

**Technical Report 1191**

**Web-Enabled Training-Development Tool for Pre-Deployment and Deployed Training**

**Anna T. Cianciolo**

Global Information Systems Technology, Inc.

**November 2006**



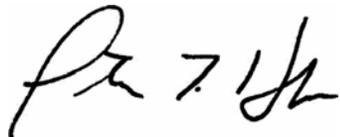
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and Deployed Training**

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# WEB-ENABLED TRAINING-DEVELOPMENT TOOL FOR PRE-DEPLOYMENT AND DEPLOYED TRAINING

## EXECUTIVE SUMMARY

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### Research Requirement:

Today's US Army unit trainer must develop effective training in less time than ever before. In addition, Soldiers and leaders must acquire skill more quickly in order to react adaptively to constant change in their operating environment. Research and development to support training therefore must explore not only advanced learning environments and instructional strategies but also advanced training-development processes. Advanced training-development processes are required to enable the rapid generation of training activities that are responsive to immediate training need.

Enabling advanced training-development processes requires determining the methods necessary to make doctrine, operational digital products, and other training-support resources readily available to unit trainers. These methods must then be implemented in a tool that generates structured, doctrinally sound training activities. The purpose of the present Phase I Small-Business Technology Transfer (STTR) effort was to meet these requirements by exploring the design and implementation of a web-enabled "training assistant" (TA) that supports the rapid generation of contextualized training activities.

### Procedure:

To conduct the Phase I research and development, Global Information Systems Technology, Inc. (GIST) and Human Resources Research Organization (HumRRO) researched the Army training process, identified methods for relieving the constraints on rapid, contextualized training development, and developed these methods into a prototype TA capability for feasibility analysis. The feasibility of developing a full-scale, Phase II TA for use by unit trainers was then examined.

### Findings:

Subject matter experts have suggested that the Phase II TA as envisioned has great potential for saving time, increasing productivity, and improving training. A full-scale capability enabling the development of several collective exercises and individual, small-group training activities would have broad impact and would be doctrinally sound and easy to use. Even after effort to manage the scope of the TA concept, however, implementing the full-scale concept capability cannot feasibly be accomplished in the Phase II effort.

Instead, the most feasible, influential, and immediately usable Phase II implementation of the TA concept should focus on supporting junior officers, schoolhouse instructors, and mission support training facility (MSTF) and home station operations center (HSOC) trainers in the development of training activities not supported currently by doctrine, especially the decision-

making exercise (DMX). The DMX is intended to train flexible responding to rapidly changing enemy tactics or other unexpected events, a training objective not well addressed by other, doctrinal training activities but of greatest importance to junior officers. Because the DMX does not have a doctrinal structure, it is more subject to the lack of training experience most junior officers have. Providing a structured DMX-development process based on best practice would enhance the training quality of DMXs Army-wide through reduced individual differences in instructional-design savvy and increased average capability. The DMX also is relatively easy to generate and simple to conduct in the short timeframe available to train rapidly changing techniques and procedures.

There are several different, feasible ways in which the Phase I prototype TA may be scaled up to an operational Phase II product such that it enables the rapid development of contextualized DMXs or other scenario-based individual, small-group exercises. Effective scaling up must enhance (a) the basic functionality of the tool to support modification of developed training; (b) the range of methods the unit trainer can use to create training exercises; (c) the instructional and technological sophistication of the TA output; and (d) the ease with which users can access resources from the operational environment.

#### Utilization and Dissemination of Findings:

The present Phase I research-and-development effort indicates that a web-enabled training-development tool to accelerate and better contextualize scenario-based decision-making training can be developed feasibly in a Phase II effort. If developed, the Phase II product would improve the instructional-design capability of junior officers, increase the likelihood that training activities currently not supported by doctrine are developed and conducted effectively, increase the frequency with which individual, small-group decision-making exercises are conducted prior to and during deployment, and enhance the training utility of operational database resources. The ultimate outcome of implementing the Phase II product would be leaders who demonstrate more agile responding to change in the operational environment.

# WEB-ENABLED TRAINING-DEVELOPMENT TOOL FOR PRE-DEPLOYMENT AND DEPLOYED TRAINING

## CONTENTS

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	Page
Introduction.....	1
Training in the US Army .....	2
Overview of Army Unit Training .....	2
Who are the Unit Trainers?.....	3
What Training Activities Should/Do Unit Trainers Generate?.....	3
How is Training Conducted? .....	5
What Doctrine and Other Resources Are Available for Generating Training Activities? ..	6
What Role Can/Do Resources from Operational Databases Play in Providing Context for a Training Activity? .....	8
Design of the TA Concept .....	10
The TA Target Audience .....	11
Training Development and Training Products Supported by the TA .....	11
Integrating Doctrinal Resources into TA-Supported Training Development .....	13
Retrieving Content from the Operational Database .....	14
Description of the TA Phase I Prototype .....	15
Create New Training – DMX.....	15
DMX Output – What Exactly Does the Unit Trainer Create? .....	16
DMX Input – How Does the Unit Trainer Create a DMX? .....	19
DMX Content – How Does Generic Content Work?.....	24
DMX Content – How are Operational Database Resources Used? .....	25
Feasibility Analysis.....	26
Achieving Maximum Training Impact with the TA .....	27
Optimal Generic, Modifiable Content .....	28
Optimal Operational Database Content .....	28
Implementing the Phase II TA.....	29
Conclusions.....	30
Future Directions .....	31
Requirements – Basic Functionality .....	31

CONTENTS (continued)

---

	Page
Requirements – Creating Exercises .....	31
Requirements – Enhancing Instructional and Technological Sophistication.....	32
Requirements – Accessing Operational Digital Products .....	32
Phase II Research Questions .....	32
References.....	33
Appendix A List of Acronyms.....	A-1

List of Tables

Table 1. Common Individual, Collective, and Leader Training Activities .....	4
Table 2. Training-Development Resources (Doctrine-based) .....	6
Table 3. Example Mission Task, Conditions, and Standards for an Infantry Rifle Platoon .....	10
Table 4. Training Format by Activity .....	13
Table 5. DMX User Queries .....	20

List of Figures

Figure 1. Training Activities Supported in the TA Concept.....	12
Figure 2. High-level Architecture of TA Concept System .....	14
Figure 3a. DMX “Background” Tab.....	17
Figure 3b. DMX “Current Situation” Tab .....	17
Figure 3c. DMX “Considerations” Tab .....	18
Figure 3d. DMX “Feedback” Tab.....	19
Figure 4a. DMX Background Task Pull-Down Menu.....	21
Figure 4b. Example Helpful Hints Box .....	22
Figure 4c. DMX Progress Tracker.....	23
Figure 4d. DMX Preview Capability .....	24
Figure 5. Example Generic, Modifiable Content.....	25
Figure 6. Opportunities to Use Operational Database Resources.....	26

## Introduction

We have engaged repeatedly in conditions of uncertainty and ambiguity... but always viewing such operations as the exception rather than the rule. That can no longer be the case. As elusive and adaptive enemies seek refuge in the far corners of the earth, the norm will be short-notice operations, extremely austere theaters of operation, and incomplete information... Soldiers with a joint and expeditionary mindset will be confident that they are organized, trained, and equipped to go anywhere in the world, at any time, in any environment, against any adversary, to accomplish the assigned mission.

Schoomaker & Brownlee, 2004 (p. 5)

The above quote from Schoomaker and Brownlee's strategic publication on joint and expeditionary capabilities illustrates why today's US Army unit trainer must develop effective training in less time than ever before. In addition, Soldiers and leaders must acquire skill more quickly in order to react adaptively to constant change in their operating environment, particularly immediately prior to and following deployment. Research and development to support Soldier and leader training therefore must explore not only advanced learning environments and instructional strategies but also *advanced training-development processes*. Advanced training-development processes are required to enable the rapid generation of training activities that are responsive to immediate training need.

The rapid development of effective, responsive training is difficult for a number of reasons. First, units are increasingly required to reach learning objectives with which trainers are unfamiliar. This unfamiliarity stems from changes to unit structure and tactics or from changes in the nature of operational missions (e.g., armor Soldiers and leaders must learn tasks that were traditionally the domain of infantry Soldiers and leaders). Some unit trainers may be unaware of the existing doctrine and other resources (e.g., lessons learned, best practices, etc.) that are available to support training development and that require a great deal of time to sift through. Second, although doctrine [e.g., Army Training and Evaluation Programs (ARTEPs) and Training Circulars (TCs)] provides guidance for structuring training exercises, the design of training ultimately is up to unit trainers who differ in their effectiveness and creativity as instructors. Trainers with less experience in designing structured training require more time and effort to develop an effective, innovative training activity than trainers with more experience. Third, and finally, the materials that could be used to contextualize training and reduce time to competency, such as classified digital products from theater or even unclassified sample products, are widely dispersed, difficult to locate or access, and tedious or impossible to modify. Trainers with good intentions may not be able to create just-in-time training because it takes too long to locate and/or create accompanying materials.

Enabling advanced training-development processes therefore requires determining the methods necessary to make doctrine, operational digital products, and other training-support resources readily available to unit trainers. These methods then must be implemented in a tool that generates structured, doctrinally sound training activities. The purpose of the present Phase I Small-Business Technology Transfer (STTR) effort was to meet these requirements by

exploring the design and implementation of a web-enabled “training assistant” (TA) that supports the rapid generation of training activities that are contextualized using new tactics, techniques, and procedures and lessons learned from currently deployed units. To conduct this exploration, Global Information Systems Technology, Inc. (GIST) and Human Resources Research Organization (HumRRO) researched the Army training process, identified methods for relieving the constraints on rapid, contextualized training development, and developed these methods into a prototype TA capability for feasibility analysis. The goal of this project was to determine the feasibility of developing a full-scale, Phase II TA for use by unit trainers. In this report, we describe our effort and the results of our feasibility analysis and outline the objectives for Phase II work.

### Training in the US Army

We began our Phase I effort with an analysis of the Army training process in order to gain an understanding of the Army’s expectations for how training is developed and conducted. We also sought to determine how training is actually developed and conducted by unit trainers. Our intent was to design the TA to enable the development of doctrinally sound training, but also to allow unit trainers to tailor their training to meet specific needs. Ideally, enabling unit trainers to tailor their training using lessons learned and/or digital products from theater would reduce Soldier and leader time-to-competency to meet the demands of a rapidly changing operating environment (see Jean, 2005). Our analysis focused on the following general questions:

1. Who are the unit trainers?
2. What training activities should/do unit trainers generate?
3. How are these activities conducted (i.e., what materials does the unit trainer have to produce to conduct each activity)?
4. What doctrine and other resources are available for generating training activities?
5. What role can/do resources from operational databases play in providing context for a training activity?

Our analysis consisted of a review of relevant doctrine [US Department of the Army (DA), 1984, 2002; 2003b; US Army Training & Doctrine Command (TRADOC), 1999, 2004], interviews of a variety of unit trainers, observations of pre-deployment training, and the application of in-house subject matter expertise. Our interviewees included an infantry battalion commander recently returned from deployment, Army schoolhouse instructors located at Fort Leavenworth, Kansas, and observer/controllers at the National Training Center at Fort Irwin, California. After a brief overview of training in the US Army, we discuss the general results of our analysis and their implications for the design of the TA concept.

#### *Overview of Army Unit Training*

Because the purpose of the Army is to defend the US, unit training by necessity begins with the unit commander’s analysis of the mission(s) he or she expects the unit to undertake to protect national interests (DA, 2002). In peacetime, training addresses the general requirements units must meet to be combat ready against probable threats. In wartime, missions come from higher headquarters approximately one year prior to deployment, giving units time to prepare through home-station certification and live exercises at combat training centers. Unit

commanders analyze these missions to identify the tasks that are essential for success then select these mission-essential tasks for training emphasis. Training the mission-essential tasks may occur both prior to and during deployment, but the majority of training occurs pre-deployment when training resources are most readily available and so that Soldiers and leaders are combat ready when they reach theater.

### *Who are the Unit Trainers?*

Although the unit commander is ultimately responsible for the mission readiness of his/her unit (DA, 2002), the label “unit trainer” refers to a variety of individuals including tactical unit commanders, operations staff officers, non-commissioned officers, schoolhouse instructors, and civilian contractors, among others. Generally speaking, tactical unit commanders identify training objectives, oversee training progress, and participate actively in leader training. Operations staff officers at the battalion and brigade level (and unit commanders at lower echelons) plan, execute, and assess collective and officer individual training. Non-commissioned officers direct the training of individuals, crews, and small teams. Civilian contractors--often retired unit trainers located on post in a mission support training facility (MSTF) or home station operations center (HSOC)--assist stateside commanders and staff by designing and implementing computer-based collective training exercises using the latest simulation technology and information from deployed units. Mission support training facilities and HSOCs also provide critical reachback capabilities to deployed units, enabling the development of structured just-in-time training and mission rehearsal for commanders with limited time and technical resources. The personnel at combat training centers assist in pre-deployment training by designing and implementing multi-echelon (brigade and below) live training exercises based on the brigade commanders’ mission-essential task list (METL).

Civilian contractors also support unit training as instructors at Army schoolhouses or as distance-learning developers. These individuals generally are indirectly involved in unit readiness, but they must ensure that their course curricula are up-to-date, especially as more and more course instruction is delivered online (Abell, n.d.). Schoolhouse instructors provide the education for general individual and leader skills and competencies that apply across mission types and theaters. However, they use capstone exercises to prepare students to apply these skills and competencies in current operating situations. Schoolhouse instructors often find themselves pulled in two different directions as the operational Army demands theater-specific training and the institutional Army demands general education. If unit training is conceived as broadly as possible, doctrine writers and other policy developers also may be considered unit trainers.

### *What Training Activities Should/Do Unit Trainers Generate?*

Generally speaking, unit trainers generate three types of training: individual, collective, and leader (DA, 2002). Common training activities of each training type are shown in Table 1 below.

Educated review of this table reveals that there is overlap of several training activities across the three training types. This overlap occurs in large part because leader training may

focus either on individual leadership skills (e.g., decision-making capability) or on collective leadership skills (e.g., synchronization). Moreover, the training of individual skills (whether focused on Soldiers or leaders) may be conducted in a group setting, as in the case of seminars/lectures and demonstrations. Because we examined the Army training process for tool design implications, we did not attempt to force distinct categories of training activities, but rather to understand how the intended end users categorize training such that the tool would be as consistent as possible with the expectations of a variety of unit trainers.

Table 1

Common Individual, Collective, and Leader Training Activities

Individual	Collective	Leader
<ul style="list-style-type: none"> <li>- Soldier Training</li> <li>- Military Occupational Specialty (MOS) Training</li> <li>- Seminar/Lecture</li> <li>- Demonstration</li> <li>- Regulations Training</li> <li>- Certification Training</li> <li>- Cultural/Language Training</li> </ul>	<ul style="list-style-type: none"> <li>- Joint Training Exercise</li> <li>- Combined Training Exercise</li> <li>- Field Training Exercise (FTX)</li> <li>- Combined Arms Live Fire Exercise</li> <li>- Live Fire Exercise</li> <li>- Fire Coordination Exercise</li> <li>- Situational Training Exercise (STX)</li> <li>- Drills (battle, crew, or battle staff)</li> <li>- Lane Training Exercise</li> <li>- Deployment Exercise</li> <li>- Sergeant’s Time/Team Training</li> </ul>	<ul style="list-style-type: none"> <li>- Seminar/Lecture</li> <li>- Tactical Exercise without Troops (TEWT)</li> <li>- Mission Rehearsal</li> <li>- Decision-Making Exercise (DMX)</li> <li>- Military Decision-Making Process (MDMP) Training</li> <li>- Command Field Exercise</li> <li>- Command Post Exercise (CPX)</li> <li>- Targeting Training</li> <li>- Logistics Exercise</li> <li>- Map Exercise (MAPEX)</li> <li>- Staff Exercise (STAFFEX)</li> </ul>

The unit trainer’s selection of a particular training activity depends on who is being trained and the resources available to conduct training. For example, staff exercises are not conducted below battalion level, because echelons below battalion do not have a staff. A staff trainer (i.e., the staff executive officer) may choose to precede a staff exercise with a lecture/seminar on team communication or on digital command and control systems in order to maximize the degree to which collective activity, as opposed to individual staff knowledge, is trained in the staff exercise. Conducting training in this way is consistent with the Army’s crawl, walk, run progression of training difficulty, such that trainees are challenged at a level that optimizes the tradeoff between resource expenditure and training benefit.

Many collective exercises, such as joint or combined training exercises are too resource intensive to develop on a regular basis and involve several unit trainers in the design process. Other, more cost effective training activities may be developed instead of these large-scale exercises, or as a prerequisite so that trainees will achieve the most benefit. These activities are more commonly developed by unit trainers. For example, schoolhouse instructors, MSTF trainers, and HSOC staff primarily develop small-group collective exercises, either to facilitate the

learning of students in a formal educational setting or to train the leader teams in a unit that is stateside or deployed. These collective exercises are enabled by networked, distributed computer systems that simulate mission situations from convoy operations to large-scale maneuver battles.

Even so, our interviews with subject matter experts indicated that unit commanders and staff do not conduct enough smaller-scale collective training exercises, such as staff training or targeting training, which limits the benefit that pre-deployed units gain from field training exercises conducted at combat training centers. Scheduling and resource constraints are the most common limiting factors in conducting home-station collective training, but an additional limiting factor may be an all-or-none attitude toward training realism. Army training doctrine (e.g., DA, 2003b) emphasizes the importance of maximizing realism in training exercises, which may lead unit trainers who are resource constrained to also be idea constrained when it comes to designing collective training exercises.

### *How is Training Conducted?*

Training may be conducted in a variety of ways, with differing implications for what unit trainers must develop to conduct a particular training activity.

Individual training often is administered in the form of computer-based training packages, which can be delivered via the web or on a compact disc. Computer-based learning management systems are providing ever-increasing support for the monitoring of individual training progress. One noteworthy exception to the rule of individual training monitoring versus individual training generation is the seminar/lecture, which may need to be rapidly developed as a prerequisite for a larger training exercise or in rapid response to an identified shortfall in individual performance during collective exercises. Another exception includes individual training on practical skills, which is conducted by non-commissioned officers to ensure troop readiness. As sudden demands for individual skills in response to training or operational need become more frequent, so too do other exceptions to this rule.

Collective training (groups of leaders or of multi-echelon trainees) may be conducted as live exercises (including live fire exercises), computer-simulated exercises, tabletop exercises (technology-enabled or otherwise), or as simple thought exercises. In any case, the unit trainer must develop background materials to set the conditions for the exercise and to situate the trainees. He or she also identifies the resource requirements for the exercise and handles the scheduling of the exercise. Exceptions to this rule include very large-scale exercises and some computer-simulated exercises that involve multiple training developers. Smaller-scale exercises, such as tabletop exercises and thought exercises, require less detailed background materials and fewer resource requirements, but require greater involvement of the unit trainer in structuring and leading the exercise.

Conducting effective training requires that training be structured using instructional strategies that are aligned with the training objectives. To some degree, unit trainers have their instructional strategies already selected for them by the format of the training activity they have chosen to develop. For example, most collective training activities use a scenario-based/practical exercise approach with delayed feedback (i.e., after-action review). Freedom in implementing

instructional strategies occurs when unit trainers tailor activities to meet specific training objectives they have identified or to address particular training problems. Trainers may wish to use immediate feedback, repetitive drills, cue highlighting, reflective practice, or other means for enhancing the effectiveness of a training activity, but use of these means requires that unit trainers have experience with instructional design. Many of these dedicated people do not.

*What Doctrine and Other Resources Are Available for Generating Training Activities?*

Unit trainers generally attempt to make their training as doctrinally sound as possible. The Army supports their efforts by providing numerous resources for planning, conducting, and assessing training activities. Table 2 below lists several doctrinal resources available to unit trainers, providing a description of each.

Table 2

Training-Development Resources (Doctrine-based)

Resource Name	Resource Description
Combined Arms Training Strategies (CATS)	“...provides Army units with a training strategy, linked to resources and readiness, to sustain unit operational readiness... describes how the Army will train the force to standard, and consists of unit, individual, and self-development training strategies... CATS further identifies, quantifies, and justifies training resources required to execute training” (TRADOC Pamphlet 350-70-1).
Drill Books	Contain small-group collective tasks (battle, crew, or battle staff) with associated conditions, standards, performance steps, and assessment criteria; Tasks focus on automatizing a trained response to a given stimulus. Drills may also be found in mission training plans.
Field Manuals (FMs)	Describe Army standards with regard to numerous topics, including general unit employment tactics, leadership, terms and symbols, and mission planning, among several others.
Mission Training Plans (MTPs)	List established collective mission tasks along with their associated conditions, standards, and assessment criteria; describe the process for structuring collective exercises that are aggregates of multiple mission tasks; provide sample collective exercise outlines and materials, to include exercise background and resourcing information; MTPs are based on the integration of numerous resources, including mission and task analysis products, Army publications, and short-range CATS, among others.

*(Table Continues)*

Officer Foundation Standards Manuals	List individual officer tasks along with associated conditions, standards, performance steps, and assessment criteria; Intent is to support leader self-development for all ranks of commissioned officer.
Soldier Manuals and Trainer's Guides	List individual, MOS-specific Soldier tasks along with associated conditions, standards, performance steps, and assessment criteria.
Soldier Training Publications (STPs)	List individual Soldier mission tasks along with associated conditions, standards, performance steps, and assessment criteria.
Soldier's Manuals of Common Tasks	List individual Soldier tasks (shared across branches at four levels of skill) along with associated conditions, standards, performance steps, and assessment criteria.
Training Circulars (TCs)	Provide training guidance on a wide variety of topics for leaders and Soldiers.
Training Support Package (TSPs)	"A complete, task-based, exportable package integrating training products, materials, and information necessary to train one or more critical collective tasks and supporting individual tasks" (TRADOC Pamphlet 350-70-1).

The length and quantity of doctrinal training manuals slows down the training-development process because substantial time is required to locate appropriate manuals and implement their guidance in training exercises. Moreover, many training developers may be unaware that doctrinal support exists and therefore do not seek it out. Currently, there is no simple way for unit trainers to locate segments of doctrine for relevant training guidance, although searching for entire manuals is relatively straightforward in Army Knowledge Online (AKO) and through the US Army Training & Doctrine Command (TRADOC) website. Many doctrinal manuals, including training publications, are well over 200 pages long, requiring non-trivial download times (especially for trainers using dial-up internet connections) and significant review time to locate topics of interest. Newer manuals, saved as portable document format files (.pdfs), however, are much easier to search, abbreviate, and print, than older manuals saved as other types of files and scanned into .pdfs.

There appear to be differing opinions regarding the relevance of current doctrine to the development of training that will support mission readiness in the contemporary operating environment. These differences in opinion appear to stem from different conceptions of what the purpose of doctrine is and how quickly it should be updated. Ancker and Burke (2003) write:

"In order to understand the role of doctrine, we must distinguish between doctrine, tactics, techniques, and procedures. When they use the term doctrine, most people are referring to the whole body of doctrine and fail to separate the specific role of each component... Each component... has a different 'cyclic rate' in terms of its development and useful life."

Quoting J.F.C. Fuller (1926), Ancker and Burke define doctrine in the narrow sense as: "Fundamental principles by which the military forces or elements thereof guide their actions in support of national objectives. It is authoritative but requires judgment in application." Doctrine, *by design*, takes longer to develop and is intended to have a long life cycle. Tactics,

the employment of units in combat, are similarly intended to have a longer life cycle (though not as long as doctrine), with tactics publications representing a set of possible ways to arrange and deploy forces in a given situation. Doctrine and tactics are designed to support mission readiness in an indirect fashion by imparting broad knowledge that is applied differently in different situations. Much more specialized and more rapidly changing are techniques and procedures, which capture unit-specific methods for using resources and performing tasks. These components of doctrine are the unit's standard operating procedures, which must change as situations demand. The sharing of techniques and procedures across units increases organizational knowledge, and training on techniques and procedures is what facilitates mission readiness.

In general, the subject matter experts we interviewed stated that current doctrine (using the broad definition of the term) is relevant to setting training objectives, but that training objectives now are more common across the different branches than they were. Access to current doctrinal manuals may be more stovepiped than the effective training of general mission competencies will allow. Some subject matter experts also stated that much work must be done to establish employment tactics for new types of units and missions.

In the absence of established tactics to address the transformed Army, unit commanders must use their best judgment for identifying mission-essential tasks, structuring collective training exercises, and defining assessment criteria. Unit commanders can inform their judgment by reviewing published lessons learned, military professional journals, and combat training center publications. All of these resources are available through web searching and AKO, but may take considerable time to locate and synthesize into meaningful implications for training. An additional concern is that techniques and procedures, necessary for setting training objectives that directly affect mission readiness, which are posted in these locations, may be dated by the time they appear (Baum, 2005). Unit trainers may need to access non-doctrinal resources, such as unit networks and other discussion forums, to capture the most up-to-date techniques and procedures their units must learn to be mission ready. Although this practice of horizontal knowledge sharing could permit the temporary dissemination of an ineffective tactic, technique, or procedure, it is generally recognized that facilitation, networking with experts, and self-policing during professional exchange help to prevent content mediocrity (e.g., Dixon, Allen, Burgess, Kilner, & Schweitzer, 2005; Wenger, McDermott, & Snyder, 2002).

### *What Role Can/Do Resources from Operational Databases Play in Providing Context for a Training Activity?*

There is no single operational database but several, including deployed unit websites, unit networks, and structured professional forums. Elements in these operational databases include digital operational products, such as operations orders, intelligence reports, and after-action reviews, as well as text messages, lessons learned, emerging doctrine, training plans, and other resources.

Understanding how resources from an operational database may be used to contextualize training involved first identifying how this contextualization occurs. Training objectives, based on the METL, consist of the task that must be executed, the conditions under which it must be

executed, and the standards to which task performance must conform (DA, 2002). Mission tasks and their corresponding conditions and standards are either described in established doctrine or (in the absence of established doctrine) determined by unit commanders using “mission orders and guidance, lessons learned from similar operations, and their professional judgment” (DA, 2002). Trainers contextualize their training by customizing the conditions and (to some extent) the standards they use to match a particular mission setting in which they expect their units will be situated.

There are, therefore, two ways in which resources from operational databases can be used to provide context for training. First, elements in a database can be used to customize the established conditions and standards of mission tasks for a particular training activity; they can be directly embedded into the training activities themselves. Consider the example mission task, conditions, and standards from ARTEP 7-5-MTP (2003a), presented in Table 3.

For the mission task described in the table, a unit trainer could use an operations order (OPORD), fragmentary order (FRAGO), or rules of engagement/rules of interaction (ROE/ROI) from a unit website to provide context. Alternatively (or in addition), the unit trainer could use building plans, photographs, or overlays to set the conditions, provided the training environment either replicates those buildings (e.g., through computer simulation) or the images themselves simulate the building, as in a DMX. Training developers at the Fort Lewis (Washington) Battle Command Training Center use this approach to integrate theater conditions and lessons learned directly into the training for units preparing to deploy (Jean, 2005). This approach provides pre-deployed units with a virtual “right-seat” ride, which trainers report reduces time-to-readiness when units arrive in theater (Jean, 2005). The unit trainer could also use existing tactical standing operating procedures (TSOPs) and ROE/ROI for assessing whether performance conforms to organizational standards. Operational database elements may also be used to contextualize training activities that are not directly associated with a mission task, such as seminars/lectures, demonstrations, and some types of leader or collective education (such as more generalized thinking, teamwork, or leadership skills). In these cases, database elements may be embedded for use as illustrative examples, bases for practical exercises, or background information, among other things.

Table 3

Example Mission Task, Conditions, and Standards for an Infantry Rifle Platoon

Task	Search a Building
Condition	The platoon is conducting operations as part of a larger force and has received an operation order (OPORD) or a fragmentary order (FRAGO) to search a building at the location and time specified. All necessary personnel and equipment are available. The platoon has communications with higher, adjacent, and subordinate elements. The area around the building is secure. The platoon has been provided guidance on the rules of engagement (ROE) and rules of interaction (ROI). Coalition forces and noncombatants may be present in the operational environment. Some iterations of this task should be conducted during limited visibility conditions. Some iterations of this task should be performed in mission-oriented protective posture, level 4 (MOPP4).
Standard	The platoon searches the building in accordance with (IAW) the tactical standing operating procedures (TSOP), the order, and or the commander's guidance. The platoon enters, searches, and exits the building while maintaining all around security. The platoon complies with the ROE and ROI.

Second, multiple elements in an operational database, such as informal documents and text messages, can be reviewed and synthesized to inform the development of training conditions and standards for mission tasks that are not well established in doctrine (i.e., new techniques and procedures). Synthesized operational database material may also be used to customize the conditions for established mission tasks, but in a more indirect way. Using the example mission task above, text messages shared in a unit network may give the unit trainer insight into what (simulated) coalition forces and noncombatants should be present in the training environment--and how they should behave--in order to maximize the realism of the exercise. Training developers at the National Training Center adopt this second approach. They use lessons learned from theater to determine opposing force tactics, civilian behaviors, and urban terrain characteristics that form the learning environment.

An important caveat regarding the use of operational database resources involves the security classification of these resources. All elements present in unit networks and unit websites are classified and cannot be used as is for training unless the training exercise is itself classified. Moreover, unit trainers have limited opportunities to search classified websites because there are a relatively small number of computers connected to the classified internet. For these reasons, it is more likely that deployed unit trainers would use resources directly from classified operational databases than unit trainers stateside. Stateside unit trainers may use declassified products if they are available or resources from databases that are not themselves classified, such as structured professional forums or lessons-learned websites.

### Design of the TA Concept

In this section, we review the key findings of our Army training analysis and discuss their implications for the design of the TA concept (i.e., a full-scale, idealized capability). Our goal

was to design a tool to support more rapid generation of more effective and more relevant pre-deployment and deployed training.

### *The TA Target Audience*

Recall from the previously described training-process analysis that the label “unit trainer” is used to refer to a variety of individuals and that individuals can be more or less directly involved in unit training. Because the purpose of the TA is to support the rapid development of contextualized training activities, the initial scope of the TA concept design was limited to addressing the needs of individuals directly involved in small- to moderate-scale unit training: tactical unit commanders, operations and executive staff officers, non-commissioned officers, MSTF and HSOC trainers, and schoolhouse instructors. Emphasis was placed on mechanized infantry/dismounted armor trainers, as the effective functioning of these types of units is a critical determinant of success in the contemporary operating environment.

That the TA must serve a variety of unit trainers--deployed or stateside--necessitates that the tool be accessible through a means that is easily accessed anytime from anywhere. For this reason, web-enabled implementation was the desired approach for TA development. Web-enabled implementation does not require trainers to have specialized software to create or administer training. Moreover, implementation within the Army information technology infrastructure [i.e., using a .mil server accessible through AKO or the Battle Command Knowledge System (BCKS) and using AKO authentication] would ensure secure, uniform access that is familiar to all unit trainers and their trainees. Recent updates to AKO reportedly have made AKO faster and easier to use, making it an ideal centralized source for training development and administration. In addition, unclassified operational databases, such as structured professional forums, the Army Center for Lessons Learned (CALL), and the Warrior Knowledge Base, are accessible through these portals.

The subject matter experts we interviewed expressed wariness at the idea of a “new tool” and stated that the design and functionality of such a tool should be maximally consistent with existing technology, else it will not be used. This finding further supported our belief that TA implementation could occur within AKO and/or BCKS--Army-wide portals for information sharing--and that the look and feel of the TA should be as close as possible to that of AKO and/or BCKS.

### *Training Development and Training Products Supported by the TA*

The TA concept enables the rapid development of training via two main functionalities. First, the TA enables unit trainers to create new training from scratch, assembling novel and existing materials to create a variety of training activities. This functionality is the heart of the TA and its core capability. Second, the TA enables unit trainers to modify existing training that has been developed by others who have used the TA to create their own new training. This second functionality helps trainers avoid reinventing the wheel by making the efforts of others easy to access and build upon (Kilner, 2002). Below we describe in detail the training development and products supported by the TA concept.

Ideally, the TA could support the development of all of the training activities listed in Table 1 above. For large-scale training exercises, this capability would enable multiple trainers to develop the same exercise collaboratively. It could also enable trainers to modify directly simulation-based exercises, provided the TA and the exercise software were interoperable. For individual training activities, this capability would enable every Soldier and leader to be a “unit trainer” by designing his or her own self-training activities and even sharing these with others in Army structured professional forums. Decisions must be made to manage scope, however, so we prioritized the TA concept capabilities based on our assessment of what training is most frequently developed by unit trainers, what training development is most in need of embedded instructional strategies, and what training development is most feasible to support at this time.

Figure 1 below depicts the training activities supported in the TA concept. This selection enables the development of individual, collective, and leader training activities that are not the primary responsibility of the institution. Rather, the TA concept places emphasis on collective and leader training activities, which are difficult to create but critically important to mission success. Figure 1 also depicts how training activities are linked to training type (individual, collective, and leader) and trainee type (e.g., crew, platoon, staff, etc.) in the TA concept. This linkage organizes training activities in a way that is meaningful to the unit trainer, and is intended to be flexible to address overlap among training activities and types. For example, a staff trainer may wish to develop a command post exercise (CPX) to train the staff on battle execution standing operating procedures (SOPs). The trainer may think of this as leader training or collective training, and in the TA concept he can access CPX by selecting either.

Table 4 below depicts the form of training associated with each training activity such that once unit trainers select a training activity, they can also select a form of training consistent with a crawl, walk, run progression of training. For example, a unit trainer may wish ultimately to conduct a collective exercise, but also recognizes the need to conduct individual or leader training as a prerequisite. The TA concept would enable the trainer to develop each form of training associated with the crawl, walk, run progression using a single source.

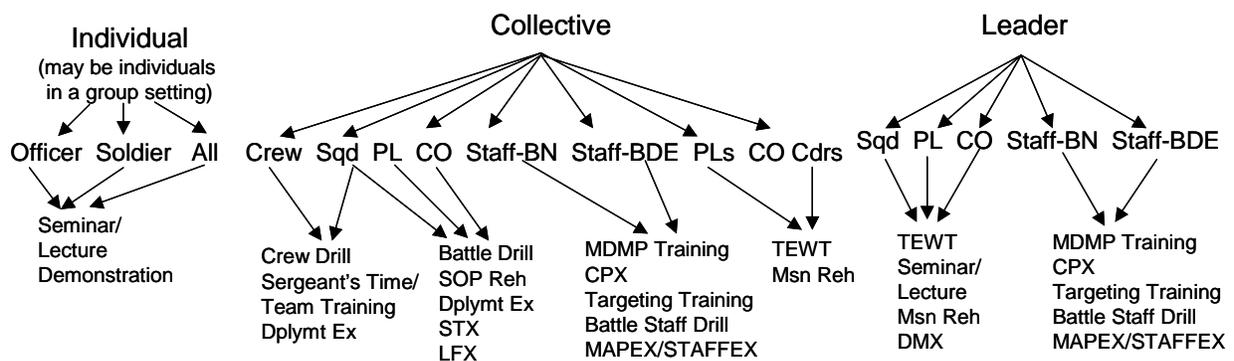


Figure 1. Training Activities Supported in the TA Concept.

The TA concept produces different output, depending on the training activity and format selected. The output ranges from printable background materials to seminar/lecture presentations, to interactive computer-based exercises. For easy access, all output is in the form

of web pages. These can be printed, presented, shared, and viewed simultaneously (though not in a distributed/collaborative fashion) without specialized software available on the computer by which the training is accessed. The web-enabled format of the output allows trainers and trainees alike to access the TA from any computer that has internet access, whether deployed or stateside. For deployed units with limited access to the internet, stateside trainers could print and send training materials they have developed.

Table 4

Training Format by Activity

Training Activity	Training Format
Demonstration	Demonstration (when a stand-alone activity)
Seminar/Lecture	Seminar/Lecture (when a stand-alone activity)
Drill (Crew, Battle, Battle, Staff)	Seminar/Lecture, Demonstration, Practical Application, Drill
Sergeant's Time/Team Training	Seminar/Lecture, Demonstration, Collective Exercise
Deployment Exercise	Seminar/Lecture, Practical Application, Deployment Exercise
SOP Rehearsal	Seminar/Lecture, Practical Application, Collective Exercise
STX	Seminar/Lecture, MAPEX, TEWT, STX
Live Fire Exercise (LFX)	Seminar/Lecture, Demonstration, Practical Application, Collective Exercise
MDMP Training	Seminar/Lecture, MAPEX, STAFFEX
CPX	Seminar/Lecture, Practical Application, CPX
Targeting Training	Seminar/Lecture, Practical Application, Targeting Training
MAPEX/STAFFEX	Seminar/Lecture, MAPEX, STAFFEX
TEWT	TEWT (activity is situation triggered)
Mission Rehearsal	Mission Rehearsal (activity is situation triggered)
DMX	Think Like a Commander (TLAC) Exercise (activity is individual education, possibly in a group setting)

The TA concept is also intended to support training development by providing space for an online training notebook. This space would enable the centralized storage of key materials involved in the training development process that are not themselves training, such as METLs, training schedules and plans, and readiness reports, among others.

#### *Integrating Doctrinal Resources into TA-Supported Training Development*

The results of our training analysis indicate that the TA can significantly enhance the training-development process by making doctrinal resources readily available via a centralized source and in a format that enables easy insertion into training activities.

Figure 2 features the high-level architecture of the TA concept system. As shown in the figure, the selection of a training activity by the unit trainer determines the set of queries the TA presents to support the development of training materials for that activity. These queries enable

the trainer to provide training content to the system for assembly into a completed set of training materials, including the content of the training activity itself as well as performance assessment criteria and feedback or after action review (AAR) materials, where applicable. The TA concept also provides content for the trainer. This content is based directly or indirectly on doctrinal resources and is relatively generic and modifiable to ease the training development process.

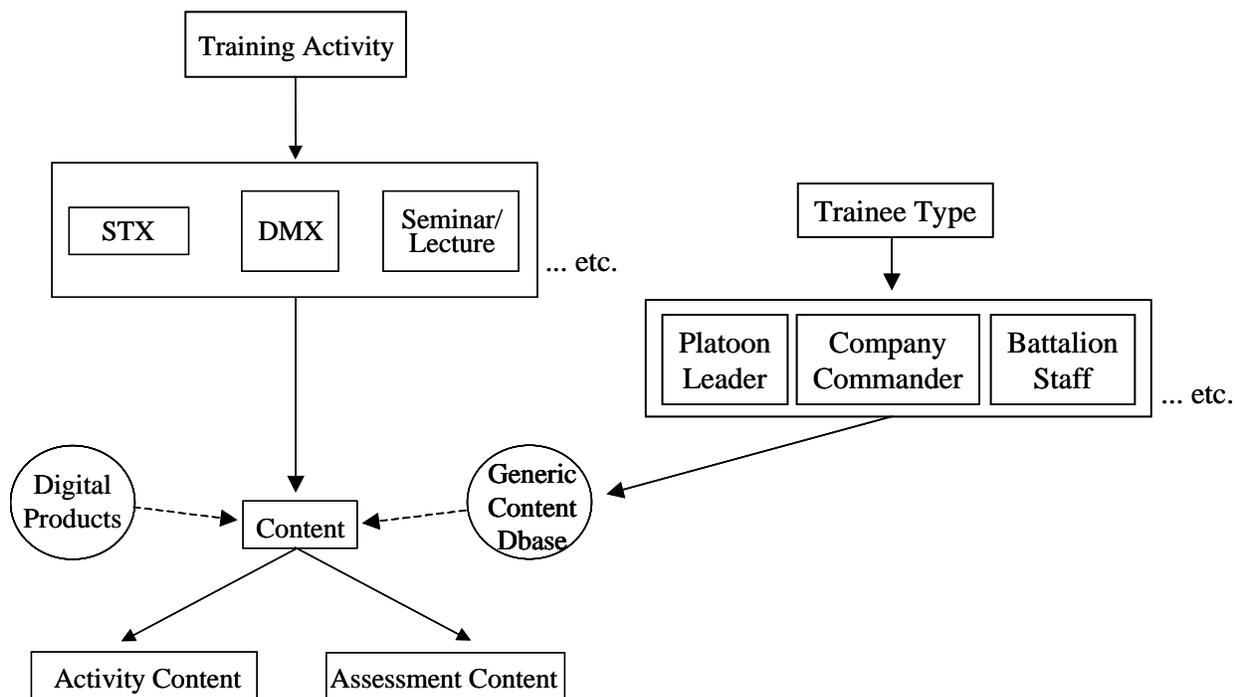


Figure 2. High-level Architecture of TA Concept System.

As shown in Figure 2, the TA concept stores generic modifiable content in a database whose fields are called up by the development queries associated with each type of training activity. In general, the content called up is jointly determined by the type of training activity and trainee type. Content that is directly based on doctrinal resources is taken verbatim from doctrinal manuals. An example of this type of content includes the numbers assigned to drills as well as their associated performance procedures and assessment criteria, which can be located in ARTEPs. Content that is indirectly based on doctrine features material that is consistent with doctrine, but is not explicitly stated. An example of this type of content includes some seminar/lecture content and background materials for collective, scenario-based training (e.g., STX or DMX). The integration of doctrinal resources through generic, modifiable content enables the trainer to develop rapidly training activities that are consistent with doctrine, but also enables the trainer to customize training to suit the immediate needs of his or her unit.

#### *Retrieving Content from the Operational Database*

As described previously, there currently is no single operational database that could support contextualization of the variety of training activities that unit trainers from across the Army might wish to generate. The lack of such a database, combined with extremely low

interoperability among the extant databases, limits the degree to which a tool for supporting advanced training-development processes can enable contextualization without overcoming significant networking barriers. Tackling such networking issues was well beyond the scope of this research-and-development effort. At present, our TA concept design assumes a single operational database, in effect a tagged file repository, consistent with the vision that at some future time all Army operational databases will be unified or interoperable. A TA concept capability therefore must be designed to communicate flexibly with different databases so that it can be implemented easily in a variety of locations (e.g., one TA “in” each structured professional forum).

A major challenge to developing highly contextualized training is the constrained schedule of the unit trainer. Even if a training-development tool were to communicate with a single, universal operational database, it would still require a great deal more time than most trainers have to review and synthesize the resources available for determining training-environment implications or informing mission task conditions and standards. A text-analysis tool that could automate the synthesis of operational database resources would be necessary to address this problem, but for reasons of scope and technical difficulty, this capability was not explored in the present effort.

In order to support the development of contextualized training, therefore, the TA must enable users to embed operational products within a training activity and must provide easy access to the other materials available in the operational database for review and synthesis. Figure 2 above shows how the TA concept integrates operational products into the training-development process. As TA queries request content from the user, the user may provide content by uploading digital products that are then embedded into the output of the TA either as hyperlinks or (clickable) image thumbnails.

Also, the TA must be designed such that it can be used on either the classified or the unclassified internet so that the full range of operational database resources may be used. Both the classified and unclassified internet use hypertext markup language (HTML) for displaying web pages and communicate using the Transfer Control Protocol/Internet Protocol (TCP/IP), so designing the TA for the unclassified internet will not require significant redesign for the classified internet.

### Description of the TA Phase I Prototype

In this section, we describe the TA Phase I prototype. The Phase I prototype design was intended to feature a selection of the full-scale TA concept capabilities that best enabled the feasibility assessment of a Phase II effort.

#### *Create New Training – DMX*

Of the TA concept functions previously described, we focused Phase I effort on authoring new training activities from scratch because this functionality is the heart of the TA and its core capability. To manage the scope of the Phase I effort we designed the tool to support company commanders as trainers and platoon leaders as trainees. These leaders are likely to have the most

rapidly changing training objectives and the least experience developing structured training. In addition, we focused our attention on developing the capability to author a DMX.

A DMX is an “exercise used to brainstorm rough contingency courses of action in response to conditions which could arise during an operation. It is intended to improve dialog, understanding, and teamwork between commanders, subordinate commanders, and staffs” (www.fas.org - military definitions). The DMX is not formally described in doctrine but evidently has emerged as useful technique for educating leaders’ ability to think adaptively in response to unexpected circumstances. In the face of an asymmetric, highly unpredictable enemy, leaders who can respond rapidly and decisively to deviations from the planned sequence of events (which are frequent) are best able to survive and accomplish the mission. Given the importance of educating adaptive thinking and the reduced likelihood that training not formally described in doctrine will be developed, we thought it especially critical to support unit trainers in creating a DMX.

#### *DMX Output – What Exactly Does the Unit Trainer Create?*

We used the Think Like a Commander (TLAC) adaptive-thinking training methodology (Lussier, Shadrick, & Prevou, 2003) as the basis for designing the output of the prototype TA DMX authoring capability. That is, the DMX output is designed to present to trainees a brief scenario depicting an ongoing situation (e.g., a patrol operation), its associated context (e.g., higher mission and intent, status of friendly forces, general enemy tactics, etc.), and a set of unexpected events that occur during the ongoing situation. The DMX output requires trainees to indicate the factors they would consider in deciding how to handle the unexpected events and allows trainees to compare the factors they identified relative to those identified by an expert (or experts). Consistent with the TLAC methodology, the TA prototype organizes expert considerations using the eight expert-thinking themes described in Lussier et al. (2003).

Figures 3a-3d below depict the output of the prototype TA DMX. The format of the DMX is a series of interactive web pages with which trainees review the situation, context, and unexpected events. This information is presented through a combination of text entered by the unit trainer and files uploaded by the unit trainer (i.e., operational database materials, personal files, etc.). Files uploaded by the trainer may appear as an embedded file or a link to file, depending on the format of the file. In the Phase I prototype, files that require an application to open (e.g., Microsoft Word) are made available through links whereas other files, such as .jpegs, are embedded into the output.

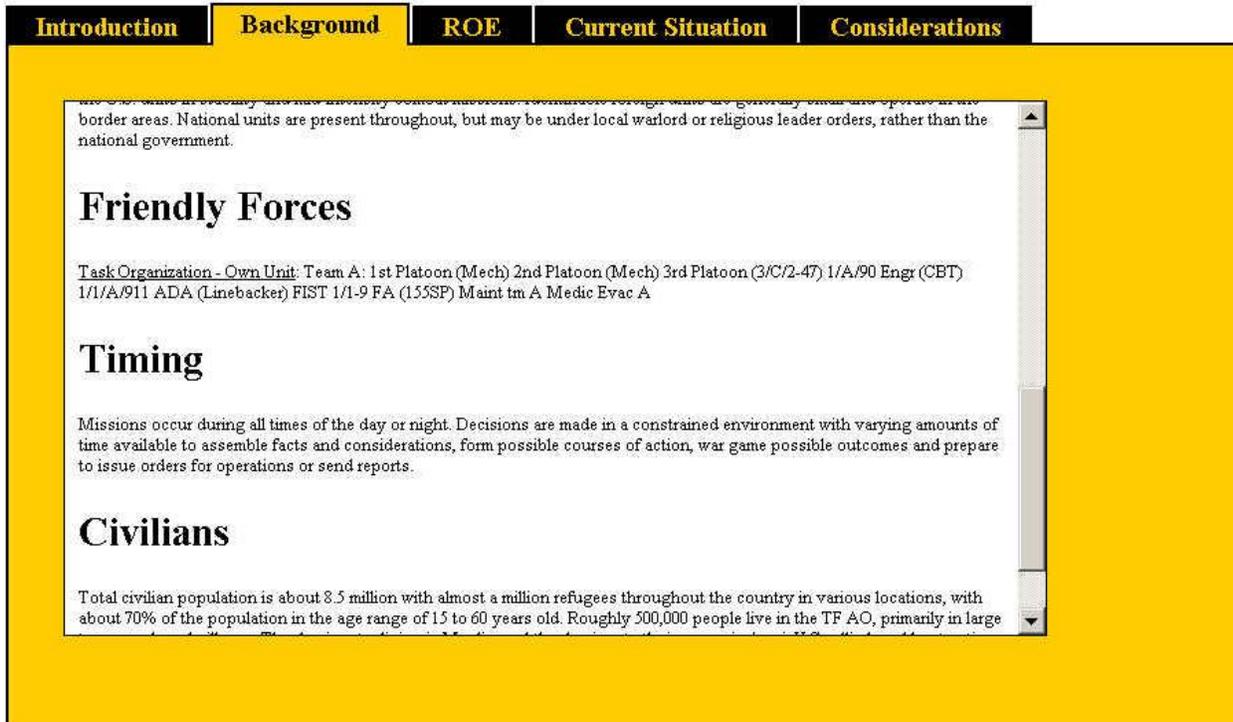


Figure 3a. DMX “Background” Tab.



Figure 3b. DMX “Current Situation” Tab.

After reviewing these materials, trainees indicate their decision-making criteria using text entry. After they have completed their text entry, they may receive feedback on their responses by checking off the expert considerations they identified and reviewing the percentage of considerations in each expert-thinking theme they successfully identified.

**Introduction** | **Background** | **ROE** | **Current Situation** | **Considerations**

In the text box below, enter the factors you would consider when deciding how to handle this situation. Use the eight adaptive thinking themes to the right to help determine these factors.

ROE constraints on action  
Motives of the media  
Earning civilian trust and support - compressed levels of operation

1. [Keep a Focus on the Mission and Higher's Intent](#)
2. [Model a Thinking Enemy](#)
3. [Consider Effects of Terrain](#)
4. [Use All Assets Available](#)
5. [Consider Timing](#)
6. [See the Big Picture](#)
7. [Visualize the Battlefield](#)
8. [Consider Contingencies and Remain Flexible](#)

Continue

You can click on the previous tabs to review the command scenario

Figure 3c. DMX “Considerations” Tab.

The screenshot shows the 'Feedback' tab of the DMX interface. At the top, there are navigation tabs: Introduction, Background, ROE, Current Situation, Considerations, and Feedback. The main content area is yellow and contains the following elements:

- Instructional Text:** "Now, compare the factors you identified to those identified by your trainer by checking off those you both identified."
- List of Factors:**
  - ROE constraints on action
  - Motives of the media
  - Earning civilian trust and support - compressed levels of operation
- Assessment Section 1:**
  - Title:** "Keep a Focus on the Mission and Higher's Intent"
  - Score:** "You got 50%"
  - Questions:**
    - How do I apply the ROE to this situation with the personnel in the area?
    - Am I still able to accomplish my original mission?
- Assessment Section 2:**
  - Title:** "Model a Thinking Enemy"
  - Score:** "You got 50%"
  - Questions:**
    - How will the media be exploited by various groups to advance their own agendas?
    - Given the situation, what options do hostile elements have for further operations?
- Footer:** "Click [here](#) for feedback"

Figure 3d. DMX “Feedback” Tab.

*DMX Input – How Does the Unit Trainer Create a DMX?*

As described previously, and shown in Figure 2 earlier, the unit trainer creates a training activity through a series of queries that are specific to that training activity. To create a DMX, the following queries are used and information provided by the user (in order, grayed out areas are optional):

Table 5

## DMX User Queries

Query	Form of User Input
Select Background Task	Pull-down menu selection or text entry
Select the Area of Operations (AO)	File upload
Specify Key Terrain Features	Text entry
Specify Higher Mission & Intent	Text entry
Specify Higher Task Organization	Text entry
Specify ROE/ROI	Text entry or file upload
Indicate Additional Context	Text entry or file upload
Specify Enemy General Tactics	Text entry
Specify Additional Enemy Intelligence	Text entry or file upload
Specify Recent Enemy Activity in the AO	Text entry or file upload
Specify Task Organization – Own Unit	Text entry
Specify Personnel/Equipment Status	Text entry
Specify Other Military Elements in the AO	Text entry
Specify Timing	Text entry
Specify Civilians	Text entry
Specify Unexpected events	Text entry
Specify Factors to consider – Keep a Focus on Mission/Higher’s Intent	Text entry
Specify Factors to consider – Model a Thinking Enemy	Text entry
Specify Factors to consider – Consider the Effects of Terrain	Text entry
Specify Factors to consider – Use all Assets Available	Text entry
Specify Factors to consider – Consider Timing	Text entry
Specify Factors to consider – See the Bigger Picture	Text entry
Specify Factors to consider – Visualize the Battlefield	Text entry
Specify Factors to consider – Consider Contingencies and Remain Flexible	Text entry

Figures 4a-4d below depict selected query screens. The user begins the query process by selecting a background task that is going on when unexpected events take place. The background tasks available for selection were pulled from training doctrine (Stryker infantry rifle company; DA, 2003b), chosen for the likelihood of their occurrence during stability and reconstruction operations. The Phase I prototype enables the selection of three of these tasks: convoy escort, patrol operations, and re-supply operations. The selection of a background task triggers much of the generic, modifiable content that follows. The unit trainer may alternatively

enter in a background task not listed on the pull-down menu, but this will limit the amount of generic, modifiable content present in the following queries.

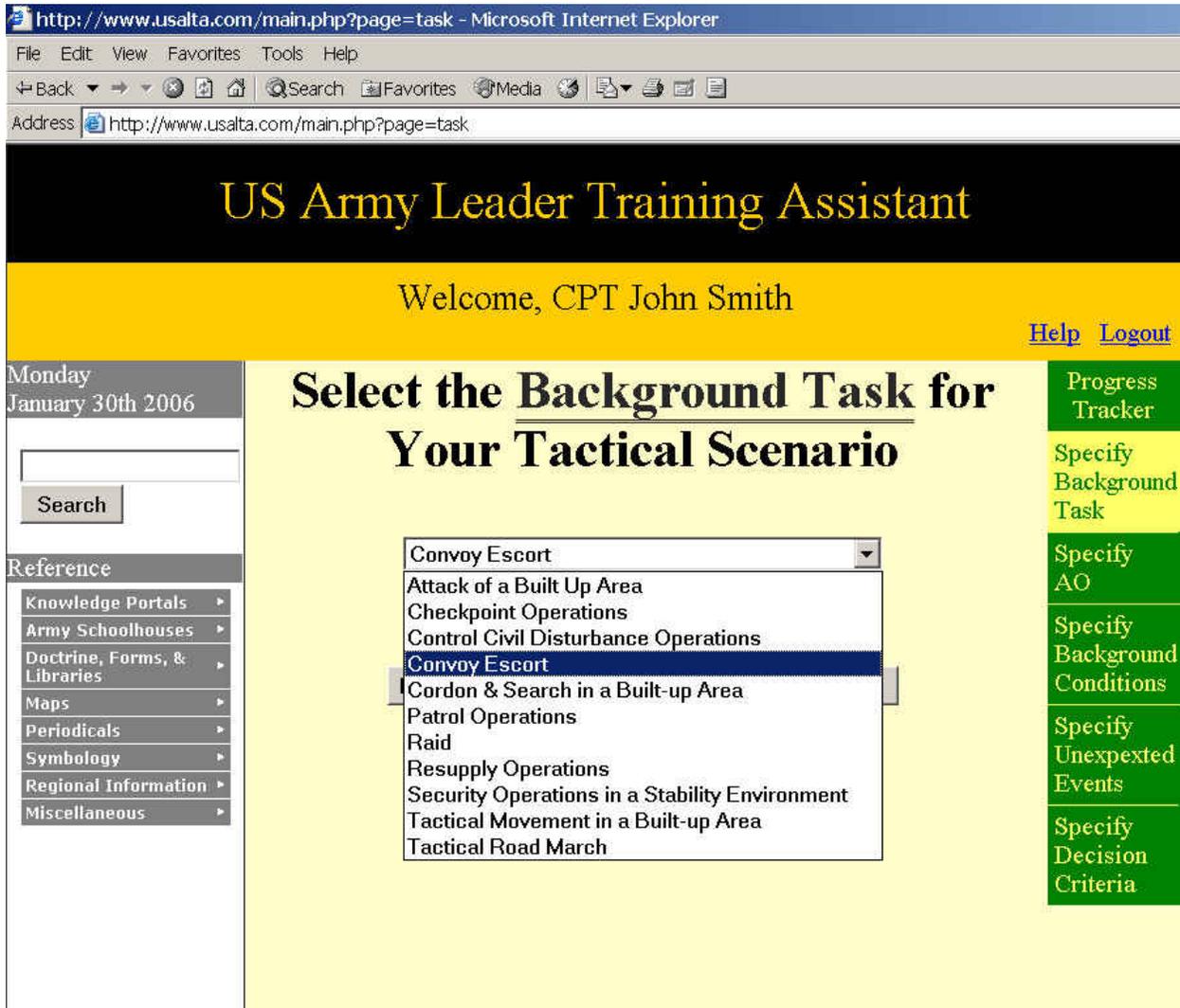


Figure 4a. DMX Background Task Pull-Down Menu.

The trainer next provides text and files in response to the TA queries. Helpful hints boxes, which can be viewed by placing the cursor over designated areas of the display, accompany several of the queries listed in Table 5. Helpful hints explain what the query is asking for, and provide guidance for quickly providing sufficient information.

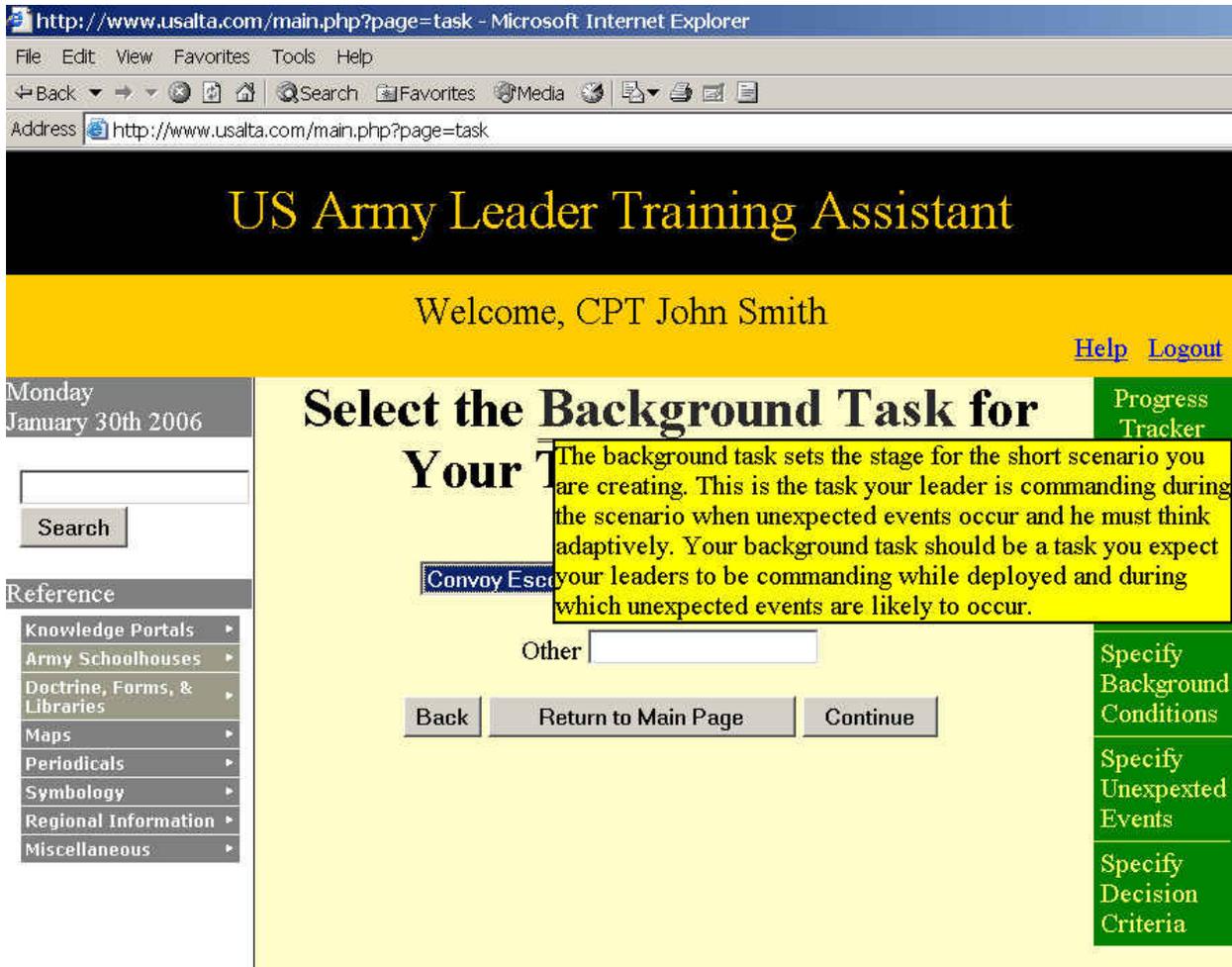


Figure 4b. Example Helpful Hints Box.

The unit trainer can track his progress via two methods. First, the trainer can use the progress tracker to get an idea of how far he is along in the training-development process. This feature helps the trainer gauge whether there is enough time to complete the DMX in one sitting or whether he will have to save the incomplete exercise, exit, and continue at a later time.

Figure 4c. DMX Progress Tracker.

Second, the unit trainer can preview his DMX while it is in progress. This feature allows the trainer to review how the wording of his text will read to the trainee and make modifications if necessary. It also helps the trainer to visualize how the exercise will look to his trainees, a task which might otherwise be difficult for training activities that are not explicitly described in doctrine.

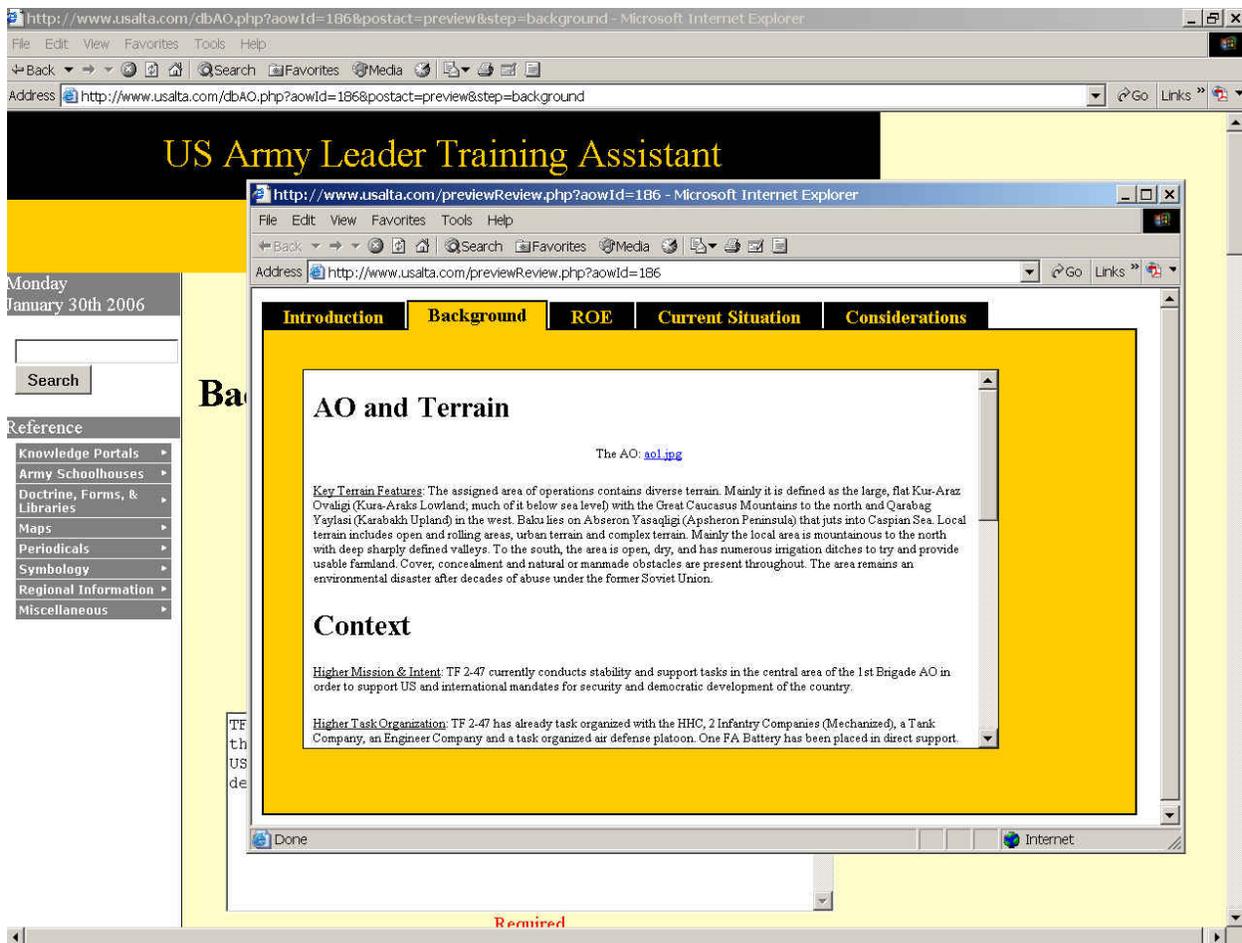


Figure 4d. DMX Preview Capability.

### *DMX Content – How Does Generic Content Work?*

A subject matter expert developed the generic content for the prototype TA, which is present in all of the required fields listed in Table 5 above (except the selection of the background task). In general, fields in the generic content database are called up depending on the background task and trainee type selected by the unit trainer. However, some fields (e.g., ROE/ROI, civilians, timing) are generic across all trainee types and background tasks. Generic content appears to the user as text already filled into a field, which may be modified or deleted, depending on the user's preference. Figure 5 shows a screen capture of the prototype TA with generic content filled in.

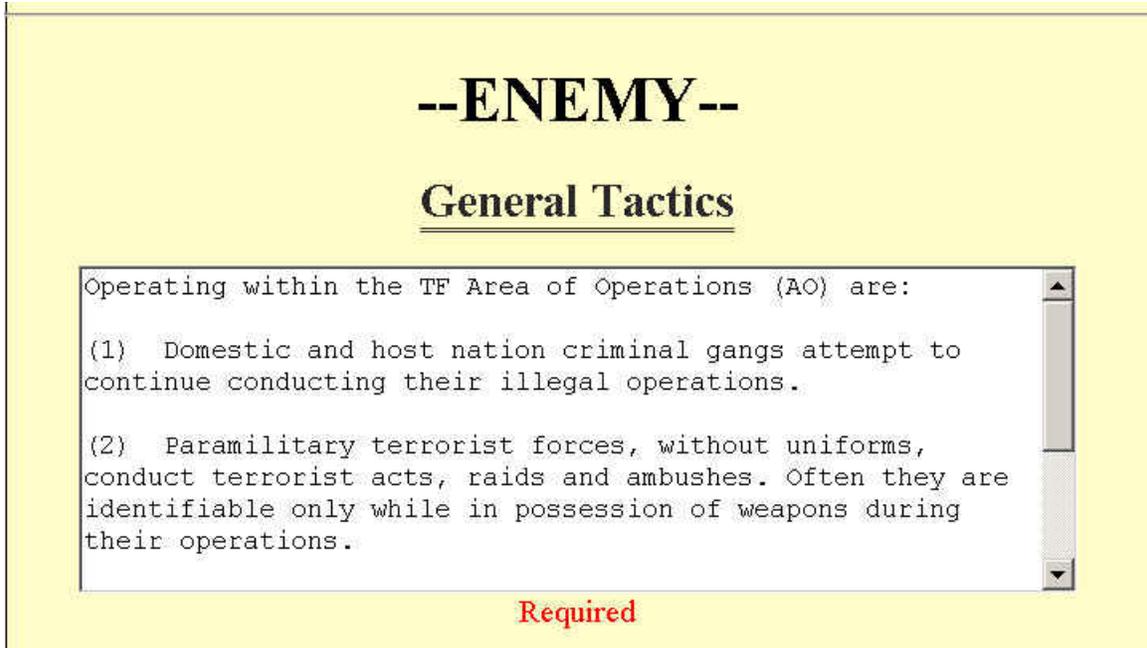


Figure 5. Example Generic, Modifiable Content.

*DMX Content – How are Operational Database Resources Used?*

There are several opportunities for the unit trainer to embed operational database resources into the DMX. These opportunities include uploading (a) depictions of a deployed unit's AO (i.e., map files or map files with graphics, photographs, sketches, or other graphic files); (b) ROE/ROI used in theater; (c) additional contextualizing materials from an area of operations (AO) in theater (e.g., photographs, weather reports, incident reports, etc.); (d) additional enemy intelligence from deployed units' reports (i.e., intelligence reports such as person files, pattern analyses, etc.); and (e) information on recent enemy activity (i.e., FRAGOs; text descriptions from unit networks or lessons learned sites could be pasted in the text entry field and modified as well). Figure 6 shows a screen capture of some operational database opportunities featured in the prototype TA.

**ROE/ROI**

RULES OF ENGAGEMENT

(1) If you are operating as a unit, squad, or other formation, follow the orders of your leaders.

(2) NOTHING IN THESE RULES NEGATES YOUR INHERENT RIGHT TO USE REASONABLE FORCE TO DEFEND YOURSELF AGAINST DANGEROUS PERSONAL ATTACK. These rules are intended to prevent indiscriminate use of force or other violations of law or regulation.

**Required**

What are My Other Options for ROE/ROI?

Search:

<a href="#">Select</a>	ROE_enemymilitarypersonnel.doc	ROE, rules of engagement, enemy military personnel, example
<a href="#">Select</a>	RulesofEngagementgeneric.doc	ROE, rules of engagement, generic, example

Figure 6. Opportunities to Use Operational Database Resources.

In addition, the unit trainer may bypass the DMX background/situation specification altogether and upload an OPORD and other resources from a unit in theater. This trainer would begin authoring the DMX by specifying unexpected events and finish authoring the DMX by specifying the factors he would consider to handle these unexpected events. Building the DMX in this fashion would dramatically speed up the training-development process and allow trainees to practice reviewing the kinds of information resources they would use in the field.

### Feasibility Analysis

Our discussions with subject matter experts indicate that the TA concept has great potential for saving time, increasing productivity, and improving training. A full-scale capability enabling the development of several collective exercises (up to STX in size and complexity) and individual, small-group training activities (e.g., leader training) would have broad impact and would be doctrinally sound and easy to use. Even after effort to manage the scope of the TA concept, however, implementing the full-scale concept capability cannot feasibly be accomplished in the Phase II effort.

In this section, we present the results of the analysis we conducted to determine the design and development objectives for a feasible Phase II effort. We describe (a) how maximum training impact can be achieved with the Phase II TA through the selection of high-priority training activities and end users; (b) what generic, modifiable content and digital operational products should be used to maximize the tool's flexibility and minimize administration requirements; and (c) how the Phase II TA should be implemented to reduce the demand on network administrators to prepare/maintain the tool for operational use.

## *Achieving Maximum Training Impact with the TA*

For the TA to have maximum training impact, it must either significantly shorten the time required to create the most time-consuming training activities and/or enable the development of high-priority training activities that typically are neglected. Multi-echelon collective exercises are among the most time-consuming training activities to develop. However, the time it takes to generate the background materials for such exercises is only one component of this lengthy process. Scheduling and securing the personnel and resources required to conduct multi-echelon collective exercises is difficult at best and, according to the National Training Center observer/controllers we interviewed, generally precludes collective training at the home station. Collective exercises therefore are also the training activities typically neglected by unit commanders, who must not only accommodate scheduling and resource limitations, but who must also ensure that Soldiers and leaders are trained on prerequisite individual skills such that expensive collective training is justified.

Unfortunately, the TA cannot solve problems of scheduling and resources, which stem from factors outside of the training-development process. Therefore, there is some likelihood, at least in the immediate future, that the TA would not be used to develop several types of collective exercise because they cannot be conducted. The TA may have greater training impact if applied to developing small-group individual and collective exercises, where increasing the speed of the training-development process can enable more frequent training in response to rapid changes in training need. Reducing the time required to generate small-group individual and collective exercises not only would facilitate the training effectiveness of unit commanders but also MSTF and HSOC trainers who are under heavy demand as the operating environment constantly changes.

The TA also must reduce individual differences in the instructional-design savvy of unit trainers while simultaneously increasing their average capability. Reduction in individual differences is accomplished through the use of structured training-development procedures that, in effect, automate much of the training-development process. If the structure provided is based on sound instructional-design principles, average capability in training savvy concordantly will increase. Extensive training doctrine assists in the training-development process by standardizing the training materials, procedures, and outputs for a number of individual and collective training activities, such as MOS training, STXs, and drills. Where applicable, the TA concept maintains this standardization through its training-development queries. However, the TA concept also enables the development of training activities that are not already structured by doctrine, such as seminars and DMXs. The TA provides variance-reducing structure for developing such training activities by implementing recognized best practice (e.g., Lussier et al., 2003) into the training-development queries. Because doctrine is already available to structure many training exercises, the TA would have the greatest impact on training quality by structuring the development of training activities not addressed by doctrine.

Another method for reducing variance in instructional-design savvy is to ensure that structure is provided to those trainers in most need of it. Inexperienced leaders new to designing and implementing training would benefit the most from structured training-development queries. In a sense, these queries act as a mentor for maturing trainers who need guidance in determining

the characteristics of a training activity necessary to exercise and enhance target skills. Moreover, junior officers are likely to develop (and require) training more frequently than more senior officers as they learn new techniques and procedures from their face-to-face encounters with threat forces. The TA therefore would have greater impact on training quality if it was designed to support junior officers (i.e., platoon leaders and company commanders), than if it was focused on supporting more senior officers in the generation of background materials for complex collective exercises.

### *Optimal Generic, Modifiable Content*

The content that is necessary for the TA to enhance the training-development process requires significant administration to make an effective contribution. For example, in order for the TA to supply generic, modifiable content drawn directly from doctrinal resources, the content must be in a format that is consistent with the fields present in the TA's database. Doctrinal resources currently do not exist in this format, and so cannot readily be used to populate the tool's database. Instead, doctrinal resources must be divided manually into smaller segments. In addition, as doctrine is updated, so too should the generic content database. Basing generic, modifiable content explicitly on doctrine would require significant, continuous involvement of TA administrators to prepare doctrinal materials for use by the tool.

Where the TA does not present doctrine verbatim, generic, modifiable content must be generated manually through the educated interpretation of doctrine and best practice. Generation of this type of content requires the participation of subject matter experts and also is a time-consuming process. To the extent that subject matter experts have experience with developing scenario-based training (the type of training most likely to use content that is not explicitly based on doctrine) and searching the internet for the latest lessons learned, generating generic, modifiable content that extends doctrine should be relatively straightforward. The most feasible implementation of the TA concept in Phase II should make maximum use of this type of generic content (while minimizing the overall need for generic content), which will provide greater return on the time invested because the content will represent the most recent information coming from theater.

### *Optimal Operational Database Content*

The digital products the TA provides (through search and upload) to contextualize training are determined by the content available in the TA's "working operational database." The TA concept is not designed to communicate directly with an extant operational database because security and interoperability barriers make such communication infeasible. Rather, the TA working operational database provides an independent means to access digital products using the tool. This independent access not only circumvents communication barriers, but gives the organization implementing the TA some flexibility concerning any content they wish to restrict from the tool (e.g., for security reasons or concerns about information currency). The down side is that because there is no single Army-wide operational database, widespread adoption of the TA requires a network or database administrator to populate the TA working operational database each time the TA is newly implemented.

The content in the TA's working operational database must include file descriptions and path names that indicate where the digital products are located on the server, which enable the TA's search functionality to work properly. Where an operational database exists formally, for example in a structured professional forum or a lessons-learned website, the administrator must migrate content from one database to the other. This is a fairly straightforward process if the versions of the extant operational database and the TA working operational database are compatible and file descriptions have already been created, but can become time consuming when these conditions are not met. Where an operational database does not exist formally, as in the case of unit websites, the TA working operational database must be populated manually, a process that becomes increasingly time consuming as the number of files represented in the database increases.

Security classification is also an issue in implementing operational database content. Unit networks and unit websites require a security clearance to access, which limits the number of trainers who can access digital operational products. For those trainers who can access such products, there is the additional requirement either to hold a classified training event or to invest time in declassification. Fortunately, much content that can be useful for contextualizing training is not classified above For Official Use Only (FOUO). Given that much of the intelligence that Soldiers and leaders require for mission rehearsal and execution--especially maps and other ground truth data--often is not available (Erwin, 2006), FOUO content may be as useful as operational content for training. To ensure the most widespread adoption of the TA, the Phase II capability should be designed to produce effective training even if FOUO content is all that is available.

### *Implementing the Phase II TA*

To state the obvious, the TA must be used as widely as possible to have maximum impact. For the tool to be used as widely as possible, it must be easily located and must live up to its promise of being quick and easy to use. To be easy to locate, the TA should be accessible through the websites that unit trainers already visit, such as the "Important Distance Learning (DL) websites" section of the "My Training" website located in AKO. Other possibilities include Army training websites themselves, such as "Soldier's Training Homepage." To make the TA quick and easy to use, however, it should be able to communicate with an operational database that is densely populated with digital products whose search terms correspond to those that trainers would use. The websites just listed may not feature such databases. Instead, such databases might include the file repositories of lessons-learned websites (e.g., STRYKERNET) or active--and well-facilitated--structured professional forums. For the TA to be easily accessible and able to communicate with a useful operational database, the TA must be hosted on a .mil server and protected with AKO authentication. Hosting on a .mil server with AKO authentication would not allow access to classified materials, but would enable trainers to build training content that is FOUO.

Ideally, the Phase II capability would be built within the Army information technology infrastructure such that it is built using the actual .mil server on which it will be hosted for operational use. In the likely event that it is not, transition of the Phase II capability to operational use will require the participation of the network administrators who maintain the

websites into which the TA will be integrated. Specifically, the network administrator supporting the end user of the TA must do the following:

- 1) Set up a server to host the web programming code used to create the TA.
- 2) Set up a server to host the database software used to create the TA databases (separate generic content and working operational databases).
- 3) Create the TA databases (generic, modifiable and operational) using a script provided by the TA developers (i.e., GIST).
- 4) Populate each database with content (generic content from the TA developers, operational digital products from the network administrator's own website).
- 5) Create database connections to connect the TA code to the databases, such that the TA can pull up content from these databases to populate the user queries or enable searches of digital products.
- 6) Set up security/access restrictions at the database- and web-level.

To minimize the demands on the network administrator (which reduce the likelihood of implementation and operational use), the Phase II capability should be built using a coding language and database software that are already supported by the servers used to maintain the website into which the TA will be integrated. This consistency may eliminate the need for the network administrator to set up separate servers to host the TA. Servers hosting other Army websites likely will support Microsoft SQL and the .NET framework, but it is best to identify and collaborate with the initial potential end users of the TA prior to making choices about how to develop the Phase II capability.

## Conclusions

The findings of the above feasibility analysis suggest that the most feasible, influential, and immediately usable Phase II implementation of the TA concept will support junior officers, schoolhouse instructors, and MSTF and HSOC trainers in the development of training activities not supported currently by doctrine, especially the DMX. The DMX is intended to train flexible responding to rapidly changing enemy tactics or other unexpected events, a training objective not well addressed by other, doctrine-based training activities but of great importance to junior officers whose tactical decisions increasingly have strategic impact (McCausland & Martin, 2001). Providing a structured DMX-development process based on best practice would enhance the training quality of DMXs Army-wide through reduced individual differences in instructional-design savvy and increased average capability. The DMX also is relatively easy to generate and simple to administer in the short timeframe available to train rapidly changing techniques and procedures. The MSTF and HSOC trainers especially would benefit from the rapid generation of the DMX in order to meet the great demand on them to support stateside and deployed units as they train in response to changes in the operational environment. Moreover, the small-group training provided by the DMX serves as a way to precede multi-echelon collective exercises, which may better prepare more senior trainers to conduct such exercises. Finally, because the DMX is not dependent on generic content that is explicitly based on doctrine, emphasizing the DMX in the Phase II capability reduces the demand on administrators to find, analyze, and convert doctrine into usable content. Generic content for a DMX is relatively straightforward to develop by subject matter experts or even other users of the TA. The DMX makes no greater

demand for operational database content than any of the other training activities supported by the TA concept capability.

### Future Directions

There are several feasible ways in which the Phase I prototype TA may be scaled up to an operational Phase II product such that it enables the rapid development of contextualized DMXs. The Phase I prototype currently enables only the creation of a DMX using the TLAC methodology and a limited range of scenario backgrounds and generic, modifiable content. In addition, access to operational digital products using the prototype is somewhat cumbersome and does not reduce the time required to locate appropriate resources. Finally, the instructional effectiveness of the exercise created by the prototype is constrained by limitations in the way the exercise is presented. Effective scaling up must expand (a) the basic functionality of the tool to support modification of developed training; (b) the range of methods the unit trainer can use to create training exercises; (c) the instructional and technological sophistication of the TA output; and (d) the ease with which users can access operational database content and embed it into training. In this section, we describe the specific requirements for Phase II TA design and development. We also identify the research questions for the Phase II effort.

#### *Requirements – Basic Functionality*

The basic functionality of the prototype TA should be expanded in Phase II in the following ways:

- Enable the modification of existing training, either created by oneself or by another user of the TA (to include “seeding” the database with developed exercises).
- Enable the nesting of existing training such that deliberate practice using multiple exercises with varying conditions can be accomplished.
- Enable the browse or search of existing training for rapid identification of creative solutions, emerging best practices, and/or appropriate candidate materials.
- Enable TA administrators to easily update generic, modifiable content through web-enabled forms.
- Enable rapid migration to the .mil server into which the TA will be integrated through use of consistent web-programming languages and database software.

#### *Requirements – Creating Exercises*

The exercise creation capability of the prototype TA should be expanded in Phase II in the following ways:

- Enable the creation of dynamic multi-media exercises using input formats other than text entry, to include voice recording and graphics development.
- Enable the creation of exercises using a more generic structure than is supported by the TLAC methodology such that simpler and more immediate training objectives can be addressed.
- Present a wider range generic content formats, to include sample digital products.

### *Requirements – Enhancing Instructional and Technological Sophistication*

The instructional and technological sophistication of the TA should be enhanced in Phase II in the following ways:

- Enhance the presentation of the exercise materials to include multi-media presentation and dynamic display of exercise events.
- Enhance the interactivity of the trainee performance requirements beyond text entry (e.g., to include drag and drop and point and click).
- Enable moderated group discussion of the exercise learning objectives/principles after performance, but prior to feedback.
- Provide a learning management system for tracking individual progress.

### *Requirements – Accessing Operational Digital Products*

Access to operational digital products using the TA should be enhanced in Phase II in the following ways:

- Enable trainer input to TA queries to automatically generate search requirements and results, such that information is pushed, rather than pulled from the operational database.
- Enable search functionality to “learn” from the previous selections made by individual users such that search results are better targeted to user needs.

### *Phase II Research Questions*

For the Phase II TA to meet the above-listed requirements, the following research questions must be answered:

- What are the most rapidly changing characteristics of the operational environment and to what tasks/missions do these pertain?
- How should the interface (to include a nested training functionality and individual learning management system) be designed to minimize system-learning/time requirements on the users?
- What instructional strategies (e.g., performance indicators, assessment criteria, and feedback) will be used for each type of training objective?
- How should the enhanced search capability be designed to minimize search time, maximize search utility, and maximize search flexibility across databases?
- How many separate DMX-development templates are required, and how should they be coded?
- How should the search and DMX-development system be integrated to maximize efficiency?
- What web-programming languages and database software do the servers used by the potential end users of the TA support?
- How will automatic database searching be triggered such that it pulls up maximally relevant materials, and information push is not an annoyance but an aid?

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## Appendix A

### List of Acronyms

AAR	After Action Review
AKO	Army Knowledge Online
AO	Area of Operations
ARTEP	Army Training and Evaluation Program
BCKS	Battle Command Knowledge System
CALL	Center for Lessons Learned
CATS	Combined Arms Training Strategies
CPX	Command Post Exercise
DA	Department of the Army
DL	Distance Learning
DMX	Decision-Making Exercise
FM	Field Manual
FOUO	For Official Use Only
FRAGO	Fragmentary Order
FTX	Field Training Exercise
GIST	Global Information Systems Technology, Inc.
HSOC	Home Station Operations Center
HTML	Hypertext Markup Language
HumRRO	Human Resources Research Organization
IAW	In Accordance With
LFX	Live Fire Exercise
MAPEX	Map Exercise
MDMP	Military Decision-Making Process
METL	Mission-Essential Task List
MOPP4	Mission-Oriented Protective Posture, Level 4
MOS	Military Occupational Specialty
MSTF	Mission Support Training Facility
MTP	Mission Training Plan
OPORD	Operations Order
ROE	Rules of Engagement
ROI	Rules of Interaction

SOP	Standing Operating Procedures
STAFFEX	Staff Exercise
STP	Soldier Training Publication
STTR	Small-Business Technology Transfer
STX	Situational Training Exercise
TA	Training Assistant
TC	Training Circular
TCP/IP	Transfer Control Protocol/Internet Protocol
TEWT	Tactical Exercise without Troops
TLAC	Think Like a Commander
TRADOC	US Army Training and Doctrine Command
TSOP	Tactical Standing Operating Procedures
TSP	Training Support Package