Anywhere - Anytime Orders Production Training using OneSAF Objective System and the Maneuver Control System

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ABSTRACT

Tactical orders production in a fast paced, time sensitive, combat situation requires warfighter operations officers to be firmly grounded in doctrine, tactics, unit structure and capabilities and highly proficient in the use of digital communications equipment. Currently, military service schools and unit-level staff training programs do not provide a low overhead, train anywhere – train anytime process, but instead are time-consuming, resource-laden undertakings. The need exists for a low cost, time efficient process for the development of tactical orders production skills. This paper presents a training system design using software applications developed for the U.S. Army's next generation training simulation, One Semi-Automated Forces Objective System (OOS), and digital communications equipment found in Army brigade-level tactical units called the Maneuver Control System. Enhancement of tactical orders production skills will be achieved by requiring the operations officer to develop and digitally transmit a doctrinally correct operations order within time limitation using actual wartime procedures and technology. A 'train up' period will be required emphasizing doctrine, tactics, techniques and procedures, orders formatting, battlefield synchronization and use of the communications equipment. Evaluation will be accomplished utilizing several of One Semi-Automated Forces Objective System (OOS) software applications designed for command and control interface, military scenario development and after action review.

This 'learning with technology' approach provides for Army-wide application and lends itself to a broader Department of Defense use by integrating joint-service language and operational graphics designed for automated communications in an intra/inter-service environment.

ABOUT THE AUTHORS

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INTRODUCTION

Today's modern battlefield requires brigade operations officers to retrieve and interpret digitized operations orders from higher headquarters, then quickly produce a digitized brigade-level order to subordinate elements. Service schools provide attending officers with fundamental training to perform this critical skill, however, the opportunity to practice and perfect the orders production task on actual digital hardware is generally not available except in a tactical brigade.

An Army-wide need exists for every brigade operations officer to rapidly analyze digitized orders from division-level and produce a digitized brigade-level order to subordinate units in order to gain a valuable time advantage over enemy force planning and execution. Brigade orders must be in compliance with inter-service Battle Management Language (BML) and completed within the Army's time completion standard (1/3 – 2/3 Rule). The rule requires a higher-level unit to provide two-thirds of available planning time before a military mission to subordinate units for their preparations (e.g. if an attack is to commence in 72 hours, the brigade must complete and disseminate the brigade attack order within 24 hours). Brigade operations orders (OPORD) must also include a digital overlay graphically depicting the location of units, scheme of maneuver and control measures required for the operation. The graphical depictions called symbology must be in compliance with Department of Defense MIL-STD 2525B.

This paper will present a training system design intended to provide brigade-level operations officers with the necessary skills to quickly and accurately complete a digital operations order and supporting graphic overlay. The order and overlay must comply with Joint Service Battle Management Language and MIL-STD 2525B symbology requirements while achieving the Army's mandated time for completion.

BACKGROUND

In 1999, the Army began the process of transforming into an Objective Force capable of quickly and decisively responding to crisis situations anywhere in the world. The Objective Force is being designed, trained and resourced to achieve the advantage of real-time situational awareness through technologically advanced intelligence gathering platforms and digital information exchange. As part of this effort to speed up intelligence reporting and information exchange, the orders production process must be more responsive in providing detailed coordination via digital communications systems (Kleiner, Carey, Beach, 1998). With the projected fielding of digital communication systems at every echelon of the Army's structure, the need exists for combat staffs to be trained to expedite orders production using digital communications equipment.

An additional requirement of the new warfighting strategy is the requirement to train anywhere-anytime in the most realistic manner possible. This is best achieved through the use of embedded training whereby the warfighter trains on the "go to war" equipment he or she will use on the battlefield. To fulfill this requirement, the item of equipment must be integrated with a device that will stimulate and/or simulate the exact conditions of a combat scenario. In the case of orders production training, the communications/processing hardware used to produce and digitally transmit the order must have embedded simulation software to achieve the desired training result. In this way, an individual or staff section can practice their wartime skills at any time.

TRAINING SYSTEM DESIGN

The training system design for this important skill development need consists of a three-phase training process (Train Up, Test, Evaluation – see Figure 1), supporting requirements, and hardware and software requirements. Within the first 90 days of assignment as a Brigade Operations Officer, the newly assigned officer must have trained, tested and been evaluated on his or her orders production skills using the "go to war" digital communications equipment organic to their unit of assignment. The desired training result will be realized by using a combination of (1) the unit's Maneuver Control System (MCS), (2) a training/assessing software suite consisting of One Semi-Automated Forces Objective System (OOS), Military Scenario Development Environment (MSDE) and Powerstripes After Action Review (PAAR), and (3) the brigade commander's operational expertise in evaluating the training officer's operations order and graphic overlay.

Phase I (Train Up)

The Train Up Phase consists of the officer's study of standardized reference material and "hands on" familiarity with the operation of MCS communications equipment required for brigade-level orders production and transmission. The officer must study on-line tutorials and complete computer graded quizzes on a variety of subjects including service doctrine, unit structure and capabilities, tactics, techniques and procedures, joint-service battle management language (BML), inter-service graphic symbology (MIL-STD 2525B), order formatting and coordination of the battlefield operating systems (BOS). Throughout Phase I, the brigade operations officer would be encouraged to practice uploading and running a partial or fully completed operations order using MCS and the training/assessing software to improve equipment usage skills and to self-assess progress being achieved in the production of an operations order.

ORDERS PRODUCTION TRAINING
3 Phase Process

Phase I (Train Up)	Phase II (Test)	Phase III (Evaluation)

- On line tutorials and computer graded quizzes
  - service doctrine
  - tactics, techniques and procedure
  - BML, MIL-STD 2525B
  - unit structure & capabilities
- Familiarity and operation of digital commo equipment
	- Receipt of DIV OPORD
	- Development of BDE OPORD w/graphic overlay
	- Transmit to DIV G3
		- Time met (1/3 - 2/3 rule)
		- Assessment using OOS/ MSDE/PAAR
		- Analysis by Bde Cdr/XO
		- Completion of Checklist

Figure 1. Orders Production Training (3 Phase Process)

Phase II (Test)

Following the "train up" phase (30-75 days depending on the officer's level of experience and time available), the brigade operations officer will receive a digitally transmitted division-level operations order. The officer will be required to analyze the order, receive guidance from his or her commander regarding intent for the operation, produce a properly formatted order with supporting graphic overlay, and digitally transmit the brigade order to division headquarters within the Army standard timeline for completion. Army

Field Manual 101-5 states, "a higher headquarters must allow a subordinate headquarters two-thirds of the available time before an operation is to begin to complete their planning and issuance of orders" (FM 101-5, 1997). This training system design is based on an operation beginning in 72 hours; therefore, the brigade order must be completed and transmitted within 24 hours of receipt. For training and testing purposes, the brigade order will only be transmitted to the division headquarters' operations cell transmitting the division order.

Phase III (Evaluation)

Following transmission to the division headquarters, the brigade commander will be required to evaluate the order, with the assistance of the brigade executive officer, using an Army standardized checklist developed by the U.S. Army Combined Arms Center (CAC), Fort Leavenworth KS. OneSAF Objective System's embedded software evaluation tools will greatly assist the brigade commander's evaluation and ensure standardization, reliability and validity of the testing process Army-wide. Evaluation of the operations order will include formatting, organization of forces, scheme of maneuver and fires and achievement of the division commander's intent for the operation/mission. The operations order would be loaded and run using the OneSAF Objective System suite of training/assessing software to evaluate relative success the tactical plan would have in a simulated combat situation. In addition to receiving a general analysis of the operational plan's strengths and areas for improvement, the option exists to select specific data collection, such as weapon system locations with sector of fire coverage, target planning effectiveness, and friendly to enemy force ratios for determination of doctrinal compliance.

SUPPORTING REQUIREMENTS

Army-level

A centralized repository of test results would need

to be established at the U.S. Army Combined Arms Center (CAC), Fort Leavenworth, KS. CAC would need to develop a comprehensive curriculum with link from their existing website for specific tutorials, computer graded quizzes and reference materials required for practice, testing and study by the brigade operations officer. The CAC website on-line training and testing would require the brigade operations officer to have Internet access. This resource may not be available to the operations section when participating in a field exercise, but would be available in most other situations whether the unit is deployed or located in home station.

One contractor position would have to be created within the Combined Arms Center (CAC), Fort Leavenworth, KS. The position would be responsible for curriculum development to support orders production skills and for the production of four standardized division-level orders, two for offense and two for defensive operations. A standardized operations order (OPORD) evaluation checklist would be developed by the contracted position for use by the brigade commander. This checklist would be based on the measures of performance found in the Army Universal Task List manual (FM 7-15, 2002). (Figure 2, Example of OPORD Evaluation Checklist). The contractor would also collect and analyze the results of the orders production evaluations across the Army. This data would be used to constantly evaluate and improve service school training materials and the on-line training/testing materials located on the CAC website.

No.	Scale	Measure
01	Yes/No	Orders or plans will accomplish the mission and commander's intent. They will be completed with sufficient time for the force to complete required preparatory actions before execution, and communicated effectively.
02	Yes/No	Commander's intent refined and adequately addresses key tasks for force as whole, wider purpose, and expressed in four to five sentences.

Figure 2. Example of OPORD Evaluation Checklist

Division-level

Every Division-level (G3) Training Section in the Army must track the administration of the training system within the division's subordinate brigades. The division training section would also be required to maintain CAC-produced division-level operations orders, two for offensive operations and two for defensive operations. One of these

division operations orders would be digitally transmitted to the Maneuver Control System (MCS) of the brigade testing their newly assigned operations officer. Army divisions would have the authority to modify the generic, CAC-produced unit designations (e.g. 1-64 Armor) within the orders to provide added realism by using task organizations organic to the brigade and division.

Brigade-level

Whether at home station or deployed in a foreign country, the brigade operations officer must have a 24-hour period available to prepare the brigade operations order. Additionally, he or she must have access to the unit's Maneuver Control System (MCS) for the preparation and digital transmission of the completed order. MCS-L (Light) is a laptop computer having a Windows-like 'look and feel' well within the capability of the officer to grasp. MCS is a hardened desktop computer that may require a school-trained unit operator to assist the training officer with some equipment functions.

The brigade commander and executive officer must allocate sufficient time to review and assess the order including completion of the standardized checklist. To assist them in evaluating the order in a number of operational areas, OneSAF Objective System's suite of training and assessment software (OOS, MSDE, PAAR) can be used to provide general and specific analysis of the task organization, scheme of maneuver and fires, weapon/sensor employment, and force protection measures required for the operations order to be considered doctrinally correct and tactically sound. Following the operations order evaluation, the brigade commander would be responsible for sending an e-mail with the attached checklist to the Combined Arms Center's collection and analysis cell for further processing. A copy of the e-mail must be sent to the Division (G3) Training Section for filing. The Division Commander would have access to the "testing" order evaluation checklist or could be informed of satisfactory completion as part of his Brigade Quarterly Training Brief (QTB).

HARDWARE AND SOFTWARE REQUIREMENTS

Hardware

Although less than 10% of the Army's active component maneuver brigade's have been outfitted with digital communications equipment to the platform-level, all active maneuver brigade's are outfitted with digital communications equipment in the brigade operations section. The Maneuver Control System (MCS), a desktop personal computer hardened for military use, is capable of receiving and sending all forms of tactical data including orders, overlays, messages and reports. MCS can be used for on-line study and completion of computer-graded quizzes, practice sessions to improve equipment usage skills, and for training and assessing orders production skills utilizing OneSAF Objective System's software suite of applications. The Maneuver Control System can remain in the command and control vehicle while parked in the unit motor pool or can be removed from the S3 combat vehicle and placed in the Brigade S3 office area for completion of the three-phase orders production training process. Figure 3 shows a Maneuver Control System with Central Processing Unit, Plan View Display and keyboard. Figure 4 shows a simulated combat scenario on the MCS Plan View Display.

Figure 3. Maneuver Control System

Figure 4. MCS Plan View Display

Software

The OneSAF Objective System training/assessing suite of software includes OneSAF Objective System (OOS), Military Scenario Development Environment (MSDE) and Powerstripes After Action Review (PAAR). OneSAF Objective System is under development as the U.S. Army's "cutting edge" training simulation software for use at the brigade-level and below. OOS provides the unit structures, behaviors, equipment and battlefield environment for realistic training and analysis of military operations (OneSAF ORD, 2002). OOS is the training simulation used for the testing of the brigade operations order. MSDE is

a scenario development tool used for uploading the operations order and graphic overlay to be run on OOS as a fully automated, computer generated force (Abbott, Parsons, Liu, Dannemiller, 2001). The brigade operations officer would enter BML-compliant terminology directly into the MSDE template or has the option to paste the data into the correct paragraph locations of the template. Figure 5 shows an MSDE Operations Order data entry template. (Note: The MSDE template explains to the user what information is required for entry in each paragraph and subparagraph of the operations order.)

Figure 5. MSDE Operations Order Template

The accompanying graphic overlay would be loaded on a slide, as a component of the MSDE application, and transmitted with the brigade operations order. The graphic overlay could be converted to BML or could remain in standard MIL-STD 2525B symbology formatting for digital transmission. The option of BML-conversion provides an easy to understand operational concept when time is critical in an actual combat situation, but also serves as an excellent assessment tool for the brigade commander in

evaluating the brigade operations officer's tactical plan. Figure 6 is an example of a Division-level graphic overlay converted to BML with mission, concept of operations and tasks to subordinates matrix (who, what, when, where, why) for time-critical understanding and dissemination or as an assessment tool for the brigade commander evaluating the tactical correctness of the overlay.

Powerstripes After Action Review (PAAR) is the assessment software used to capture individual
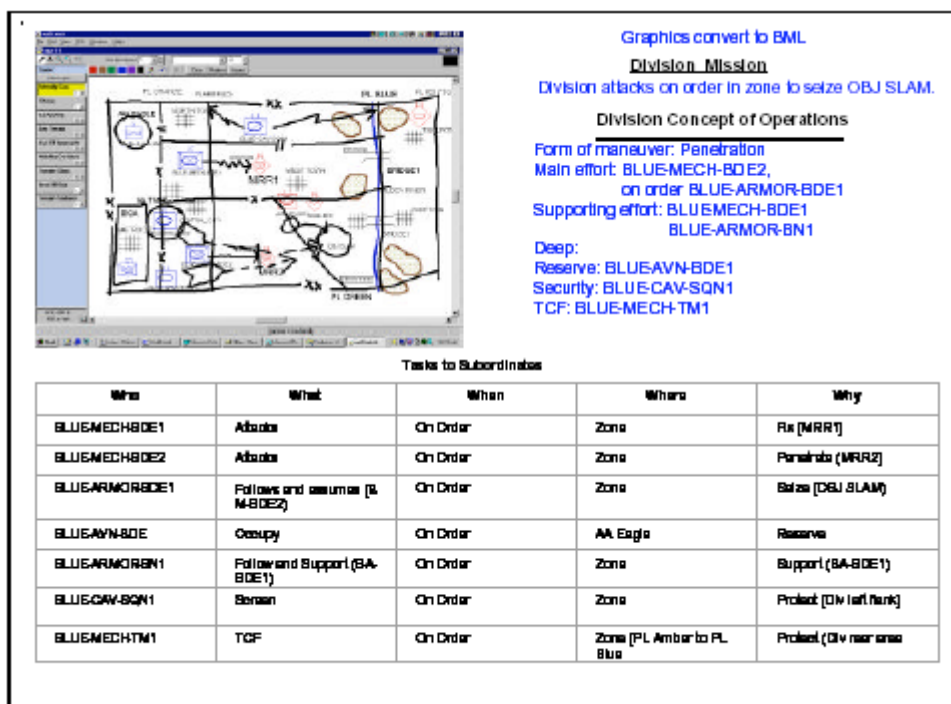
Figure 6. Graphic overlay converted to BML

combatant, platform/system and aggregate unit performance, both friendly and opposing force, throughout the runtime of the military scenario (Abbott, 2003). The displays and data provided by PAAR would greatly assist the brigade commander in completing the Army standardized checklist. PAAR can provide 3D runtime analysis of a tactical event, battle space geometry, sensor/munitions range fans, and graphs or tables for specific analysis. Figure 7 provides four depictions of PAAR capability (3D, Battle Space Geometry, Sensor/Munitions Ranges, Statistical Chart).
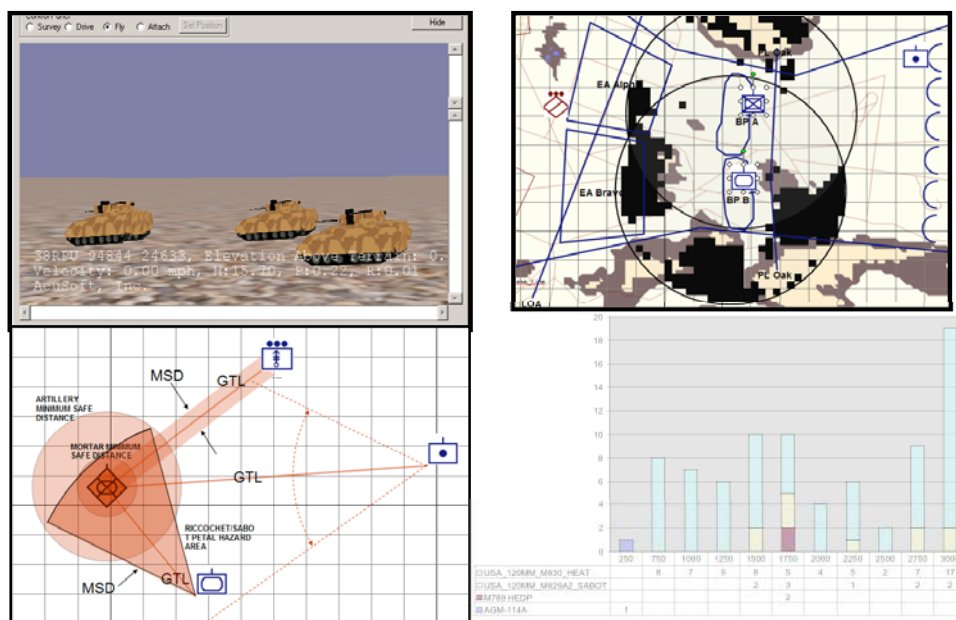

Figure 7. Powerstripes AAR (3D, Battle Space Geometry, Sensor/Munitions Ranges, Statistical Chart

DISCUSSION

Army Standardization

This training system design would provide newly assigned brigade operations officers across the Army with necessary orders production training using their actual "go to war" equipment while at home station or deployed. Army standardization would be achieved through issuance of standard division operations orders with monitoring procedures at each installation and data collection and analysis completed by the U.S. Army Combined Arms Center, Fort Leavenworth, KS.

This approach would provide a tool for the brigade commander to assess the operations officer's orders development proficiency and offers a medium for discussions concerning the brigade commander's operational vision early in the officer's assignment to the unit. The division commander will also be able to readily assess operational expertise of brigade operations officers across the division. Through Army level data collection and analysis, the Army will be able to evaluate brigade operations officer production skills including doctrinal correctness and Department of Defense (DoD) terminology and symbology compliance in order to improve service school curriculums and officer training programs.

Inter-service Standardization

The need for brigade operations officers to develop expertise in using inter-service terminology and symbology cannot be overemphasized due to the expanded use of joint operations in present and future conflicts. Orders must be quickly disseminated between service components using digital transmission with clear understanding of paramount importance. The software used in this training system design will greatly aid the newly assigned brigade operations officer in developing his or her skills in using the standardized language. Figure 8 shows an example of Battle Management Language (BML) (Carey, Kleiner, Smith, Galloway, 2003). Figure 9 shows an example of MIL-STD 2525B symbology required by today's operations order formatting for digital communication and joint-service understanding (MIL-STD 2525B, 1999).

Phase 1: ATTACK

What	When	Where	Why
attacks	START AT: 302130JAN98	in Area of Operations 1-118P1 to OBJ JAB	DEFEAT: UIE3 MRB
attacks	ON ORDER	in Area of Operations 1-118P1 to PL SPRUCE	DEFEAT: 100 MRR
occupies		CONTACT POINT 41 CONTACT POINT 42 CONTACT POINT 43	COORDINATION: 1 SQ 4 CAV

Figure 8. Example of Battle Management Language

Training Design Trade Offs

The principle trade off with this training system design is the loss of peer and instructor knowledge exchange commonplace in a centralized service school-learning environment. This trade off is not a significant detriment when considering the expense of travel, loss from unit, 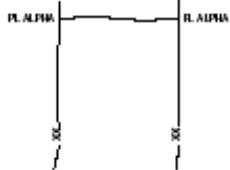instructor requirements and training equipment and materials necessary to operate a centralized training program. Factors such as cost savings, familiarization with unit equipment and the opportunity for the operations officer to be mentored by his brigade commander early in his or her assignment far outweigh the beneficial learning aspects of aggregated, centralized training.

MIL-STD-2525B

APPENDIX B

TABLE B-IV. C² Symbology: Military Operations set - Continued.

DESCRIPTION	FIXED/ DYNAMIC	HIERARCHY SYM-ID	TACTICAL GRAPHIC
COMMAND AND CONTROL AND GENERAL MANEUVER GENERAL LINES PHASE LINE Parameters 1. Anchor points. This graphic requires at least two points, points 1 and 2, to define the line. Additional points can be defined to extend the line . 2. Size/Shape. The first and last anchor points determine the length of the line. The end-of line information will typically be posted at the ends of the line as it is displayed on the screen. 3. Orientation. Orientation is determined by the anchor points	D	2.X.2.1.2.4 G*GPGLP---****X Example	

Figure 9. Example of MIL-STD 2525B Symbology

Another tradeoff of this design is the lack of stress inherently present in tactical field exercises such as fatigue, adverse weather conditions, electronic jamming and an aggressive opposing force. The requirement to complete and digitally transmit the "test" brigade operations order (OPORD) within 24-hours of receiving the division order is the major stressor of the design.

Broader Staff Training Application

A weakness of this training system design is the lack of coordinated staff action central to an optimally functioning brigade-level staff. The production of an operations order is a time consuming, highly complex undertaking requiring the coordinated efforts of numerous staff officers and non commissioned officers in the areas of maneuver, indirect and direct fires, U.S. Army helicopter and U.S. Air Force aviation, engineer, chemical support and many other considerations.

Although this training system is principally designed for the brigade operations officer's development, the training system could easily be expanded to a larger training audience. As time

permitted and with prior planning, the entire brigade staff and supporting staff officers and non commissioned officers could conduct a combined staff training exercise with this training system design. For expanded staff training, the brigade would simply receive a digitally transmitted division operations order on the brigade's Maneuver Control System and complete their orders production and transmittal to subordinate units within required timelines. The commander and staff could use OneSAF Objective System's suite of training/assessing software for self-analysis and group evaluation.

CONCLUSION

Today's military forces are required to respond to worldwide contingencies with rapid and decisive actions. This requires operations officers to possess skills enabling them to quickly receive, analyze and disseminate information through digital means. The Maneuver Control System is the principal device available at the brigade-level to accomplish this mission essential task.

The Maneuver Control System can serve as an ideal training tool for the brigade operations officer through embedding of the OneSAF Objective System (OOS) suite of training and assessing software. This hardware-software combination serves as an ideal "embedded" training system for a brigade operations officer who may be required to improve his or her orders production skills in a fast-paced home station or deployed situation.

The success of this training system design will be dependent upon two factors. First is the personal discipline of the brigade operations officer to aggressively complete all tutorials and computer graded quizzes while mastering his or her digital communications equipment, the Maneuver Control System. Second is the dedicated involvement of the brigade commander in evaluating the operations order and graphic overlay developed by his or her operations officer.

Through the dedicated efforts of the brigade commander and brigade operations officer, orders production skill development will be accomplished regardless of the learning environment. The Army and Department of Defense would greatly improve the operational responsiveness of all warfighter operations officers through this training system design. Knowledge and use of digital communication equipment, timely production of combat orders, and the use of service-wide terminology and symbology in all communications are essential skills requiring an aggressive training system approach.

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