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USING AFTER ACTION REVIEW SYSTEMS FOR EXERCISE PLANNING AND CONTROL

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ABSTRACT

After Action Review Systems—the training assessment component of simulation training exercises—provide vital feedback to the military training audience. This paper describes how AARSs serve another essential training function—exercise planning and control—by supplying archived data, in a variety of formats, arrays, and sequences, that can be used to develop plans and monitor exercise progress. This claim is based on Logicon's nine years of experience developing and using an AARS to support the United States Army Battle Command Training Program.

1 BACKGROUND

The U.S. Army fielded Logicon's After Action Review System (AARS) in January 1994 to assist the Battle Command Training Program (BCTP) in assessing simulation-supported training exercises for large units. The AARS software collects, stores and correlates selected military unit, event and ground truth data obtained from the Corps Battle Simulation (CBS), a constructive simulation that provides a realistic, stressful environment in which the training audience must behave (generate orders) as if they were in an actual battlefield situation. Commercial off-the-shelf software (COTS) provides the graphics, text and presentation capabilities to format and present the collected data. The AARS runs on a group of SUN model 5 workstations and 20 Sparcstations, organized into two local area networks and connected by a wide area network that links the exercise site with the National Simulation Center at Fort Leavenworth, Kansas.

Data collection and AAR preparation processes begin before the start of the exercise and continue through to the end of the exercise when the after action review is presented. Objective data, such as artillery missions fired, battle damage assessments, unit movements, and unit logistics status, is collected from the simulation and stored in the AARS database. Subjective data, from observation of the training audience conducting command and control tasks, is gathered from the simulation workstations and the tactical staffs by a group of workstation controllers and observers and forwarded to the analysts. Using these data, along with a comparison of standard Army doctrine for the particular type operation and the exercise unit's plan of operation, analysts determine key events and trends related to the unit's training objectives. These events and trends are then incorporated into presentation materials, including standard doctrinal templates, proposed exercise unit scheme of maneuver, battle summaries of significant events keyed to a sequence of timed situation snapshots and force ratio charts. These materials can either be presented as overhead slides or as part of a narrated automated sequence, using the AARS presentation subsystem. AAR facilitators and exercise controllers use these presentation materials during after action reviews and the exercise control meetings. These materials are also archived on the system and available for use during future exercise planning.

2 EXERCISE PLANNING AND DESIGN

The AARS has capabilities that can facilitate and improve the planning and design of a simulation-driven exercise. As figure 1 shows, a training exercise has three major components: planning, execution and control, and assessment (or feedback). Planning begins by determining on a scenario which events will accommodate the unit's training objectives. These objectives are translated into questions that will be answered by the outcome of the exercise. The questions also indicate which Battlefield Operating Systems (BOSs) will be of primary interest. The BOSs consist of a variety of functions that assist the commander in building and sustaining combat power. Commanders integrate and coordinate these functions to synchronize battle effects in time, space, and purpose. Each BOS, such as fire support, has been further defined by a series of subtasks that need to be accomplished during the curse of normal operations. They vary in importance, or criticality, depending on the type of operation and the unit training objectives. Once the exercise planner has identified the critical tasks, they are incorporated into an operational

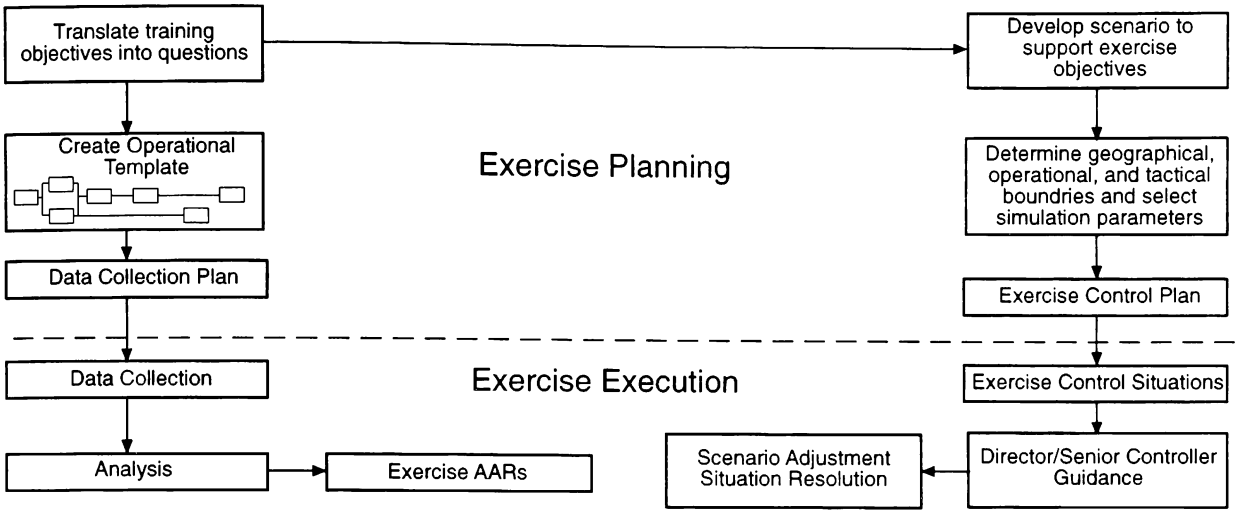

Figure 1: Exercise Planning and Execution

template of the tasks or activities involved in the operation of interest. From the template, we tentatively determine what products are to be created. This, in turn, provides a list of the data needed for preparation. The next step in planning is the data collection plan. Here we marry the critical tasks, the products selected for discussion, the necessary data items, and where and how the data will be collected.

Exercise execution and control proceed together. During execution, the unit attempts to put their plan into operation. Exercise control consists of monitoring the progress of their efforts and the results, through a process of identifying the key events associated with the unit training objectives, periodically reviewing the progress of exercise activities, determining when, where and how adjustments to the scenario need to be made, and the adjudication of any outcomes that are unrealistic or detrimental to the intent of the exercise.

AARSs are designed to store and access large amounts of data For example, the current CBS AARS has 18 gigabytes of available data storage, including archives of data needed to plan and design an exercise. The AARS provides:

- Operational and data collection templates
- Scenarios, key events, and control measures
- Parameter selection checks

Operational templates can be selected from a series of templates, one for each standard military operation, e.g., hasty attack, or deliberate attack, or movement to contact. These standard templates can be modified as desired. Data collection plan templates, archived from previous exercises, can also be accessed through the AARS libraries. These will assist the exercise planners in determining the MEL and the data collection plan.

A database of previous exercise scenarios, key events, and control measures provides information that must be inserted into the exercise through exercise control action, e.g., decisions and actions by higher command levels, certain types of intelligence data. This data is of material assistance in determination of the exercise layout, exercise control organization and functions.

The AARS also provides a means for checking the selection of simulation parameters. For example, exercise performance data, on selected combat and combat support systems, can be collected and analyzed during pre-exercise preparations to determine the reality of results. Additionally, the AARS Geographical Information System (GIS) permits the exercise planners and controllers to set and review the geographical operational and tactical limits of the exercise playbox.

3 EXERCISE CONTROL

During the exercise, the exercise director and the control cell monitor all aspects of the exercise to determine whether the scenario is on track and what corrections are required. The workstation controllers receive exercise data from the AARS, the control cell, the exercise director and senior observers, and C^4I system inputs. (C^4I system inputs will be fully integrated into simulation-driven exercises when the Army fields its digitized battle command and control system, ABCS (Army Battlefield Control System), which will transmit operational directives and reports. Exercise analysts and controllers will need access to this data to understand the flow of operations.)

The controllers watch for the key events they previously identified when they constructed the MEL. As the exercise unfolds, the control cell monitors these events and

periodically briefs the exercise director on their progress so that any necessary changes or corrections can be made to attain the training objectives.

Figure 2 shows the interaction of exercise control and the AARS. During the execution of the exercise, data is collected by the AARS for use in the assessment of the exercise unit training. Many products prepared in the assessment process will be used both in the after action review and by exercise control. Exercise controllers use the products to monitor exercise unit actions and activities as well as those of the opposing forces (OPFOR) by using the following AARS capabilities:

- Operational situation snapshots
- Animation clips
- Correlation of forces and means (COFM)
- Battlefield Operating Systems (BOS) products

Operational situation snapshots show the position of the exercise and OPFOR units at particular times of interest. These snapshots can be tailored to show specific units and selected levels of command. Additionally, for field artillery cannon and missile units, target acquisition and counterfire radars, and electronic warfare emitters, the range capability of the system can be shown. Such snapshots are particularly useful to controllers in ascertaining whether or not the exercise unit is keeping pace with the flow of the exercise and accomplishing key events needed to meet their training objectives.

Animation clips, constructed in the GIS, are used to view and assess the progress of the battle, either in limited time blocks or over more extended periods. These clips can be viewed by the control cell on a Sparcstation monitor or on a much larger screen using the AARS presentation subsystem. These clips, along with an explanation of key events that have been completed, provide a comprehensive operations summary for the controller staff.

Correlation of forces and means (COFM) functionality is frequently used to monitor the strength ratio of the OPFOR in particular subareas of the exercise playbox where key events in the scenario are taking place. This ratio is based on type units and combat systems, and is computed automatically.

Automated BOS products—normally line, bar, area or pie charts—are used to assess and monitor the progress of key events in selected BOS areas. BOS products contain selected parameter statistical information, such as types of field artillery missions and numbers of rounds fired, that can be scheduled for periodic collection, display and rapid review, and that clearly indicates trends on a particular BOS. Additionally, the exercise control element monitors key events from the standpoint of reality and adverse impact on the exercise.

These AARS capabilities are in constant use during the exercise, not only to support the periodic control assessment briefings, but also to take more immediate corrective actions. For example, let's assume that the execution of a deep attack by the exercise unit, using attack helicopters, is a unit training objective. During the conduct of this operation, the exercise unit experienced what it believed to be an unusually heavy and unrealistic loss in aircraft to enemy antiaircraft action. The control element responds to this protest, using AARS to help assess this action, by collecting and presenting the necessary simulation data on weapon systems parameters, critical time periods, numbers of aircraft, routes, targets, opposing antiaircraft units locations and zones of acquisition and fire, friendly suppression fires and actions, and the resulting aircraft losses. This data is presented to the senior controller in formats that permit a quick review of the operation's specifics, both statistically and geographically. Based on his assessment of this information, the exercise controller will make a decision on whether to let the result stand or modify it in some fashion. This type of procedure is employed several times throughout the course of the exercise.

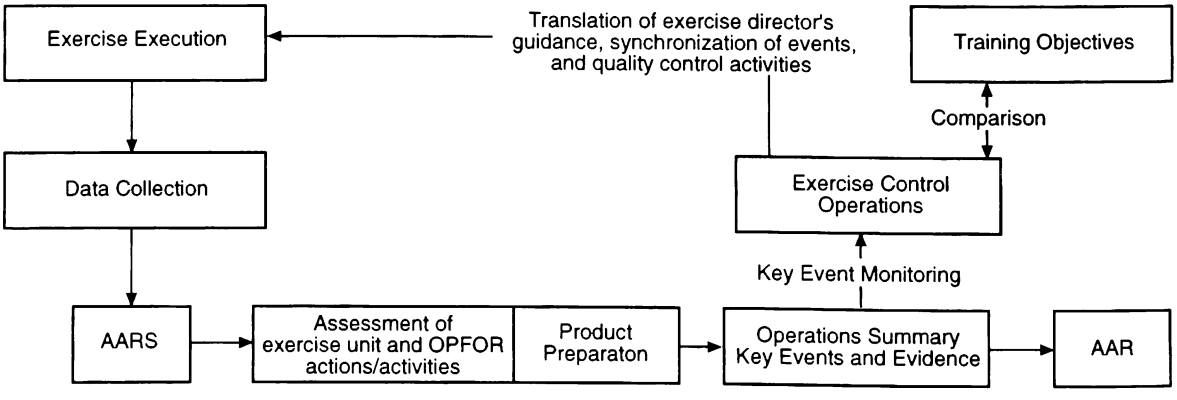

Figure 2: Interaction of Exercise Control and AARS

4 CONCLUSION

Although intended as a training feedback support system, the AARS has important planning and control uses in simulation training. To leverage the AARS's functionality, and avoid unsatisfactory results, training simulations should be designed with both training assessment and exercise planning and control requirements in mind.

AUTHOR BIOGRAPHY

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