

Expanding the Role of Simulation

by

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For many years, simulation has been used to develop techniques for studying military activities. Such techniques include:

- Identification of required accuracy of environmental data specification in various spatial reference frames
- Methods for organizing environmental data for high efficiency in both storage required and time to access
- Development of algorithms for converting environmental data between spatial reference frames
- Development of techniques for describing behaviors within an environment
- Development of protocols for communicating changes in the environment between existing representations of that environment.

These studies have been beneficial and have greatly increased the understanding of military operations and organization of environmental data. Now that this knowledge has matured, there is an opportunity to apply the results of these studies.

Previously, such studies have been largely conducted as an R&D exercise. With the advent of cost-effective broadband data communications, it is now possible to disseminate these techniques for more operational use. Given environmental databases represented in a standardized manner (e.g., using SEDRIS), behavior description mechanisms which are also standardized (e.g. using VRML 97 or its X3D successor), given standardized protocols for communication behavioral changes (e.g., DIS), and given low-cost commercial equipment based on PC and Internet technology, it should be possible to use simulation techniques for operational mission planning.

This usage is made possible through widespread cost-effective availability of several recent advances in technology including:

- Low cost computing power
- Low cost 3D graphics processors
- Low cost high bandwidth wireless networking

- Low cost multi-gigabyte storage
- XML

For mission planning purposes, the use of commercial computing equipment should be adequate for demonstrating the mission parameters and for simulating the operation. There are still missing pieces, however.

The availability of complete, interoperable databases for all environments is currently deficient. Moreover, a standard for providing a common representation for this data so that it can be used by a wide spectrum of application is just now being developed. This is the SEDRIS family of standards in which data modeling (the SEDRIS DRM standard), classification and attribute specification (the EDCS standard), and accurate spatial data specification (the SRM standard) will provide a complete and cohesive structure for environmental data.

The ability to integrate available civilian data is questionable but should be made more practical with the increasing availability of such data on the World Wide Web (WWW) in the form of XML. XML allows such data to be easily retargeted for different usages.

The effective visual presentation of a proposed mission requires quick specification of the mission parameters and reuse of tactical objects predefined for such missions and made available through libraries. This type of presentation for missions has been demonstrated using the VRML 97 standard and will be more effective as well as easier to define and moderate when the X3D standard is available.

The communication between the different aspects of the simulation including inter-tactical object communication as well as communication between the simulation and the players has been demonstrated using DIS. However, the ability to control multiple independent players in real time will require refinement of this protocol and integration of this protocol with others that may be needed by non-military resources being tapped.

The payoffs are genuine. By providing an accurate simulation of a mission prior to its inception, the success of such missions is increased. This also allows a simulation director to vary the scenario being presented to study alternatives or to provide training for the participants. By using low-cost physical resources, such mission planning operations should be able to become a standard part of the TO&E of tactical units.