Three-dimensional, on-line color graphics representation in complex decision-making tasks

DOUGLAS R. EDDY
NTI, Inc., Dayton, Ohio

This paper described a research simulator that represents a three-dimensional space for an air traffic control operator. The system is modeled after an Airborne Warning and Control System (AWACS) weapons director workstation. It was designed to allow a human operator to locate, identify, and track aircraft, and to direct weapons against targets.

Digital systems that represent objects moving in a three-dimensional space are generally computation bound. Even if the displays were generated from programmed information, algorithms for deciding what to change, how much to change, what is hidden, and so forth, require many instructions. In the command and control environment, sensor data must be processed, filtered, and fed to the visual display. The AWACS solution to this complex graphics problem represents three-dimensional space in two dimensions (a bird's-eye view) and uses alphanumerics to code the third dimension.

Also discussed were some of the problems in representing three-dimensional space in real time and modifications of the AWACS solution. Some of the positive and negative features of alternative representations were discussed from a human factors point of view.