possible to achieve in live training.

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<sup>1</sup>See, for example, Chief of Staff of the Army and Secretary of the Army, *2014 Army Posture Statement* (Washington, D.C.: April 2014).

<sup>2</sup>The Army defines its readiness for a broader range of military operations in terms of its ability to conduct decisive action in support of unified land operations. According to Army doctrine, decisive action is the continuous, simultaneous application of offensive, defensive, stability, or defense support of civil authorities tasks. For the purposes of this report, we use the phrase “broader range of military operations” to describe the types of tasks required by Army units when conducting decisive action in unified land operations.

<sup>3</sup>Live training is training executed in field conditions using tactical equipment. It involves real people operating real systems but may be supported by training aids. Virtual training is executed using computer-generated battlefields in simulators with the approximate characteristics of tactical weapon systems and vehicles. Constructive training uses computer models and simulations to exercise command and staff functions. Gaming is the use of technology employing commercial or government off-the-shelf, multi-genre games in a realistic, semi-immersive environment to support education and training. For the purposes of this report, we define virtual training devices as those training devices that involve a simulator, simulation, or computer-generated battlefield.

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Given some of the challenges of training in a live environment, such as limited range availability and resource constraints, the Army has sought opportunities to increase the use of virtual training. However, several factors have limited the Army's ability to conduct training with virtual training devices. For example, in 2013, we found that the Army considered various factors in determining whether to use live or simulation-based training, but it lacked key performance and cost information that would enhance the Army's ability to determine the optimal mix of training and prioritize related investments.<sup>4</sup> We recommended that the Army develop outcome-oriented performance metrics that could be used to assess the impact of simulation-based training and a methodology for comparing the costs associated with the use of live and simulation-based training. In response, the Army has reported developing a proposal describing how such metrics and costs could be identified, but has not yet implemented it.

Both the Senate and House reports accompanying bills for the National Defense Authorization Act for Fiscal Year 2016 included provisions for us to review the Army's training plans and requirements and its use of virtual training.<sup>5</sup> This report (1) describes the Army's efforts to adjust its training requirements and resources to prepare units for a broader range of military operations and (2) evaluates the extent to which the Army has integrated virtual training devices into operational training.

To determine how the Army is adjusting its training requirements and resources to prepare units for a broader range of military operations, we analyzed Department of Defense (DOD) and Army training strategy, policy, and guidance documents, such as the 2010 Strategic Plan for the Next Generation of Training for the Department of Defense and Training and Doctrine Command (TRADOC) Pamphlet (TP) 525-8-3, *The U.S. Army Training Concept 2012-2020*, which highlighted training priorities for a broader range of military operations, and Army readiness reports and senior leader statements, such as the Quarterly Readiness Report to

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<sup>4</sup>GAO, *Army and Marine Corps Training: Better Performance and Cost Data Needed to More Fully Assess Simulation-Based Efforts*, [GAO-13-698](#) (Washington, D.C.: Aug. 22, 2013).

<sup>5</sup>S. Rep. No. 114-49 and H. Rep. No. 114-102. Both reports' provisions also included review of the Air Force's training plans and requirements, which we are addressing in a separate report.

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Congress, which highlighted training goals. We also reviewed information on five ongoing Army initiatives to define training requirements and resource needs and improve measurement of training readiness. We interviewed officials from Headquarters, Department of the Army, U.S. Army TRADOC, U.S. Army Forces Command, U.S. Army Europe, U.S. Army Pacific, U.S. Army Alaska, I Corps, III Corps, 1st Cavalry Division, 1st Infantry Division, and four brigade combat teams to understand adjustments made to training priorities for a broader range of military operations.<sup>6</sup> We selected a non-generalizable sample of four brigade combat teams to speak with that had recently trained or were currently training for a broader range of military operations. They included one infantry, one Stryker, and two armored brigade combat teams and their subordinate organizations.

To determine the extent to which the Army has integrated virtual training devices into operational training, we collected information on virtual training device development, usage, evaluation, and incorporation into training strategies. More specifically, we reviewed policies and guidance, such as Army Regulation (AR) 350-38, *Policies and Management for Training Aids, Devices, Simulators, and Simulations*, and TP 350-70-13, *System Training Integration*, to understand the Army's process for the development of virtual training devices. We also selected a non-generalizable sample of nine virtual training devices to analyze as case studies. The nine devices were judgmentally selected from the portfolio of Army virtual training devices based on (1) their relevance to training for ground combat forces, (2) their location (we included devices that were at locations we were to visit), and (3) their acquisition cost (we included devices whose estimated acquisition cost fell in the top 20 percent of all Army training aids, devices, simulators, and simulations).<sup>7</sup> We interviewed officials responsible for the management of virtual training devices at Headquarters, Department of the Army, the Army Modeling and Simulation Office, the Army Training Support Center, and four Army Centers of Excellence, which also have a responsibility to develop

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<sup>6</sup>A corps is one of the highest echelons of Army organization. It can be composed of up to 100,000 soldiers spread among 2-5 divisions. A division has approximately 10,000-18,000 soldiers spread among 5 brigade sized elements. A brigade or brigade combat team has 3,000-5,000 soldiers.

<sup>7</sup>The focus of our report is Army brigade combat teams, although the Army does have virtual training devices for other force elements, such as aviation forces.

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training plans for virtual devices, to discuss the integration of virtual training devices into operational training. We also collected information about our selected virtual training devices from senior officials, including brigade operations officers, at the four brigade combat teams we visited and installation staff where the brigade combat teams were stationed.<sup>8</sup> We compared this information to leading practices for managing strategic training and Army policies on the management of virtual training.<sup>9</sup> We assessed the reliability of the data associated with our sample of devices by collecting and assessing information on the systems used to produce and record the data. We determined the data to be sufficiently reliable for the purposes of this report. Appendix I provides further details on our scope and methodology.

We conducted this performance audit from July 2015 to August 2016 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

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<sup>8</sup>Virtual training devices are used by operational units such as brigades; however, they are managed by the installation staff where they are located.

<sup>9</sup>GAO, *Human Capital: A Guide for Assessing Strategic Training and Development Efforts for the Federal Government*, [GAO-04-546G](#) (Washington, D.C.: March 2004) This guide introduces a framework, consisting of a set of principles and key questions that federal agencies can use to ensure that their training and development investments are targeted strategically. Information in this guide was developed through consultations with government officials and experts in the private sector, academia, and nonprofit organizations; examinations of laws and regulations related to training and development in the federal government; and reviewing the sizeable body of literature on training and development issues, including previous GAO products on a range of human capital topics; Headquarters, Department of the Army, *Policies and Management for Training Aids, Devices, Simulators, and Simulations*, AR 350-38 (Mar. 28, 2013); and U.S. Army TRADOC, *System Training Integration*, TP 350-70-13 (Oct. 27, 2014).

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## Background

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### Training for a Broad Range of Military Operations

The Army defines its readiness for a broad range of military operations in terms of its ability to conduct decisive action in support of unified land operations.<sup>10</sup> Decisive action is the continuous, simultaneous application of offensive, defensive, stability, or defense support of civil authorities tasks. By contrast, counterinsurgency training focuses on stability tasks, with a lesser emphasis on the application of offensive and defensive tasks, according to Army officials. Table 1 provides examples of decisive action-related tasks.

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**Table 1: Examples of Decisive Action Tasks**

Decisive action tasks	Examples of tasks
Offensive tasks	Attack; exploitation; pursuit
Defensive tasks	Mobile defense; area defense
Stability tasks	Establish civil control; restore essential services; support to governance
Defense support of civil authorities tasks	Provide support for domestic disasters or for domestic chemical, biological, radiological, and nuclear incidents

Source: GAO analysis of Army Doctrine Reference Publication 3-0, Unified Land Operations. | GAO-16-636

Army units prepare for decisive action in their operational training.<sup>11</sup> Operational training begins at a unit's home station when a unit commander and staff conduct an analysis of their expected mission, relevant training guidance from higher command organizations, and training requirements. Commanders then establish their own training guidance, which informs subordinate units of training requirements and priorities; a training plan that includes lists of tasks for which the unit

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<sup>10</sup>Unified land operations are how the Army seizes, retains, and exploits the initiative to gain and maintain a position of relative advantage in sustained land operations through simultaneous offensive, defensive, and stability operations, in order to prevent or deter conflict, prevail in war, and create the conditions for favorable conflict resolution.

<sup>11</sup>According to Army doctrine, there are three training domains: operational (training conducted at a unit's home station, at a combat training center, during joint exercises, at mobilization centers, and while operationally deployed), institutional (training conducted by Army schools or programs such as basic training), and self-development.

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trains; and a calendar of relevant training exercises. A unit's training plan initially focuses on simple training tasks, such as individual soldier skills, and then progressively advances to focus on increasingly more complex, collective training tasks. Collective training requires interactions among individuals or organizations to perform tasks that contribute to the unit's training objectives and missions.

A unit training plan often culminates with a rotation to complete a training exercise at one of the Army's combat training centers.<sup>12</sup> There are different types of combat training center exercises, but over the past five years, two types of exercises were most prevalent:

- Mission rehearsal exercises that emphasized training that is needed for a unit's impending deployment to conduct a specific mission. For example, for deployments to Iraq or Afghanistan, units typically conducted mission rehearsal exercises that focused on preparing the skills necessary to perform counterinsurgency operations.
- Decisive action exercises that emphasized training on offensive and defensive tasks against an adversary with similar capabilities.

Both types of exercises have specific required prerequisite training that units are expected to complete at home station prior to arrival at a combat training center. For example, a mission rehearsal exercise can require a unit to complete certain language and culture training in advance of its exercise. By contrast, a decisive action exercise can require a unit to complete company-level combined arms live fire exercises at home station in advance of its exercise.

The United States began the processes of reducing military forces in Iraq and Afghanistan in 2009 and 2011, respectively. In the wake of those processes, the Army began to plan for a future operational environment and a broader range of capabilities required by future Army forces. This planning informed changes in training doctrine, strategy, plans, and

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<sup>12</sup>The Army operates two maneuver combat training centers in the continental United States, which are used to execute large-scale, highly realistic, and advanced training. The two centers are the National Training Center at Fort Irwin, California, and the Joint Readiness Training Center at Fort Polk, Louisiana. The Army also operates a combat training center in Hohenfels and Grafenwoehr, Germany, called the Joint Multinational Readiness Center.

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guidance and resulted in the shift from counterinsurgency-focused training to decisive action for unified land operations training.

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## Virtual Training Devices

The Army has an inventory of more than 800 types of items that support operational training, including system and non-system virtual training devices.<sup>13</sup> Virtual system-based training devices are designed to train individual and/or collective tasks associated with specific weapon systems.<sup>14</sup> Virtual system training devices are part of the system's acquisition program and are fielded in conjunction with the system and funded by that system's program manager. Virtual non-system training devices train tasks that are not associated with a specific weapon system. They support general military training and non-system-specific training.<sup>15</sup> The Army's Training Support System program resources the fielding and sustainment of virtual non-system training devices.

Department of Defense Directive 5000.01, *The Defense Acquisition System*, provides management principles and mandatory policies and procedures for managing DOD acquisition programs, to include major Army acquisition programs, such as some virtual training devices. The Army policies that implement the acquisition system require organizations to provide details about prospective acquisitions, such as a detailed description of the device to be acquired, its intended usage, key performance parameters, cost information, how a device will be used in training, and the training required to use the device.<sup>16</sup> These details are to be included in documents supporting the acquisition program, such as

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<sup>13</sup>For the purposes of this report, virtual training devices are those devices that involve a simulator, a simulation, or a computer-generated battlefield. Some of the devices in this inventory are not virtual training devices. For example, the inventory includes medical training mannequins and dummy land mines.

<sup>14</sup>According to the Army, examples of virtual system training devices are the Advanced Gunnery Training System for the M1A2 Abrams Tank and the Stryker Mobile Gun System, the Conduct of Fire Trainer for the Bradley Fighting Vehicle, and the Common Driver Trainer.

<sup>15</sup>According to the Army, examples of virtual non-system training devices are the Engagement Skills Trainer, the Call for Fire Trainer II, the Intelligence and Electronic Warfare Tactical Proficiency Trainer, Virtual Battlespace, and the Dismounted Soldier Training System.

<sup>16</sup>The Army implements the acquisition process through its "70 series" regulations.

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capability production documents and system training plans.<sup>17</sup> Army policies also establish roles and responsibilities for the development of virtual training devices to a number of different organizations. For example,

- Headquarters, Department of the Army: The Deputy Chief of Staff G-3/5/7 exercises supervision over the definition of concepts, strategies, resources, policies, and programs for Army training and training support. In conjunction with the Deputy Under Secretary of the Army (Test and Evaluation), the Deputy Chief of Staff G-3/5/7 reviews capability production documents for virtual system training devices and reviews and coordinates approval of capability production documents for virtual non-system training devices.
- Army Centers of Excellence: Training developers at Army Centers of Excellence are responsible for the training requirements associated with devices they propose and develop. These training developers are also responsible for integrating their virtual training devices into documents that guide operational training, such as *Combined Arms Training Strategies* and *Training and Evaluation Outlines*.<sup>18</sup>
- Army Training Support Center: The Army Training Support Center serves as an expert reviewer of virtual non-system training devices and recommends whether a device should be approved to continue in the Joint Capabilities Integration and Development System process.

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<sup>17</sup>A capability production document details a proposed training device's authoritative capability requirements, in terms of key system attributes and performance parameters. The system training plan is the master training plan and training tool for a new or modified system. It outlines the development of the total training concept, strategy, and training support system estimates for integrating the system or family of systems into the operational, institutional, and self-development training domains. It is an extension of the training information contained in the capability development document and the capability production document.

<sup>18</sup>*Combined Arms Training Strategies* are guidance, tailored to specific types of units based on capability and function, that provide recommended tasks that are logically trained together. As training is executed, commanders and leaders evaluate and assess tasks using *Training and Evaluation Outlines*. These outlines provide the task, conditions, standards, performance steps, performance measures, and other supporting information related to the task (both individual and collective). They are the primary source for Army task standards.

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## Prior Concerns with Army Virtual Training Devices

We and others, including the Army Audit Agency, have identified prior concerns with the Army's management of its virtual training devices. In some instances, the Army has identified specific actions it planned to take to address these concerns. For example,

- In 2010, the Army Audit Agency reviewed a sample of 8 virtual training devices, and found that the Army had evaluated the effectiveness of only one of the devices. As a result, the Army Audit Agency recommended that the Army establish additional guidance specifying when, how, and by whom effectiveness analyses must be conducted. The Army agreed with the recommendation, but stated that establishing such guidance would not provide for sufficient resources to conduct the analyses. Instead, the Army agreed to issue an annual guidance memorandum stating which virtual devices are candidates for effectiveness analyses 2 years in advance, to allow agencies and organizations to program for the resourcing to conduct the analyses.<sup>19</sup>
- In 2013, we reported that the Army considers various factors in determining whether to use live or simulation-based training but lacks key performance and cost information that would enhance its ability to determine the optimal mix of training and prioritize related investments. We recommended that DOD develop outcome-oriented performance metrics that could be used to assess the impact of simulation-based training and a methodology for comparing the costs associated with the use of live and simulation-based training. DOD partially agreed with our recommendations.<sup>20</sup> The Army has developed a proposal that describes how metrics and costs for simulation-based training could be identified but has not implemented it.
- In a 2014 report, the Army Audit Agency reported that the Army had no assurance that it was maximizing the use of simulation-based training in a cost-efficient manner, because, among other factors, the Army had not defined what it considered "acceptable" or "expected" usage levels for virtual training devices it had fielded, nor had it established consistent metrics for collecting and reporting usage data.

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<sup>19</sup>Army Audit Agency, *Management and Use of Ground Combat System Training Aids, Devices, Simulators, and Simulations*, A-2010-0180-ALA (Alexandria, VA: Aug. 31, 2010).

<sup>20</sup>[GAO-13-698](#).

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The Army Audit Agency determined that the usage data for fiscal year 2013 were unreliable, but it was also able to determine that usage was likely low for some of the devices in its sample. The Army Audit Agency recommended that the Army revise its regulation on training devices to clarify roles and responsibilities for reporting usage, establish a strategic plan on training device usage, and ensure continuous Army-wide emphasis on training device usage. The Army agreed with the recommendations and has established roles, responsibilities, and procedures to track the usage of virtual training devices.<sup>21</sup>

- In a 2015 report, we found that the Army could not provide sufficiently reliable data for us to determine the number, total cost, or performance of DOD's current non-major acquisition programs, which included the Army's Synthetic Environment Core program. This program is intended to provide the Army with a common virtual environment that links virtual simulators and simulations into an integrated and interoperable training environment. According to the report, Army officials stated that increasing requirements to meet additional training needs contributed to program cost increases significant enough to require the program to be re-categorized in terms of its size and scope. We recommended that DOD establish guidelines on what constitutes a current non-major program, take steps to improve data reliability, and determine how to measure cost and schedule performance. DOD partially concurred with our recommendations and planned actions it would take in response; however, the planned actions may not fully address the issues we identified in the report.<sup>22</sup>

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<sup>21</sup>Army Audit Agency, *Virtual Training Simulators and Simulations Usage*, A-2015-0001-MTT, (Ft. Belvoir, VA: Oct. 2, 2014).

<sup>22</sup>GAO, *Defense Acquisitions: Better Approach Needed to Account for Number, Cost, and Performance of Non-Major Programs*, [GAO-15-188](#) (Washington, D.C: Mar. 2, 2015).

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## Ongoing Initiatives May Better Define Unit Training Requirements and Resource Needs for a Broader Range of Military Operations when Fully Implemented

Beginning in 2010, the Army began to modify its training priorities and goals as it shifted its focus from counterinsurgency to a broader range of military operations, and units have made some progress incorporating those priorities and goals in their training. The Army is currently undertaking several initiatives that may standardize operational training priorities, better define requirements and resources needed to incorporate those priorities in its training, and enable more objective measurement of training for the priorities, but in some cases the results of the initiatives will not be realized at least until fiscal year 2017.

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## The Army Has Identified Training Priorities and Goals, and Units Are Making Some Progress Incorporating Them into Training

Army and DOD guidance since fiscal year 2010 has identified training priorities for a renewed focus on a broader range of military operations. We analyzed several such guidance documents to identify common priorities.<sup>23</sup> As shown in table 2, we identified nine common training priorities among the documents that cover a wide variety of training tasks, conditions, and issues. The table includes GAO summary definitions of the training priorities, which are not intended to be comprehensive descriptions of the DOD and Army documents that contain the training priorities. Officials at U.S. Army Forces Command, which issues annual training guidance to its major subordinate commands and other units, agreed with our assessment of these priorities and stated that they were still in effect as of March 2016.

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<sup>23</sup>For the purpose of our analysis, we reviewed the 2010 *Strategic Plan for the Next Generation of Training for the Department of Defense*; the 2011 and 2012 *Army Training Strategy*; the 2012, 2013, and 2014 *Army Strategic Planning Guidance*; the *U.S. Army Training Concept 2012-2020*; and U.S. Army Forces Command's *Command Training Guidance* for fiscal years 2011 through 2016.

**Table 2: GAO Definitions of Nine Training Priority Areas Identified in DOD and Army Documents**

<b>Training priority area</b>	<b>GAO summary definition</b>
Combined arms maneuver	Apply the elements of combat power in unified action to defeat enemy ground forces.
Wide area security	Apply the elements of combat power in unified action to protect populations, forces, infrastructure, and activities.
Mission command	Exercise authority and direction using mission orders to enable disciplined initiative within the commander's intent.
Complex environment	Replicate, during operational training, the complex environment soldiers will face on the battlefield.
Joint, interagency, international, multinational partners	Prepare for integrated operations with other DOD and U.S. agencies in coordination with partner nations and non-governmental entities.
Degraded cyber environment	Operate in contested and degraded cyberspace.
Agile and adaptive soldiers	Create leaders and organizations that are physically and intellectually agile enough to adapt to conditions, tactics, and even methods of conflict that may be impossible to accurately predict.
Chemical, biological, radiological, nuclear, and explosive skills	Improve knowledge of and capabilities for nuclear warfare and operations in chemical, biological, radiological, nuclear, and highly-explosive environments.
Training management skills	Restore decentralized training management in which commanders determine collective tasks, give mission essential task list-based training guidance, execute training meetings, and provide training briefings.

Source: GAO analysis of DOD and Army documents. | GAO-16-636

The priority areas vary in terms of how they apply to training. For example, in addition to being training priority areas, combined arms maneuver, wide area security, and mission command are core concepts of the Army. As a result, Army doctrine describes how units are expected to train specific tasks to perform them.<sup>24</sup> In other cases, training guidance requires units to train to some priority areas as part of a unit's collective training, while training for other priority areas is to be accomplished as part of individual training. For example, the training priorities related to operating in a complex environment or in a degraded cyber environment establish the conditions in which collective training is to occur. Training

<sup>24</sup>Army Doctrine Reference Publication 3-0, *Unified Land Operations* (May 16, 2012).

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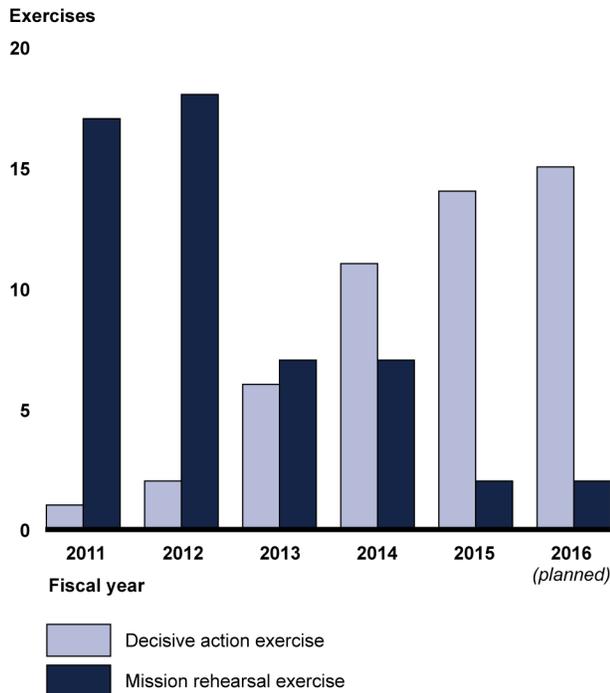
management skills and development of agile and adaptive soldiers, on the other hand, refer to specific skills and abilities expected of individual soldiers. In some cases, the training guidance prescribes specific training associated with the priority areas. For example, in terms of combined arms maneuver, U.S. Army Forces Command's *Command Training Guidance* for fiscal year 2015 required that units conduct annual company/team-level combined arms live fire exercises, under both day and night conditions. In another example, several documents describe the development of agile and adaptive soldiers through a training focus on cognitive, physical, and social components of soldiers.<sup>25</sup>

The Army has identified some training goals in its readiness reports that measure progress in training for the priority areas. For example, according to officials at Headquarters, Department of the Army, increasing the number of brigades that have completed a decisive action training environment exercise at an Army combat training center is a key goal for measuring Army forces' ability to conduct the core competencies of combined arms maneuver and wide area security. As shown in figure 1, since 2011, each year the Army has increased the number of brigades that have completed a decisive action exercise at a combat training center, and at the same time decreased the number of mission rehearsal exercises over the past three fiscal years. However, ongoing demand for Army forces in the Middle East and elsewhere for contingency operations may inhibit continued progress in this area, because personnel are deployed and have less time for training.

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<sup>25</sup>The Army describes the cognitive component as an emphasis on leader development, especially education and training; the physical component as an investment in health, injury prevention, and total fitness; and the social component as emotional intelligence, such as cultural awareness, appreciation of different cultural contexts, and proficiency in languages. U.S. Army, *The Army Human Dimension Strategy 2015* (June 2015).

**Figure 1: Types and Number of Brigade-level Training Exercises at U.S.-based Army Combat Training Centers, Fiscal Years 2011–2016**



Source: GAO analysis of Department of Defense data. | GAO-16-636

Note: A decisive action exercise prepares units to execute the Army's core competencies for a broader range of military operations. A mission rehearsal exercise focuses on the training a unit needs for an impending deployment to conduct a specific mission. Fiscal year 2016 data show the number of planned exercises. Data reflect exercises conducted at combat training centers at Fort Polk and Fort Irwin.

According to Army documents, decisive action exercises can also strengthen the professional development of unit leaders, which includes training management skills. For example, the *2014 Army Posture Statement* indicated that 5,500 company commanders, 2,700 field grade officers, and 1,000 battalion commanders were affected by the focus on counterinsurgency operations from 2004 to 2011 and thus did not receive adequate professional development to train for a broader range of military operations.<sup>26</sup> As a result, the Army has also established a goal to

<sup>26</sup>Chief of Staff of the Army and Secretary of the Army, *2014 Army Posture Statement* (Washington, D.C.: April 2014).

increase the number of officers who complete decisive action exercises at combat training centers and is tracking the numbers related to this goal.

We also analyzed fiscal year 2016 training guidance from two Army corps, three divisions, and four brigade combat teams and found that all of the training priorities are included to some extent. As shown in table 3, all of the guidance documents we reviewed called for subordinate units to focus training on combined arms maneuver, mission command, and training management skills, while other priorities were emphasized less frequently.

**Table 3: Number of Corps and Subordinate Command Guidance Documents Reviewed by GAO that Reflect the Nine Training Priority Areas**

Training priority area	Level of Army guidance		
	Corps documents (out of 2)	Division documents (out of 3)	Brigade documents (out of 4)
Combined arms maneuver	2	3	4
Wide area security	1	1	2
Mission command	2	3	4
Complex environment	2	3	3
Joint, interagency, international, multinational partners	2	3	2
Degraded cyber	2	2	1
Agile and adaptive soldiers	2	3	2
Chemical, biological, radiological, nuclear, and explosive skills	1	3	3
Training management	2	3	4

Source: GAO analysis of Army guidance documents. | GAO-16-636

Note: A corps is one of the highest echelons of Army organization. It can be composed of up to 100,000 soldiers spread across 2 to 5 divisions. A division has approximately 10,000-18,000 soldiers spread across five brigade sized elements. A brigade or brigade combat team has 3,000-5,000 soldiers.

Army guidance on training management recommends that commanders analyze a variety of information, including relevant training guidance and their unit's planned mission and readiness, to determine the training priorities for their units. As part of such analysis, unit commanders prioritize training areas based on a number of factors, including available time and resources. As a result, unit training plans can vary across the Army, a point that officials also noted during our interviews with Army Forces Command and TRADOC. Senior officials at all four brigade

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combat teams we contacted told us that they conducted analyses of information to develop their units' training plans and incorporated these nine priority areas into their training plans to varying degrees or faced challenges in doing so.

- *Wide Area Security.* Wide area security is one of the Army's core competencies. Officials at three of the four brigade combat teams we contacted agreed that wide area security was a training priority, while officials at the fourth brigade stated that the brigade had done a risk assessment and determined that it would deemphasize this training priority area. Two of the brigades that included wide area security as a training priority area cited challenges in getting personnel trained for this priority. An official from one of these two brigades stated that this training is more likely to be accomplished at a combat training center; an official from the other brigade told us there was less emphasis placed on training for wide area security due to a greater focus on combined arms maneuver. Further, officials with subordinate units at two of the four brigades we interviewed also deemphasized training to perform wide area security or did not train for wide area security at all, for similar reasons.
- *Joint, Interagency, Intergovernmental, Multinational Partner Operations.* Officials at only one of the four brigade combat teams we contacted agreed that joint, interagency, intergovernmental, multinational partner operations was a training priority. Officials from the other three brigades stated that this priority was meant for higher level units; that it was difficult to train in a live environment at home station; or that the brigade lacked the time, resources, and training support to train this priority. In addition, officials with subordinate units of two of the four brigades we interviewed did not train for joint, interagency, intergovernmental, multinational partner operations, although the 2012 *Army Training Concept* emphasizes that leaders at lower levels need to be able to operate in a joint, interagency, intergovernmental, multinational environment.<sup>27</sup>
- *Degraded Cyber.* Officials at three of the four brigade combat teams we contacted agreed that training to operate in a degraded cyber environment was a training priority area. Officials at one of these

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<sup>27</sup>U.S. Army TRADOC, *The U.S. Army Training Concept 2012-2020*, TP 525-8-3 (Dec. 19, 2012).

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brigades stated that their units train for this situation by intentionally degrading capabilities, that is, by turning off the system that powers their devices and requiring the units to rely on radios and maps. Officials at the other two brigades indicated that they had not previously trained on cyber operations until their units had to respond to a degraded cyber environment during recent combat training center exercises. Officials from both of those units stated that in the future they would be incorporating cyber operations into home station training. The official from the brigade that did not train on how to operate in a degraded cyber environment said that this was easier to achieve at a division level rather than at brigade and below, because a division has more time to train on this priority area.

- *Agile and Adaptive Soldiers.* Officials at all of the brigade combat teams we contacted agreed on the importance of developing agile and adaptive soldiers, but they varied in the extent to which they included this priority area in their training plans. For example, officials from two of the brigades stated that they train to develop agile and adaptive soldiers through their leadership development programs, and one of those brigades cited changing conditions during situational training exercises as another means to develop adaptive and agile soldiers. An official from the third brigade also stated that he put soldiers in severe training environments and conditions but noted that this is generally difficult to do at home station. The official from the fourth brigade stated that training for adaptive and agile soldiers is inherent in training and daily operations but is not explicitly included in the brigade's training plan.
- *Chemical, Biological, Radiological, Nuclear, and Explosive Skills.* Officials at three of the four brigade combat teams we contacted agreed that this was a priority area, but officials at two of the brigades cited challenges in accomplishing this type of training.<sup>28</sup> For example, an official at one brigade stated that the brigade tries to train for these skills but has limited resources to work with to develop these inherently resource-intensive skills. Officials from the other brigade acknowledged that U.S. Army Forces Command requires units to train on chemical, biological, radiological, nuclear, and explosives skills, but the guidance was unclear on how units were to train for this priority.

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<sup>28</sup>We did not receive a response on this training priority area from the official at the fourth brigade.

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The officials stated that the brigade addresses the priority by incorporating elements of chemical, biological, radiological, nuclear, and explosive skills into its broader offensive operational training.

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## The Army Has Several Ongoing Initiatives to Better Define Training Requirements and Resource Needs

The Army has several ongoing efforts to change training and readiness processes that, collectively, may better define requirements and resources needed to incorporate priorities in its training, and enable more objective measurement of its training for those priorities. In February 2016, the Army published a new directive with the goals of transitioning to a new force generation process for sustainable readiness, adopting new policies to better prioritize and protect Army training, and improving commanders' ability to assess and report training readiness.<sup>29</sup> Based on this directive, in February 2016, Headquarters, Department of the Army, also published two orders that formalized and outlined a number of initiatives aimed at (1) building and assessing training readiness and (2) sustainable readiness.

- *Revisions to Mandatory Training Requirements.* According to the training readiness order, the Army determined that mandatory training and directed tasks are too numerous and are creating challenges for commanders in balancing their units' training time with these other Army requirements. The Army is adjusting mandatory training requirements and external tasks in several ways. For example, the Army is delegating authority to two-star commanders to exempt units, as needed, from certain mandatory training. Further, some previously mandatory training—such as instruction on the law of war and combatting human trafficking—will instead be taught to soldiers in a manner determined by their commander. The Army is also seeking to protect units from external tasks, such as participation in a physical fitness pilot program, that can affect the training schedules of brigades and their subordinate units. Under this initiative, the Army will “lock in” a unit's planned training 6 weeks in advance, thereby preventing an external task from interfering with that training.

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<sup>29</sup>Army Directive 2016-05 *Building Training Readiness*, (Feb. 11, 2016). The Army's force generation process is the means by which the Army structures unit readiness over time to produce trained, ready, and cohesive units prepared on a rotational basis for operational deployment in support of combatant commanders and other Army requirements. Headquarters, Department of the Army, *Military Operations: Army Force Generation*, AR 525-29 (Mar. 14, 2011).

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- *Objective Training.* According to the training readiness order, the Army determined that its training readiness ratings were subjective and lacked objective criteria and standards, and under this initiative is changing how training readiness will be assessed. The order mandates standards in training to ensure that exercises and the evaluations of those exercises meet certain benchmarks, with a goal of achieving a clearer understanding of the readiness of the Army. For example, the Army established requirements for the number of personnel in a unit that must attend a training exercise for it to count toward the building of a unit's training readiness. Further, the order requires that evaluation of the unit's performance of training tasks in the exercise must be done in accordance with *Training and Evaluation Outlines* that objectively describe training task performance steps and measures and "go"/"no-go" criteria for the tasks associated with the exercise. Some exercises will also require external evaluation.
  - *Standard Mission Essential Task Lists.*<sup>30</sup> According to the training readiness order, the Army determined the need to align unit training and readiness with its doctrine of decisive action during unified land operations by standardizing mission essential task lists down to the company level to ensure that like units are reporting readiness on the same capabilities. Commanders choose which training tasks to focus on based on their mission essential task list, which also guides the key collective tasks their subordinate units choose for training. Army officials aim to standardize mission essential task lists for over 560 types of units, including brigade combat teams and their subordinate units.
  - *Cost of Training Readiness.* According to the training readiness order, the Army has determined that it lacks a feedback mechanism with sufficient accuracy to adequately inform the planning, programming, budgeting, and execution process for training funds.<sup>31</sup> The Army will record the costs of training for brigade combat teams and assess those costs against the readiness that the training achieves. For this effort, the Army has begun a pilot program to establish a methodology

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<sup>30</sup>A mission essential task is a collective task an organization must perform proficiently in order to accomplish an appropriate portion of its directed missions.

<sup>31</sup>The Army uses the planning, programming, budgeting, and execution process to determine and prioritize requirements and allocate resources and funding. This process is governed by DOD Directive 7045.14, *The Planning, Programming, Budgeting, and Execution Process* (Jan. 25, 2013), and supplemental guidance from the Army.

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to systematically compare unit training activity with the activity's costs and the training readiness it generated. The goal is to assist the Army in adjusting its training resourcing model, achieve greater transparency in the budgeting process, and develop the feedback needed to inform future training requirements.

- *Sustainable Readiness*. According to the sustainable readiness order, the Army is developing a new force generation model, Sustainable Readiness, which will adjust the reset, train, and ready phases and develop a more adaptive framework intended to provide forces for current operational requirements while maintaining readiness for unforeseen contingencies. According to Army officials, the Army's prior force generation model—the Army Force Generation model—was designed to produce forces for operations in Iraq and Afghanistan by synchronizing the building of trained and ready units into specified phases. This model provided predictability for soldiers preparing for and going on deployments, and unit readiness was linked to where a unit was in the process.<sup>32</sup> However, the Army recognized that the cyclical nature of that process resulted in units experiencing low readiness ratings while in the “reset” phase, a trend the Army termed a “readiness cliff.” Further, units were manned and equipped just in time to complete mission rehearsal exercises prior to deployment. The Army intends for the new sustainable readiness model to enable it to meet known operational demands while remaining optimally postured to rapidly deploy for contingencies.

According to Army officials, some ongoing initiatives were meant to address issues underlying the Army's ability to train for a broader range of operations, instead of specific training priorities. For example, the sustainable readiness initiative will establish a model that is intended to align certain units with known missions, thus informing the units' mission analysis to establish their training plans and priorities. Other initiatives may improve the ability of Army units to incorporate some training priorities into unit training at both home station and the combat training centers. For example, the standard mission essential task lists for decisive action include tasks that address combined arms maneuver,

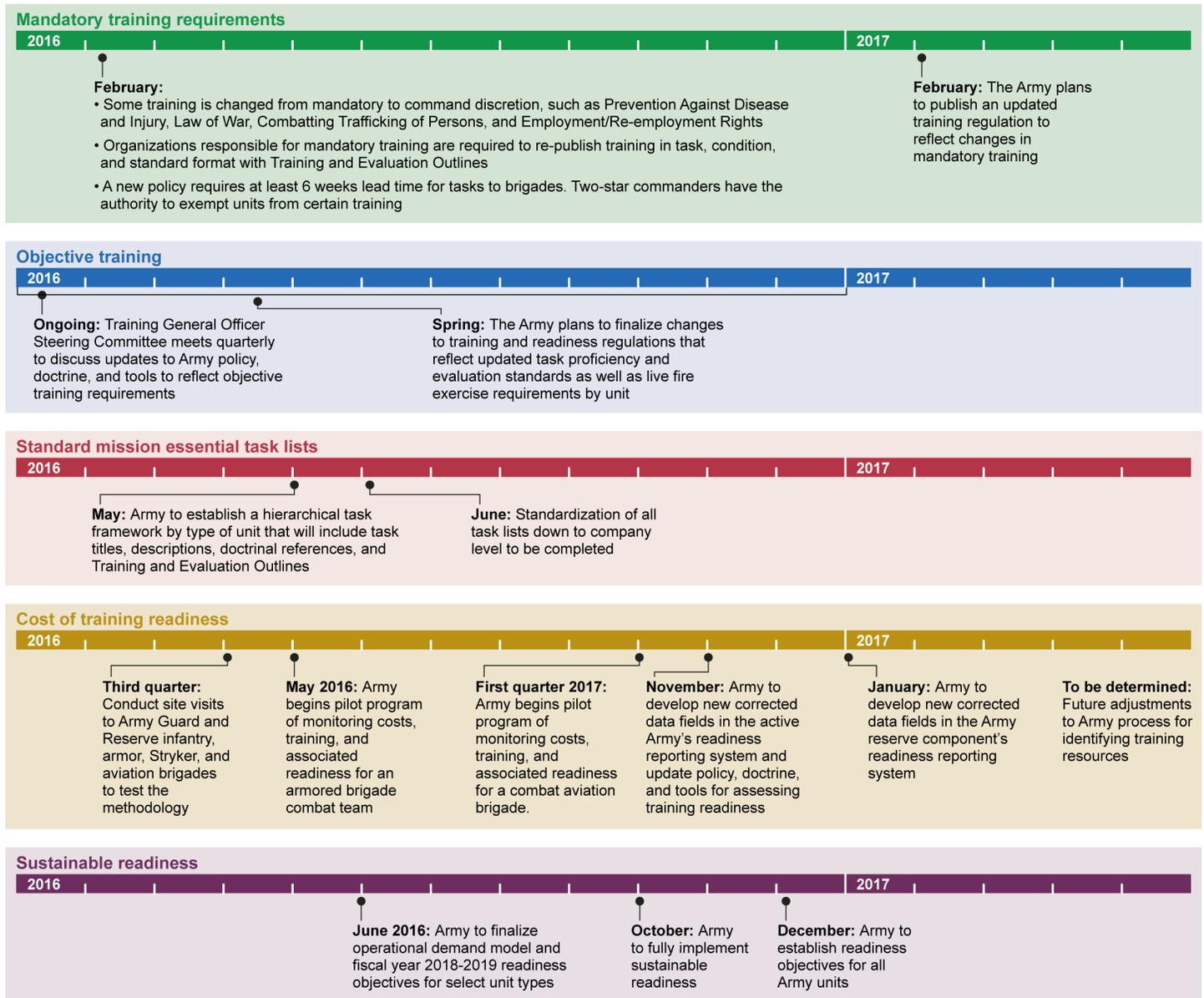
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<sup>32</sup>The Army Force Generation process moved units through three phases: reset (a unit has returned from deployment and is redeveloping its training plans), train/ready (a unit is increasing training readiness and capabilities given resource availability to meet established readiness goals), and available (unit is at the highest state of training and readiness capability and the first to be considered for sourcing operational requirements).

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wide area security, and mission command. The Objective Training initiative will require units to use the Army's Decisive Action Training Environment, a comprehensive description of a fictional operational environment that accounts for the factors intelligence officials believe units will confront on the battlefield, to replicate a complex environment in their operational training. Finally, the revisions to mandatory training requirements and the Objective Training initiative are meant to enable leaders to more effectively manage training. However, as shown in figure 2, the initiatives were still being implemented at the time of our review and in some cases may not be completed at least until fiscal year 2017; thus it is too early to determine the effectiveness of these initiatives.

**Figure 2: Timelines for Implementation of Selected Initiatives to Define Training Requirements**



Source: GAO analysis of Army information. | GAO-16-636

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## The Army's Process for Integrating Virtual Training Devices in Operational Training Has Gaps

Various factors have limited the Army's use of virtual training devices in operational training; the Army has taken steps to better integrate these devices into training, but some gaps in this process remain that could continue to limit their use. Specifically, we identified weaknesses in how the Army (1) conducted front-end analysis to develop training requirements for virtual training devices, (2) conducted analyses of the effectiveness of the devices, and (3) incorporated devices into training strategies.

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## Various Factors Have Limited the Use of Virtual Training Devices

Several factors have limited Army units' use of virtual training devices in operational training. In 2014, the Army Audit Agency reported that the usage of some virtual training devices in operational training was low across the Army. In particular, the report found that the Army had not required certain simulators to be used to complete unit training tasks and that unit commanders preferred live training over virtual training. As a result, commanders more often chose to conduct live training, which resulted in low usage of virtual training devices.<sup>33</sup> The report also found that the Army did not emphasize or prioritize compliance for reporting the use of virtual training devices. Specifically, the Army did not clearly establish roles, responsibilities, processes, and procedures for installations and activities to collect and report usage data. The report concluded that, as a result, the data in the Army's system of record for monitoring device usage was unreliable.

Our review identified factors that can influence usage of virtual training devices in operational training. From our interviews with unit officials, we identified three commonly cited factors that influence soldiers' usage of virtual training devices. The first factor, cited by officials from 14 out of 21 units across the 4 brigade combat teams we interviewed, was the amount of training time available to units. The unit officials we met with agreed that time constraints limited their ability to fully leverage virtual training devices. For example, some unit officials stated that they have forgone virtual training to focus their unit's limited time on training in a live environment. The second factor, cited by officials from 12 out of 21 units across the four brigade combat teams we interviewed, was leaders'

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<sup>33</sup>U.S. Army Audit Agency, *Virtual Training Simulators and Simulations Usage, A-2015-0001 MTT* (Fort Belvoir, VA: Oct. 2, 2014).

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knowledge of and past experience with virtual training devices. Leaders had received various levels of instruction on how to use virtual training devices and largely stated that they were more likely to use a device they themselves had trained on. The third factor, cited by officials from 14 out of 21 units across the four brigade combat teams we interviewed, was the presence of detailed training strategies that prescribe the use of virtual training devices for specific training tasks. Certain devices were included in prescriptive training strategies that required specific training on virtual training devices before soldiers could train live. The devices that were included in such strategies were among the most used devices, according to unit officials.

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## The Army Has Taken Steps to Improve the Integration of Virtual Training Devices

The Army has taken steps to better integrate virtual training devices in its operational training. According to officials from Headquarters, Department of the Army, in 2014 the Army Chief of Staff expressed concern about annual spending on virtual training devices, given the constrained budget environment, and directed the Army to determine the value of its virtual training devices. In response, the Army took actions to assess the value of virtual training, including adjusting the metric used to measure the use of certain virtual training devices. Specifically, the Army Training Support Center previously measured usage of virtual training devices with metrics that reported the number of hours a device was used compared to the number of hours the device was available. The Army Training Support Center initiated a program in fiscal year 2015 to change these metrics for selected virtual training devices by including three new elements in the metrics: the training time soldiers have available to use a device, the specific tasks a device can train, and the frequency with which a device is expected to be used. To consider available training time, the Army Training Support Center used a training model, approved by Headquarters, Department of the Army, that provides a critical path of training events that should be done, at what level within a unit, and at what frequency. The model also recommends the training environment (e.g. live or virtual) and training support that the Army will resource for a training event. With these new metrics, the Army aims to gain visibility into the use of virtual training devices and assess their value.

The Army is also taking steps to strategically develop the next generation of virtual training devices. It has developed a long-range investment requirements analysis to replace existing capabilities with new technologies that will collectively comprise the synthetic training environment. The intent of the synthetic training environment is to consolidate multiple existing programs into a single, cloud-based

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synthetic environment that can deliver training to points of need. The Army is still in the early stages of determining requirements for the synthetic training environment.

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### Front-End Analyses of New Device Requirements Are Not Based on Target Usage Rates or Time Available for Training

The Army's process for developing new virtual training devices requires an identification of tasks to be trained, but does not consider available training time or identify expected usage rates to accomplish training tasks and objectives or required proficiency levels. *The Strategic Plan for the Next Generation of Training for the Department of Defense* states that the right mix of live, virtual, and constructive training capabilities will be dependent on available training time, training tasks and objectives, and required proficiency among other factors.<sup>34</sup> We have previously found that part of the front-end analysis process for training and development programs should include a determination of (1) the skills and competencies in need of training, (2) how training will build proficiency for those skills and competencies, and (3) measures, such as expected usage rates for training devices, that the agency will use in assessing its training programs.<sup>35</sup> Although the Army has begun to analyze how much training time soldiers have available to utilize certain virtual training devices, specific tasks to be trained, and target usage rates to accomplish training tasks and objectives to achieve desired proficiency levels, this is occurring after the devices have already been acquired.

Our analysis of Army guidance and system development documents for the nine virtual training devices we reviewed found that the Army did not consider available training time or identify target usage rates during its front end analysis.<sup>36</sup> Documents for eight of the nine devices contained a general discussion of how the device could be used in training. However, only two identified specific tasks to be trained. Some documents identified common military tasks that would be supported by the device, but in most cases the tasks they cited were appropriate for the brigade level, whereas virtual training devices are generally used at much lower levels, such as squads or platoons, where training tasks are different.

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<sup>34</sup>Office of the Under Secretary of Defense (Personnel and Readiness), *The Strategic Plan for the Next Generation of Training for the Department of Defense*, (Sep. 23, 2010).

<sup>35</sup>[GAO-04-546G](#).

<sup>36</sup>In our analysis, we reviewed capability production documents and system training plans.

Additionally, we found that some documents stated that devices would be linked to tasks in future strategies or support publications. However, in such cases, tasks to be trained with the device were not identified during the front-end requirements development process. Further, eight of the nine devices we reviewed did not include consideration of available training time or the identification of target usage rates. The one device that did include target usage rates was the Dismounted Soldier Training System. For example, the system training plan for the device described exercises that could be completed annually and semi-annually. More detailed information on the virtual training devices we reviewed, including summaries of the training tasks that the Army identified in system development documents for the devices, can be found in appendix II.

The system development documents for the virtual training devices we reviewed did not consider available training time or target usage rates because Army regulations do not require them to do so. The Army's process for developing new virtual training devices is established through several different regulations that supplement broader regulations that implement the defense acquisition system in the Army. Specifically, AR 350-38 and TP 350-70-13 give specific requirements for the development of virtual training devices. In the context of virtual training devices, these regulations require the Army to consider and document an array of factors in developing virtual training devices, such as compatibility with existing or future enablers, ammunition trade-offs, transportability, and the estimated number of personnel required to use or support the device. However, our analysis of these regulations showed that only one of the regulations requires identifying specific tasks to be trained, and none require consideration of available training time or target usage rates to accomplish training tasks and objectives to achieve required proficiency levels (see table 4).

**Table 4: Extent to Which Selected Army Regulations Require Consideration of Available Training Time, Identification of Specific Tasks to be Trained, and Target Usage Metrics for New Virtual Training Devices**

Army regulation	Requires consideration of available training time	Requires identification of specific tasks to be trained	Requires target usage metrics
AR 350-38	No	No	No
TP 350-70-13	No	Yes	No
AR 350-1	No	No	No
AR 71-9	No	No	No

Source: GAO analysis of Army documents. | GAO-16-636

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Note: GAO reviewed the following documents for this analysis: Army Regulation (AR) 350-38, *Policies and Management for Training Aids, Devices, Simulators, and Simulations*; Training and Doctrine Command (TRADOC) Pamphlet (TP) 350-70-13 *Systems Training Integration*; AR 350-1, *Army Training and Leader Development*; and AR 71-9, *Warfighting Capabilities Determination*.

The Army regulations we reviewed did identify some broad requirements related to the training that a virtual device is intended to support. AR 350-38, for example, requires new devices to be based on a training strategy. However, the regulation does not stipulate whether training developers need to identify specific tasks that virtual devices are intended to train. TP 350-70-13 requires training developers to document the tasks that a new device is intended to train. The training pamphlet also discusses the use of training as a key performance parameter and identifies time to train as an attribute of the parameter, but this refers to the time required to properly train on the system when it is being used, not to a unit's available time to train with the device. As noted earlier in this report, a 2016 Army order on training readiness highlighted time constraints that units face and the need to prioritize and protect training time.<sup>37</sup>

Training developers we interviewed at three of the four Army Centers of Excellence stated that they consider, but do not document, available training time when developing requirements for new virtual training devices. Further, officials at one Center of Excellence told us that they do not consider unit training time at all when developing requirements for new devices. Without front-end analysis that considers and documents available training time, tasks to be trained, and associated target usage rates, the Army does not have the information needed to evaluate the amount of virtual training capabilities needed to achieve training tasks and proficiency goals during operational training.

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<sup>37</sup>Headquarters, Department of the Army, Execution Order 002-16, *Enable, Resource, Build, Assess, and Sustain Training Readiness*. (Feb. 23, 2016).

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## The Army Has Not Established a Well-Defined Process to Analyze the Effectiveness of Its Virtual Training Devices

AR 350-38<sup>38</sup> requires Headquarters, Department of the Army, to establish a policy for conducting post-fielding training effectiveness analyses. However, while the Army has implemented general policies for post fielding training effectiveness analysis, these policies did not establish a process for conducting such analyses of the Army's inventory of virtual training devices that defined how the analysis should be conducted and the process for selecting existing virtual training devices for the analysis.

Army Training Support Center and Army Headquarters officials told us that they believed that existing policies sufficiently addressed the conduct of post-fielding training effectiveness analysis. Specifically,

- AR 350-38 assigns responsibility to multiple organizations to provide assistance for the conduct of post-fielding training effectiveness analyses.<sup>39</sup>
- AR 350-52 assigns responsibilities to the Training Support Assistance and Integration Directorate, under the direction of the Army Training Support Center to provide analytical support for training effectiveness analyses of virtual training devices.<sup>40</sup>
- TP 350-70-13, published in 2014, requires training developers to conduct a post-fielding training effectiveness analysis for both system and non-system virtual training devices within 12 months of a new device's initial operational capability date.<sup>41</sup>

In general, existing Army policies address broad roles and responsibilities for conducting post-fielding training effectiveness analyses, but none of these policies specifically defines what constitutes a post-fielding training

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<sup>38</sup>Headquarters, Department of the Army, *Policies and Management for Training Aids, Devices, Simulators, and Simulations*, AR 350-38 (Mar. 28, 2013).

<sup>39</sup>Headquarters, Department of the Army, *Policies and Management for Training Aids, Devices, Simulators, and Simulations*, AR 350-38 (Mar. 28, 2013).

<sup>40</sup>Headquarters, Department of the Army, *Army Training Support System*, AR 350-52 (Jan. 17, 2014).

<sup>41</sup>U.S. Army TRADOC, *Systems Training Integration*, TP 350-70-13 (Oct. 27, 2014). The Initial operational capability date, in general, is attained when selected units and/or organizations scheduled to receive a new system have received it and have the ability to employ and maintain it.

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effectiveness analysis.<sup>42</sup> During our review, Army Training Support Center officials told us they had conducted seven post-fielding training effectiveness analyses on virtual training devices since 2012 based on a variety of factors, such as feedback from the field, device utilization, and return on investment. As a result, we found that the seven analyses identified by the Army Training Support Center differed in how they were conducted. For example, three were post-fielding training effectiveness analyses; two were formal cost-benefit analyses; one was an informal cost-benefit analysis that compared the costs of conducting training with different virtual devices; and one was an analysis of user feedback. The three post-fielding training effectiveness analyses also differed in their objectives and approaches. Specifically, one post-fielding training effectiveness analysis focused on the extent to which the virtual training device met soldier training requirements and needs through a review of applicable training tasks, utilization rates, and solicited user input, among other factors. Another analysis verified the training effectiveness of the device while focusing on quantifying cost savings and tradeoffs with other training resources.

In addition, we found that none of the Army's post-fielding training effectiveness analyses cited the criteria used to select the virtual training device that was the subject of the analysis, although the Army had previously indicated it would establish such criteria. Specifically, in response to a 2010 U.S. Army Audit Agency report, Headquarters, Department of the Army agreed to issue an annual guidance memorandum, 2 years in advance of conducting one of these effectiveness analyses, stating which virtual training devices would be candidates for such an analysis, in order to allow agencies and

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<sup>42</sup>According to Army officials, post-fielding training effectiveness analysis is not currently defined in policy or guidance, but a previous Army policy stated that it should, in general, evaluate and improve training development and training delivery systems, determine the effectiveness of training innovations, and assist in meeting training requirements through assessing training impacts and evaluating effectiveness of training solutions in order to sustain readiness. U.S. Army TRADOC, *The TRADOC Training Effectiveness Analysis System*, TRADOC Regulation 350-32 (Sep. 30, 1994). According to Army officials, this regulation has been rescinded.

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organizations to program for the resources to conduct the analyses. However, the Army did not issue the annual guidance memorandum.<sup>43</sup>

While the Army had not established a well-defined process for selecting and conducting post-fielding training effectiveness analyses for its existing virtual training devices, some results have helped the Army make better-informed sustainment decisions. For example, the Army conducted these analyses on two of nine virtual training devices included in our case study selection—the Engagement Skills Trainer and the Dismounted Soldier Training System. The analysis of the Dismounted Soldier Training System highlighted several issues with the system, including technical difficulties that degraded training, a limited ability for the Dismounted Soldier Training System to provide collective training above the squad level, and low usage rates across the Army. The analysis determined that an event trained through the Dismounted Soldier Training System cost approximately 78 percent more than a comparable event trained in the live environment. The analysis ultimately found that resourcing full-time operator support for the Dismounted Soldier Training System was not justifiable based on low utilization, and recommended better aligning resourcing with projected utilization.

At the time of our review, the Army had not conducted post-fielding training effectiveness analyses on seven virtual training devices included in our case study selection and did not have specific plans to do so. We found that the Army may benefit from conducting these analyses when determining which virtual training devices it will sustain in its inventory. For example,

- *The Common Driver Trainer – Mine Resistant Ambush Protected Vehicle variant device*, according to officials at three installations we visited, is not being used. Officials at two installations stated that soldiers who had used it found live training to be more effective. Officials at the third installation stated they lacked qualified instructors and operators to train soldiers on the device as a result of funding constraints and personnel turnover. One brigade official commented that the device does not simulate all tasks required of drivers, such as dismounting during an operation to conduct maintenance on a vehicle.

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<sup>43</sup>Army Audit Agency, *Management and Use of Ground Combat System Training Aids, Devices, Simulators, and Simulations*, A-2010-0180-ALA (Alexandria, VA: Aug. 31, 2010).

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- *The Conduct of Fire Trainer and the Advanced Gunnery Training System* are used during training, according to officials, because the devices are required to achieve specific training requirements in individual and crew-served weapons strategies. Officials at two installations stated that soldiers preferred to use the Close Combat Tactical Trainer for their tank training requirements, although, according to these same officials, this device is not intended to satisfy those requirements.
  - At one installation we visited, officials had adapted the *Virtual Battlespace* gaming virtual training device for various training tasks. Officials noted, for example, that *Virtual Battlespace* had been adapted to replicate training that could also be accomplished with another virtual training device, termed the *Reconfigurable Vehicle Tactical Trainer*. Those officials stated that they believed the Virtual Battlespace virtual training device was more effective in accomplishing training. As a result, the officials stated that the *Reconfigurable Vehicle Tactical Trainer* had low usage at that installation.

Although only two of nine virtual training devices in our case study selection had been subjects of post-fielding training effectiveness analysis, the Army is making considerable investments to sustain them in its inventory. Specifically, in fiscal year 2015, the combined sustainment costs for the virtual training devices in our case study were \$29.6 million. Officials from the Army Training Support Center and Army Headquarters told us that the requirement to conduct systematic post-fielding training effectiveness analyses of all virtual devices is impossible because of the limitations on resources needed to carry out the analyses. These officials noted that the number of analyses conducted by the Army Training Support Center is consistent with the maximum number of analyses that it can manage per year based on available resources. Given that officials from the Army Training Support Center stated they have limited resources, better defining how the Army will conduct these analyses and the process for selecting existing virtual training would help prioritize Army resources for such analyses. Without a well-defined process for the conduct of post-fielding training effectiveness analysis the Army risks continued funding of devices whose value to operational training is undetermined.

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## Virtual Non-System Training Devices Are Not Fully Incorporated in Training Strategies

AR 350-38 requires training developers to incorporate training devices into training strategies,<sup>44</sup> but we found differences in how virtual training devices had been incorporated into training strategies between non-system and system devices.<sup>45</sup> Training developers we spoke with stated that the requirement established in the Army's regulation to incorporate virtual non-system training devices into training strategies was met by incorporating the devices into the Army's *Combined Arms Training Strategies*—which are collective-level training strategies that inform commanders how to group together various training tasks—and *Training and Evaluation Outlines*—which are used to evaluate performance while training a task. We reviewed a sample of *Combined Arms Training Strategies* and found that they listed relevant virtual training devices with each training event, but they did not describe how a virtual training device should be utilized to train a task. Officials at 6 out of 21 units across the four brigade combat teams we interviewed said they had received little formal training on virtual training devices or did not feel fully knowledgeable in how to use them in their units' training. Moreover, officials at 5 units stated that commanders generally do not rely on *Combined Arms Training Strategies* when planning their training, a finding that was also articulated in a 2014 Army Inspector General report.<sup>46</sup> As a result, *Combined Arms Training Strategies* may not provide sufficient information to enable usage of virtual training devices in operational training.

Similarly, we reviewed a sample of *Training and Evaluation Outlines* and found that virtual non-system training devices are listed with training tasks, but the documents do not inform commanders how to conduct or evaluate the task when performed with a virtual training device. Furthermore, while there are approximately 3,800 collective-level training tasks described in *Training and Evaluation Outlines*, according to Army

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<sup>44</sup>Headquarters, Department of the Army, *Policies and Management for Training Aids, Devices, Simulators, and Simulations*, AR 350-38 (Mar. 28, 2013).

<sup>45</sup>As described earlier in this report, virtual system training devices are part of the system's acquisition program and are fielded in conjunction with the system and funded by that system's program manager. Virtual non-system training devices train tasks are not associated with a specific weapon system. They support general military training and non-system-specific training.

<sup>46</sup>Department of the Army, Inspector General, *Unit Training Management and an Assessment of the Organizational Inspection Programs* (July 23, 2014).

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officials, virtual training devices had only been incorporated into the outlines for approximately 800 tasks. While we reviewed only a sample of *Combined Arms Training Strategies* and *Training and Evaluation Outlines*, we spoke with Army officials responsible for overseeing these documents. They confirmed that the strategies provide minimal information on how virtual training devices should be utilized and the outlines only list associated virtual training devices.

By contrast, we found that three of the virtual system training devices in our sample were incorporated into specific training strategies that detailed usage of the devices. For example, according to officials, the Advanced Gunnery Training Systems for the Stryker Mobile Gun System and M1A2 Abrams tank and the Bradley Conduct of Fire Trainer are included in training strategies that detail how soldiers must train on the virtual training devices for certain amounts of time and achieve certain performance levels before they can progress to training tasks in a live environment. When we interviewed unit officials about their use of virtual training devices, officials with 14 of 21 units cited the devices' inclusion in such strategies as a factor that influenced their usage.

Training developers we interviewed at the four Army Centers of Excellence generally felt that *Combined Arms Training Strategies* and *Training and Evaluation Outlines* met the requirement to incorporate virtual non-system training devices into training programs. Army headquarters officials stated that the Army did not prioritize incorporation of virtual training devices into more detailed training strategies because commanders have the discretion to determine what training their units will complete and whether they will use virtual training devices to accomplish that training. However, we found that some Army organizations had taken steps to create more detailed training strategies that further incorporated virtual training devices—but these efforts were inconsistent across organizations and incomplete. For example, the two divisions we spoke with had developed training models that instructed units on which training events should be conducted with virtual training devices before progressing to live training. However, these efforts were ad hoc, and units followed those models to varying degrees. At one installation, the units we spoke with were aware of the model created by the division and stated that they adhered to the progression it established. At a second installation, however, officials we spoke with at one unit were unaware that their division had published such a model, and did not use it to guide their training.

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In other instances, training developers at Army Centers of Excellence were developing their own detailed training strategies for some virtual training devices, but in some cases, these strategies have been in development for several years and were incomplete. For example, the Army's Maneuver Center of Excellence has developed an "Integrated Weapons Training Strategy," which provides an overarching training strategy to guide maneuver units' progressions from virtual to live training. However, five of the six subordinate documents that provide specific guidance based on unit type were still unpublished or in development at the time of our review. Additionally, the Intelligence Center of Excellence was developing an intelligence training strategy that will guide units on how to incorporate virtual training devices into intelligence training programs, although the overall development of the strategy was focused on the need for a cohesive training strategy for intelligence soldiers and not on improving the use of virtual training devices.

As we have previously found, when designing training programs, agencies need to consider integrating them with other strategies to improve performance.<sup>47</sup> By limiting incorporation of virtual non-system training devices to an inclusion in the *Combined Arms Training Strategies* and *Training and Evaluation Outlines*, the Army may be missing opportunities to improve usage of its devices.

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## Conclusions

The Army has modified its training priorities and goals, recognizing that it must prepare forces for a broader range of military operations, and it is making some progress incorporating those priorities and goals into its training programs. Furthermore, the Army is simultaneously undertaking five initiatives that may standardize operational training priorities, better define requirements and resources needed to incorporate those priorities in its training, and enable more objective measurement of training for the priorities. However, the initiatives will take time to fully implement, because they also require changes in Army policies, doctrine, and processes. As a result, it is too soon to determine if the initiatives will achieve their intended results.

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<sup>47</sup> [GAO-04-546G](#).

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The Army has taken steps to address some concerns regarding its use of virtual training devices in operational training, but opportunities exist to further improve their integration. The Army has developed requirements for virtual training devices without considering the time soldiers have available to train with the device or intended usage rates. Without more deliberate front-end analysis of these factors, the Army does not have the information it needs to evaluate the amount of virtual training capabilities needed to achieve training tasks and proficiency goals during operational training. Further, the Army has not established a well-defined process to analyze the effectiveness of its existing virtual training devices, even though it has a requirement to establish a policy for the conduct of post-fielding training effectiveness analyses. Without a policy that defines what constitutes a post-fielding training effectiveness analysis and the process used to select existing virtual training devices for such analysis, the Army risks funding virtual training devices that have an undetermined value in operational training. Finally, the Army has incorporated some virtual training devices in operational training strategies, but other devices, particularly virtual non-system training devices, are not fully incorporated in training strategies. By limiting the incorporation of non-system training devices to certain training strategies, the Army may be missing opportunities to improve the usage of its devices.

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## Recommendations for Executive Action

In order to better integrate virtual training devices into operational training, we recommend that the Secretary of Defense direct the Secretary of the Army to take the following three actions:

- specify in Army guidance for developing virtual training device requirements that training developers consider and document the time available to train with the devices and intended usage rates to achieve training tasks and proficiency goals during operational training;
- modify its policies to define how post-fielding training effectiveness analysis should be conducted and the process for selecting existing virtual training devices for such analysis to better prioritize Army resources for conducting such analyses; and
- provide additional guidance on how to use virtual non-system training devices in operational training and explore opportunities to incorporate virtual training devices more fully into training strategies.

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## Agency Comments and Our Evaluation

We provided a draft of this report to DOD for review and comment. In its written comments, DOD partially concurred with our first recommendation and concurred with our second and third recommendations. DOD's comments are summarized below and reprinted in their entirety in appendix III. DOD also provided technical comments, which we incorporated into the report, as appropriate.

DOD partially concurred with our first recommendation that the Secretary of Defense direct the Secretary of the Army to specify in Army guidance for developing virtual training device requirements that training developers consider and document the time available to train with the devices and intended usage rates to achieve training tasks and proficiency goals during operational training. In its comments, DOD stated that unit training time is a scarce commodity and agreed that when designing and procuring virtual training devices, the Army should consider and balance the usefulness of a new device with its impact on unit training time, among other factors. DOD also agreed that virtual training device usage rates should be monitored and tracked as one measure of their usefulness. However, DOD stated that determining available training time is a task better suited for the "training requirements owners." In a subsequent discussion, DOD officials clarified that training requirements owners are officials who generate training requirements documents and thus are in a position to understand available training time. Throughout our report, we refer to training developers as the Army officials who are responsible for establishing training requirements and producing related documents, and therefore we continue to believe that these individuals are well positioned to consider and document the time available to train with virtual training devices.

DOD concurred with our second recommendation that the Secretary of Defense direct the Secretary of the Army to modify Army policies to define how post-fielding training effectiveness analysis should be conducted and the process for selecting existing virtual training devices for such analysis to better prioritize Army resources for conducting such analyses. Specifically, DOD agreed that post-fielding training effectiveness analysis should be designed, codified, and conducted by the Army on its inventory of virtual training devices.

DOD concurred with our third recommendation that the Secretary of Defense direct the Secretary of the Army to provide additional guidance on how to use virtual non-system training devices in operational training and explore opportunities to incorporate virtual training devices more fully into training strategies. In its comments, DOD also stated that Army

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commands are now fully embracing decisive action training as part of the Army's revised readiness policies and that greater use of the integrated training environment—a combination of live, virtual, constructive, and gaming simulations and simulators—is reflected in training plans being implemented across the Army. DOD further stated that it agreed to continue to emphasize to the Army the need to improve commanders' awareness of how to incorporate all available virtual and constructive non-system training devices into unit training plans.

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We are sending copies of this report to the appropriate congressional committees, the Secretary of Defense; the Under Secretary of Defense for Personnel and Readiness; and the Secretary of the Army. In addition, the report is available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staff have any questions about this report, please contact me at (202) 512-5431 or [RussellC@gao.gov](mailto:RussellC@gao.gov). Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix IV.



Cary B. Russell  
Director, Defense Capabilities and Management

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*List of Committees*

The Honorable John McCain  
Chairman  
The Honorable Jack Reed  
Ranking Member  
Committee on Armed Services  
United States Senate

The Honorable Thad Cochran  
Chairman  
The Honorable Richard Durbin  
Ranking Member  
Subcommittee on Defense  
Committee on Appropriations  
United States Senate

The Honorable Mac Thornberry  
Chairman  
The Honorable Adam Smith  
Ranking Member  
Committee on Armed Services  
House of Representatives

The Honorable Rodney Frelinghuysen  
Chairman  
The Honorable Pete Visclosky  
Ranking Member  
Subcommittee on Defense  
Committee on Appropriations  
House of Representatives

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# Appendix I: Scope and Methodology

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To determine how the Army is adjusting its training requirements and resources to prepare units for a broader range of military operations, we analyzed Department of Defense (DOD) and Army guidance that describes training priorities for the shift in focus from counterinsurgency to the full range of military operations.<sup>1</sup> Specifically, we analyzed the 2010 *Strategic Plan for the Next Generation of Training for the Department of Defense*, the 2011 *Army Training Strategy*, the 2012 *Army Training Strategy*, the 2012 *Army Strategic Planning Guidance*, the 2013 *Army Strategic Planning Guidance*, the 2014 *Army Strategic Planning Guidance*, the 2014 *Army Campaign Plan*, Training and Doctrine Command (TRADOC) Pamphlet (TP) 525-8-3, *The U.S. Army Training Concept 2012-2020*, and U.S. Army Forces Command's *Command Training Guidance* from fiscal years 2011 through 2016. We organized priorities from these documents at the DOD, Army headquarters, and Army command levels, and identified those priorities that were common within documents at least at two levels. We also reviewed Army readiness reports, such as the Quarterly Readiness Report to Congress, and senior leader statements, such as Army Posture Statements, which highlighted training goals.

We interviewed officials from Headquarters, Department of the Army; U.S. Army TRADOC; U.S. Army Forces Command; U.S. Army Europe; U.S. Army Pacific; U.S. Army Alaska; I Corps; III Corps; 1st Cavalry Division; 1st Infantry Division; and four brigade combat teams to understand adjustments made to training priorities for a broader range of military operations. We selected a non-generalizable sample of four brigade combat teams (two armor brigade combat teams, one infantry brigade combat team, and one Stryker brigade combat team) that were training for or had recently trained for decisive action and interviewed senior officials, including operations officers, from the brigades and selected subordinate units about their training as well as officials from

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<sup>1</sup>The Army defines its readiness for a broader range of military operations in terms of its ability to conduct decisive action in support of unified land operations. According to Army doctrine, decisive action is the continuous, simultaneous application of offensive, defensive, stability, or defense support of civil authorities tasks. For the purposes of this report, we use the phrase "broader range of military operations" to describe the types of tasks required by Army units when they are conducting decisive action in unified land operations.

command organizations for the brigades.<sup>2</sup> We collected command training guidance documents from these organizations and analyzed them for the extent to which they addressed the training priorities that we previously identified. Finally, we reviewed documentation, such as execution orders and briefing slides, from Headquarters, Department of the Army, on five ongoing initiatives to define training requirements and resource needs and improve measurement of training readiness, and we interviewed officials about the implementation of those initiatives.

To determine the extent to which the Army has integrated virtual training devices into operational training, we collected information on virtual training device development, usage, evaluation, and incorporation into training strategies.<sup>3</sup> We interviewed officials responsible for the management of virtual training devices at Headquarters, Department of Army; the Army Modeling and Simulation Office; the National Simulation Center; and the Army Training Support Center about the integration of virtual training devices into operational training. We reviewed policies and guidance, such as Army Regulation (AR) 350-38 and TP 350-70-13, to understand the Army's process for developing virtual training devices. We reviewed analyses conducted by the Army that evaluated the effectiveness of certain virtual training devices. We also reviewed a non-generalizable random sample of 20 Combined Arms Training Strategies and 20 *Training and Evaluation Outlines* to assess the extent to which they described how to use virtual training devices.<sup>4</sup>

In addition, we selected a non-generalizable sample of nine virtual training devices to analyze as case studies. The nine devices were

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<sup>2</sup>A corps is one of the highest echelons of Army organization. It can be composed of up to 100,000 soldiers spread among 2-5 divisions. A division has approximately 10,000-18,000 soldiers spread among 5 brigade sized elements. A brigade or brigade combat team has 3,000-5,000 soldiers.

<sup>3</sup>For the purposes of this report, virtual training devices are those devices that involve a simulator, a simulation, or a computer-generated battlefield.

<sup>4</sup>*Combined Arms Training Strategies* are guidance, tailored to specific types of units based on capability and function, that provide recommended tasks that are logically trained together. As training is executed, commanders and leaders evaluate and assess tasks using *Training and Evaluation Outlines*. These outlines provide the task, conditions, standards, performance steps, performance measures, and other supporting information related to the task (both individual and collective). They are the primary source for Army task standards.

judgmentally selected from the portfolio of Army virtual training devices based on (1) their relevance to training for ground combat forces, (2) their location (we included devices that were at locations we were to visit), and (3) their acquisition cost (we included devices whose estimated acquisition cost fell in the top 20 percent of all Army training aids, devices, simulators, and simulations).<sup>5</sup> We collected information on how these devices were developed, used, evaluated, and incorporated into Army training from the aforementioned offices and at the four brigade combat teams we interviewed. We also collected information about these devices from the installation staff where the brigade combat teams were located.<sup>6</sup> These brigades and organizations were:

- 1st Armored Brigade Combat Team/1st Infantry Division, Fort Riley, Kansas
- 1st Stryker Brigade Combat Team/25th Infantry Division, Fort Wainwright, Alaska
- 2nd Brigade Combat Team/101st Airborne Division, Fort Campbell, Kentucky
- 3rd Armored Brigade Combat Team/1st Cavalry Division, Fort Hood, Texas
- 1st Infantry Division Fort Riley, Kansas
- 1st Cavalry Division Fort Hood, Texas
- I Corps, Joint Base Lewis-McChord, Washington
- III Corps, Fort Hood, Texas
- U.S. Army Alaska, Joint Base Elmendorf-Richardson, Alaska
- U.S. Army Pacific, Schofield Barracks, Hawaii

In addition, we interviewed training developers at the four Army Centers of Excellence who were responsible for the virtual training devices in our sample. We compared that information to leading management practices for strategic training and Army policies on the management of virtual

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<sup>5</sup>The focus of this report is on ground forces, although the Army does have aviation forces and virtual training devices for those forces.

<sup>6</sup>Virtual training devices are used by operational units such as brigades; however, they are managed by the staff of the installation where they are located.

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training.<sup>7</sup> We assessed the reliability of the data related to our sample of devices by collecting and assessing information on the systems used to produce and record the data. We determined the data to be sufficiently reliable for the purposes of this report.

We conducted this performance audit from July 2015 to August 2016 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

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<sup>7</sup>GAO, *Human Capital: A Guide for Assessing Strategic Training and Development Efforts for the Federal Government*, [GAO-04-546G](#) (Washington, D.C.: March 2004) This guide introduces a framework, consisting of a set of principles and key questions that federal agencies can use to ensure that their training and development investments are targeted strategically. Information in this guide was developed through consultations with government officials and experts in the private sector, academia, and nonprofit organizations; examining laws and regulations related to training and development in the federal government; and reviewing the sizeable body of literature on training and development issues, including previous GAO products on a range of human capital topics; Headquarters Department of the Army, *Policies and Management for Training Aids, Devices, Simulators, and Simulations*, AR 350-38 (Mar. 28, 2013); U.S Army TRADOC, *System Training Integration*, TP 350-70-13 (Oct. 27, 2014).

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# Appendix II: Virtual Training Device Case Studies

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This appendix contains more detailed information on the virtual training devices we selected as case studies for our review. The Army has an inventory of more than 800 training aids, devices, simulators, and simulations, which includes virtual training devices.<sup>1</sup> This inventory includes both virtual system-based training devices that replicate an existing weapon system and virtual non-system training devices that do not replicate a specific weapon system, but rather enable collective training. Our methodology for selecting these devices as case studies is discussed in appendix I.

We selected four virtual system-based training devices, including the Advanced Gunnery Training Systems for both the M1A2 Abrams Tank and the Stryker Mobile Gun System, the Conduct of Fire Trainer for the Bradley Fighting Vehicle, and the Common Driver Trainer-Mine Resistant Ambush Protected Vehicle. We also selected five virtual non-system training devices, including the Engagement Skills Trainer, the Call for Fire Trainer, Virtual Battlespace, the Intelligence and Electronic Warfare Tactical Proficiency Trainer, and the Dismounted Soldier Training System.

In this appendix, for each virtual training device, we provide a summary that includes information on the following elements:

- Overview: A description of the virtual training device.
- Tasks to be trained: A summary from the capability production document or system training plan for each virtual training device that describes the types of tasks that the Army identified to be trained with the device.<sup>2</sup>

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<sup>1</sup>For the purposes of this report, virtual training devices are those devices that involve a simulator, a simulation, or a computer-generated battlefield. Many of the devices in this inventory are not virtual training devices. For example, the inventory includes medical training mannequins and dummy land mines.

<sup>2</sup>A capability production document details a proposed training device's authoritative capability requirements, in terms of key system attributes and performance parameters. The system training plan is the master training plan and training tool for a new training device. It outlines the development of the total training concept, the strategy, and support estimates for integrating the device into the operational, institutional, and self-development training domains. It is an extension of the training information contained in the capability production document.

- Number of fielded devices: The number of devices fielded across the Army as of the end of fiscal year 2015.
- Acquisition cost: A summary of the procurement costs as described in the contracts for each individual device. The acquisition cost does not include research, development, test, and evaluation costs.
- Sustainment cost: A summary of the fiscal year 2015 operation and maintenance funds expended on contracts to maintain and operate each device.
- Device usage: A summary of fiscal year 2015 Army-wide data on the number of hours or days the device was available. For certain virtual training devices, we present data separately for different configurations of the device.<sup>3</sup>

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<sup>3</sup>The data presented in this appendix were derived from the Army's Training Support Materiel Army-wide Tracking System database, which is the Army's approved system of record for virtual training device usage data. However, as discussed in this report, the Army Audit Agency concluded in October 2014 that the data in the database were unreliable, which could result in situations where device usage was higher than what the data showed. Specifically, the Army Audit Agency reported that the Army did not emphasize or prioritize compliance for reporting usage of virtual training devices because the Army did not clearly establish roles, responsibilities, processes, and procedures for installations and activities to collect and report usage data. At the time of our review, the Army was still in the process of addressing recommendations from Army Audit Agency's report.

**Advanced Gunnery Training System for the M1A2 System Enhanced Program**



The Advanced Gunnery Training System for the M1A2 Abrams tank provides realistic simulated training for gunnery skills for the Abrams M1A2 tank. Crews must use the Abrams Advanced Gunnery Training System as part of their progression through the gunnery tables to qualify on the Abrams tank.

- **Tasks to be trained:** Crew, section, and platoon training. Provides precision and degraded mode gunnery simulation. Firing and tactical tasks; simulates characteristics of the tank round.
- **Number of fielded devices:** 48
- **Acquisition cost:** \$127,316,741
- **Sustainment cost (fiscal year 2015):** \$1,163,160
- **Device usage (fiscal year 2015):** 20,617 hours used out of 85,156 hours available

Source: Army. | GAO-16-636

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### Stryker Mobile Gun System Advanced Gunnery Training System



The Stryker Advanced Gunnery Training System provides realistic simulated training for gunnery skills for Stryker Mobile Gun System vehicles. Crews must use the Stryker Advanced Gunnery Training System as part of their progression through the gunnery tables to qualify on Stryker vehicles.

- **Tasks to be trained:** Gunnery, collective, and tactical training.
- **Number of fielded devices:** 15
- **Acquisition cost:** \$16,410,082
- **Sustainment cost (fiscal year 2015):** \$321,200
- **Device usage (fiscal year 2015):** 3,336 hours used out of 38,779 hours available

Source: Army; GAO (photo). | GAO-16-636

### Conduct of Fire Trainer Situational Awareness<sup>a</sup>



The Conduct of Fire Trainer-Situational Awareness provides realistic simulated training for gunnery skills for the M2/M3 Bradley Fighting Vehicle. Crews must use the Conduct of Fire Trainer as part of their progression through the gunnery tables to qualify on the Bradley Fighting Vehicle.

- **Tasks to be trained:** Used at the unit and operational force levels to train individual and crew precision gunnery skills; used to exercise force-on-target training; replicates the full range of the Bradley vehicles' fire control capability; replicates the actual performance of the Bradley turret primary gunnery controls and switches.
- **Number of fielded devices:** 31
- **Acquisition cost:** \$87,600,000
- **Sustainment cost (fiscal year 2015):** \$851,840
- **Device usage (fiscal year 2015):** 4,192 hours used

Source: Army; Defense Video Imagery Distribution System (photo). | GAO-16-636

<sup>a</sup>The Army did not provide data on number of hours this device was available.

### Common Driver Trainer- Mine Resistant Ambush Protected Vehicles Variant



Source: Army; Defense Video Imagery Distribution System (photo). | GAO-16-636

The Common Driver Trainer provides initial and sustainment driver training at both the operational institution and installation levels. The trainer has several variants for different vehicle systems to provide driver training skills specific to several different platforms.

- **Tasks to be trained:** Supports driver training requirements for combat arms, combat support, and combat service support soldiers; trains driving and operating skills repetitively in simulated weather, urban operations, and complex virtual terrain environments.
- **Number of fielded devices:** 18
- **Acquisition cost:** \$12,000,000
- **Sustainment cost (fiscal year 2015):** \$744,505
- **Device usage (fiscal year 2015):** 435 hours used out of 33,222 hours available

### Engagement Skills Trainer II



Source: Army. | GAO-16-636

The Engagement Skills Trainer provides marksmanship, shoot/don't shoot decisions, and collective squad-level training for a variety of weapons systems, including the M4, the M9, and the M16. The device replicates live weapons training events and can be used to improve qualifications scores and individual small arms effectiveness.

- **Tasks to be trained:** Simulates live fire ranges in daylight and limited visibility conditions using precision-scaled targets and high resolution imagery; simulates squad collective gunnery and tactical tasks for defense and ambush missions; and helps train leaders of fire teams and squads in command, control, and distribution of fires while in a realistic collective mode.
- **Number of fielded devices:** 925
- **Acquisition cost:** \$216,590,511
- **Sustainment cost (fiscal year 2015):** \$11,850,000
- **Device usage (fiscal year 2015):** 315,834 hours used out of 831,226 hours available

### Call for Fire Trainer II



The Call for Fire Trainer provides training to fire support specialists, joint fire observers, and soldiers to call for and adjust indirect fires. Students train on simulated battlefield scenarios and practice observed fire tasks. It comes in three different configurations that vary in the ratio of students to instructors.

- **Tasks to be trained:** Designed to train fire support specialists and indirect fire infantrymen to perform many of the complex observed fire tasks, such as controlling close air support; also designed to train other combat arms soldiers as well as combat support and service support soldiers on key fire support tasks appropriate to their specialty and skill level; focuses on individual soldier learning and using proper tactics, techniques, and procedures for providing timely and accurate field artillery and mortar calls for fire.
- **Number of fielded devices:** 285
- **Acquisition cost:** \$25,168,091
- **Sustainment cost (fiscal year 2015):** \$359,652
- **Device usage (fiscal year 2015):**
  - 4 soldiers configuration: 6,797 days used out of 14,153 days available;
  - 12 soldiers configuration: 10,829 days used out of 28,654 days available;
  - 30 soldiers configuration: 25,843 hours used out of 46,640 hours available

Source: Army; Defense Video Imagery Distribution System (photo). | GAO-16-636

### Games for Training- Virtual Battlespace II

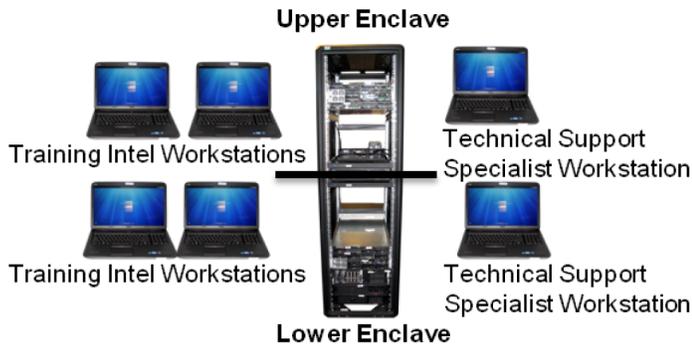


Games for Training is a family of applications that provide individual and collective-unit training. Virtual Battlespace is a major game that is used at multiple home stations for collective training. It can be tailored to provide different scenarios to units and can leverage data to replicate specific terrain on which the units can rehearse.

- **Tasks to be trained:** Provides capabilities for familiarizing and training soldiers in various tactical scenarios and environments; trains the decision-making processes for individual leaders at all levels; scenarios provide training and education in subjects such as cultural awareness, language, improvised explosive device recognition and defeat, and various other skills required for current and future military operations.
- **Number of fielded devices:** 97
- **Acquisition cost:** \$8,245,000
- **Sustainment cost (fiscal year 2015):** \$398,000
- **Device usage (fiscal year 2015):** 18,673 hours used out of 60,534 hours available

Source: Army; Defense Video Imagery Distribution System (photo). | GAO-16-636

**Intelligence and Electronic Warfare Tactical Proficiency Trainer**



The Intelligence and Electronic Warfare Tactical Proficiency Trainer simulates intelligence capabilities to enable realistic battle command training. The trainer has two subcomponents: the Technical Control Cell and the Human Intelligence Control Cell. The first subcomponent provides simulated intelligence data for exploitation during training exercises. The second subcomponent enables military intelligence officers to practice gathering human intelligence by interrogating virtual human subjects.

- **Tasks to be trained:** Assists military intelligence soldiers in exercising their technical skills; using their equipment to search, intercept, collect, and process intelligence data; and receiving a critical training feedback loop on how they used their intelligence collection assets and answered the commander's information requirements.
- **Number of fielded devices:** 97
- **Acquisition cost:** \$10,925,452
- **Sustainment cost (fiscal year 2015):** \$4,471,815
- **Device usage (fiscal year 2015):** Technical Control Cell configuration: 6,256 hours used out of 19,130 hours available; Human Intelligence Control Cell configuration: 4,417 hours used out of 107,754 hours available

Source: Army. | GAO-16-636

**Dismounted Soldier Training System<sup>a</sup>**



The Dismounted Soldier Training System combines gaming technology with a virtual 360-degree training environment to provide an immersive environment for dismounted soldiers to train. Soldiers use untethered weapons and control avatars to exercise various individual and collective tasks and rehearse repetitively at the squad or team level.

- **Tasks to be trained:** Supports individual and collective dismounted training from the individual soldier up to company level; soldiers can dismount from a vehicle or aircraft and perform the full range of military operations, i.e., engage targets with doctrinally assigned weapons, move in doctrinally correct formations, and communicate and identify with vehicle and unit personnel; trains collective skills and sustains individual and crew-specific procedural skills (e.g., gunnery, communications, and leadership).
- **Number of fielded devices:** 52
- **Acquisition cost:** \$30,739,058
- **Sustainment cost (fiscal year 2015):** \$9,481,902
- **Device usage (fiscal year 2015):** 2,311 hours used out of 15,033 hours available

Source: Army; Defense Video Imagery Distribution System (photo). | GAO-16-636

<sup>a</sup>Usage shown is from the Army National Guard. In FY 2015, Army was in the process of transitioning the Dismounted Soldier Training System from the active Army to the Army National Guard.

# Appendix III: Comments from the Department of Defense



READINESS

OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE  
4000 DEFENSE PENTAGON  
WASHINGTON, D.C. 20301-4000

JUL 27 2016

Mr. Cary Russell  
Director, Defense Capabilities Management  
U.S. Government Accountability Office  
441 G Street, NW  
Washington DC 20548

Dear Mr. Russell,

This is the Department of Defense (DoD) response to the GAO Draft Report GAO-16-636, "ARMY TRAINING: Efforts to Adjust Training Requirements Should Consider the Use of Virtual Training Devices," dated June 3, 2016 (GAO Code 100140).

The Department appreciates the opportunity to comment on this draft report. We see value in the GAO's review and the resultant observations. We concur with the three recommendations and have enclosed the Department's comments.

My point of contact is Frank C. DiGiovanni who can be reached at frank.c.digiovanni.civ@mail.mil or 703-695-2618.

Sincerely,

Diana C. Banks  
Deputy Assistant Secretary of Defense  
(Force Education and Training)

Attachments:  
As stated

GAO DRAFT REPORT DATED JUNE 3, 2016  
GAO-16-636 (GAO CODE 100140)

“ARMY TRAINING: EFFORTS TO ADJUST TRAINING REQUIREMENTS SHOULD  
CONSIDER THE USE OF VIRTUAL TRAINING DEVICES”

DEPARTMENT OF DEFENSE COMMENTS  
TO THE GAO RECOMMENDATION

**RECOMMENDATION 1:** The GAO recommends that the Secretary of Defense direct the Secretary of the Army to specify in the Army guidance for developing virtual training device requirements that training developers consider and document the time available to train with the devices and intended usage rates to achieve training tasks and proficiency goals during operational training.

**DoD RESPONSE:** Partially Concur. Unit training time is a scarce commodity. The Department agrees that when designing and procuring virtual training devices, the Army should consider and balance the usefulness of a new device with its impact on unit training time; however, determining available training time is a task better suited for the training requirements owner. Ideally, all well-designed training devices should be intuitive, easy to set up and operate, and minimize the overhead time involved in their use. The Department agrees that virtual training device usage rates should be monitored and tracked as one measure of their usefulness.

**RECOMMENDATION 2:** The GAO recommends that the Secretary of Defense direct the Secretary of the Army to modify its policies to define how post-fielding training effectiveness analysis should be conducted and the process for selecting existing virtual training devices for such analysis to better prioritize Army resources for conducting such analyses.

**DoD RESPONSE:** Concur. The Department agrees that post-fielding training effectiveness analysis should be designed, codified, and conducted by the Army on its inventory of virtual training devices.

**RECOMMENDATION 3:** The GAO recommends that the Secretary of Defense direct the Secretary of the Army to provide additional guidance on how to use non-system virtual training devices in operational training and explore opportunities to incorporate virtual training devices more fully into training strategies.

**DoD RESPONSE:** Concur. In addition, reports from the Army indicate that Army Commands are now fully embracing Decisive Action training as part of the Army’s revised Sustainable Readiness policies. Greater use of the Integrated Training environment (ITE) is reflected in training plans being implemented in U.S. Army Forces Command (FORSCOM), U.S. Army Pacific (USARPAC), U.S. Army Europe (USAREUR), the Army National Guard (ARNG) and U.S. Army Reserve (USAR). The Department will continue to emphasize to the Army the need to improve Commanders’ awareness of how to incorporate all available nonsystem virtual and constructive training devices into unit training plans.

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# Appendix IV: GAO Contact and Staff Acknowledgments

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## GAO Contact

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## Staff Acknowledgments

In addition to the contact named above, Matt Ullengren (Assistant Director), Usman Ahmad, Karyn Angulo, Joanne Landesman, Kirsten Lauber, Amie Lesser, Laura Ross, Sabrina Streagle, Hai Tran, and Erik Wilkins-McKee made key contributions to this report.

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