Computer Simulation Essay, Research Paper

Computer Simulation WARSIM 2000 is simulation software, used by the armed forces. Extensive, thorough, and tiring work has

been done on thgis program. It covers almost all aspects and situations required for realistic, meticulous and a complete simulation.

Information Technology has lead to the advancement of the tools required to build the simulator. Information Technolgy?s

guideleines and technolgy have reinforced this creative simulator General Description of Operational Capability. WARSIM 2000

will increase the effectiveness of commander and battle staff training by dramatically increasing the realism and the scope of the

available training environment. In conjunction with other services’ simulations, WARSIM 2000 will provide a complete operational

environment with scenarios drawn from the entire operational continuum to support Army, joint and coalition force training

distributed across the globe. a. The WARSIM 2000 simulation system will use a computer-based simulation and associated

hardware to support the training of unit commanders and their battle staffs from battalion through theater-level as well as to

support training events in educational institutions. Designed and built using modern computer technology, modern software

engineering techniques, and validated algorithms and databases, it will allow units world-wide to train using their organizational

equipment. A key feature of the system will be its use of technology to minimize the total Army’s overhead associated with

supporting training. The system will be designed to meet emerging Distributed Interactive Simulation (DIS) standards and

protocols to facilitate linkages with DIS compliant simulators and live training events. b. The WARSIM 2000 simulation system

will consist of, or use, several components: (1) Computer-based battle simulation models that portray the joint and combined

environment needed to support Army training events. (2) Software modules for linking WARSIM 2000 to other simulation models

to expand the training environment for joint force training exercises. (3) Databases. (4) Computer systems to run the simulation

models and support the databases. (5) Technical control systems/workstations for use by personnel in an exercise support function

e.g., simulation controllers, analysts, and opposing/ surrounding forces role players. (6) Flexible and responsive terrestrial/satellite

communications gateways and media for transmitting voice, data, facsimile, and video between different elements at remote

locations involved in supporting a training exercise. c. WARSIM 2000 will meet the Mission Need Statement’s (MNS’s)

requirement for providing a training environment that will allow unit commanders and battle staffs to focus their warfighters and

systems in countering threats across the operational continuum. WARSIM 2000 must provide an environment that presents

problems to stress and stimulate commanders and their battle staff to assess the situation, determine courses of action, and plan

and issue new orders in a timely manner, all while using their organizational equipment and procedures. d. Logistical support for

WARSIM 2000 will be based on a government- owned contractor-supported system. The government will own necessary

hardware, have all proprietary rights to the developmental hardware and software components, and full license rights to the

non-developmental software components of WARSIM 2000. Contracted logistical support will provide for the maintenance of

government-owned computer hardware at all times. e. The acquisition and development strategy for WARSIM 2000 must abide

by several constraints. (1) The WARSIM 2000 acquisition must build upon the successful infrastructure of current simulations so

that the training community (Army and international) can train in an evolutionary progressive yet consistent manner. The Army

has invested significant resources into developing its training simulation systems, linking them with other service simulations via the

Aggregate Level Simulation Protocol confederation, and proliferating them throughout the Army and the international community.

While these systems have shortcomings that must be fixed, they provide a training environment and representations of combat that

have been accepted by the training community world-wide. The WARSIM 2000 acquisition must allow the confederation of

simulations structure to evolve in a manner that allows current users (Army and international) to maintain access to the

confederation without having to make a substantial near-term investment in resources. (2) Meeting the WARSIM 2000

requirements will demand significant technological innovations. However, there are many existing and developing systems that

could and should be part of the overall solution. The acquisition strategy must ensure that developers optimize the investment of

each service in existing systems (instead of starting from a blank sheet of paper) and insert echnology into the training

environment in a way that improves training. (3) Fielding of new capabilities, whether they be functional representations or

technological enhancements, must be either practically transparent to the user or be accompanied by training so the user can

understand and receive the benefit of the new capabilities. (4 The acquisition strategy must allow for regular user involvement in

the development process. User evaluations and requirements must serve as a primary source for determining changes to the

system. 2. Threat. Rather than counter a specific threat, WARSIM will provide a training environment capable of representing

threats from across the operational continuum. 3. Shortcomings of Existing Systems. Current simulations were designed for

training corps and division staffs on command and control techniques for Army operations in mid-intensity combat. Current

software is bound to proprietary operating systems and hardware. The software design, especially the underlying representation of

terrain, precludes representing the detailed functionality required for resolving the high resolution interactions needed to train

commanders and battle staffs at levels from battalion to operational level commanders in joint scenarios for war and operations

other than war. 4. Capabilities Required. WARSIM 2000 will support commander and battle staff training from battalion up to

theater level. While the major simulation models of WARSIM 2000 will run on computers housed in fixed regional facilities,

transportable Simulation Support Modules (SSMs) will provide support functions under the control of a senior controller at

locations near the training unit. Users of the simulation will train under the guidance of a senior trainer, usually the unit’s

commander, the next higher level commander, or an instructor at institutions. WARSIM will provide users a complete training

environment consisting of simulations, data, support functions and communications. a. System Performance. The following

description of requirements for the WARSIM 2000 training environment addresses in turn each of the functional components

described in paragraph 1.b. (1) The Simulation. WARSIM 2000’s simulation component must have the following functional

characteristics. (a) General Attributes. (i) Size. The model must be large enough to support a multi- echelon corps or theater

exercise. The model must also be able to link to other copies of itself to support larger exercises. The simulation must also be able

to support multiple, concurrent, smaller training exercises, such as several battalion headquarters training independently. (ii)

Weather. The simulation must accurately portray the impact that weather elements have on operations (space, air, and ground).

At a minimum, the simulation must account for the following weather elements: cloud amount and height, visibility, restrictions to

visibility (e.g. precipitation, fog, smoke, dust and sand), precipitation accumulation, surface wind direction and speed, temperature,

relative humidity, altimeter setting, and solar and lunar light data. These weather elements must be allowed to range from tropical

to arctic regions, to vary over the geographic area of interest, and to change as often as hourly. In addition, wind direction and

speed and temperature in a vertical profile up to 70,000 feet must be allowed to impact Nuclear Biological and Chemical NBC)

weapons with changes incorporated at least twice per day. (iii) Terrain. The simulation must provide a level of resolution of terrain

such that tactical considerations of terrain analysis and the dynamic effects of man-made or natural occurrences (e.g. bomb

craters, minefields, battle damage on roads, the obstacle effect of rivers, hydrography, and weather) as considered during

Intelligence Preparation of the Battlefield (IPB) will affect the battle. The minimum acceptable tactical considerations include the

following areas: the impact of line-of-sight (to include sonar and electromagnetic spectrum considerations of concealment, thermal,

optical and radar visibility, and signal site emplacement) between potential interactors whether they be sensors or weapon systems,

air, ship, or ground mounted; the ability of terrain to support the movement of personnel, vehicles and units over time, and the

accurate portrayal of the location of natural and man-made obstacles. The outcomes of the simulated events must be sensitive to

changes in the weather (described above in paragraph 4.a.(1)(a)(ii)) as it affects terrain. (iv) Time. The simulation must be

capable of running faster than real time to a pre-defined point in time or an event, while requiring minimal input, and providing

summarized output. Users must be able to “age” the simulation to accommodate a training scenario that describes actions in the

midst of a campaign. The senior controller must be able to have the simulation start, stop/interrupt, rollback to any specified point

in scenario, restart from a given point or the initial conditions and conduct concurrent replay. The senior controller must have the

capability to change any attributes of the simulated entities or the game characteristics at any time. (b) Conditions and Constraints.

(i) Scenarios. The goal is for the simulation to portray events that could arise from scenarios based on any point in the operational

continuum. At a minimum, requirements are for scenarios for war in Europe, Southwest Asia, Southeast Asia and Korea and for

operations other than war in these locations as well as Central and South America and Africa. (ii) Fidelity. The simulation must

allow commanders and battle staffs to do their tasks under the conditions and standards outlined in the Army Training and

Evaluation Program Mission Training Plans (MTPs) for command groups and staff referenced in Appendix 1 to Annex A. (iii)

Level of Detail. The simulation must be able to portray a level of detail that captures the effects of individual entities on the battle,

e.g., single weapon platform, emitter, and sensor systems. Entities that operate near each other as cohesive units can be portrayed

in aggregated units from team to battalion that represent the normal mode of employment. Individual, low-density, entities that

operate in a geographically dispersed mode must be portrayed as they are employed, e.g., signal nodes, radars, jammers, missile

and rocket systems, engineer obstacle systems, and individual surveillance and laser designation systems. All systems will be

portrayed using performance data appropriate to the level of classification of the exercise. (iv) Reports. The simulation must

provide feedback to the training unit by sending reports of simulated events. These reports must be formatted in a doctrinally

correct fashion and occur in a time-appropriate banner. The reports must not reveal all of ground truth but reflect that information

that the simulated unit would reasonably know given its status, time removed from the reported incident, and deployed intelligence

assets. (v) Human Factors. The simulation must portray the effects of operations on the human condition as it relates to combat

effectiveness. At a minimum, the simulation must consider unit morale and cohesion, time subject to hostile actions, availability of

religious support, unit attrition rate over time, weather, and operational tempo. (vi) Simulated Mistakes. The simulation must cause

simulated entities to “make mistakes” based on a predetermined level of training and a variable combat effectiveness determined

by human factors . The mistakes should be of two types: mistakes in actions taken and mistakes in actions reported. Mistakes in

actions taken fall along the lines of getting lost e.g., arriving at or attacking the wrong location, delivering the improper quantities of

supplies, or delivering the wrong supplies. These types of mistakes will change the ground truth of the simulation. Along with

reports that are accurate but incomplete, other reports will contain information that is different from ground truth. These mistakes

in reporting will occur when a simulated unit makes a report to the training unit that conflicts with ground truth in the simulation.

These mistaken reports will not change ground truth. The simulation must have the ability to provide the correct information if

challenged for confirmation. The level of training and combat effectiveness must change over exercise time with a corresponding

change in the number of mistakes. The senior trainer must have the capability to cause a simulated unit to make specific mistakes

during the exercise. The senior trainer must be able to easily adjust the severity and frequency of simulated mistakes during an

exercise to include being able to set the level to zero, in effect turning off the mistakes. The senior trainer and the After Action

Review systems must have access to both ground truth and mistakes data. (vii) Surrounding Units. Training units, to include

combat, combat support, and combat service support units that support maneuver brigades, must be able to interact with the

simulation without the presence of any other units. This will require the simulation to emulate forward, flank and rear units,

supported and supporting units, as well as the next higher and lower echelon units, that would normally exist on the battlefield, but

are not present for the particular training event. The simulation must be able to portray dynamic scenario and event dependent

intelligence and reports concerning the activities of these units as well as their requests for information and resources from the

training units. (viii) Multi-Level Input/Output. The simulation must be able to accommodate an exercise where different levels

(division, igade, battalion) are interacting with the simulation. Each level must be able to train using the simulation by issuing only its

normal orders and instructions to the simulation while receiving only its normal reports and data from all sources. The simulation

must receive and present its information in the format and level of detail appropriate to the training unit. The simulation-provided

information must not always be 100 percent accurate. The information should at times contain errors that one could expect to

obtain in a realistic setting. Bibliography: ?WARSIM 2000, The Few, The Proud, The… hey they?re not there!? Article #45, SIRS

Encyclpaedias, Applied Science, 1994.