

Umbra Modeling & Simulation Framework

Interactive Systems Simulation and Analysis Department

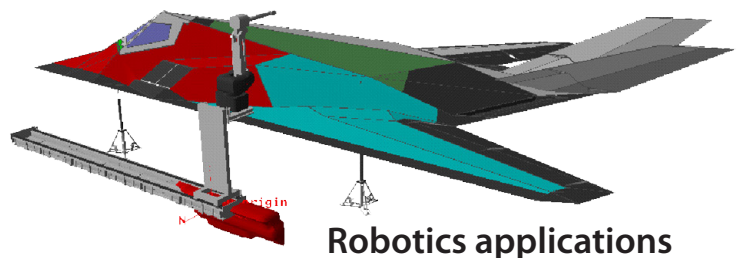
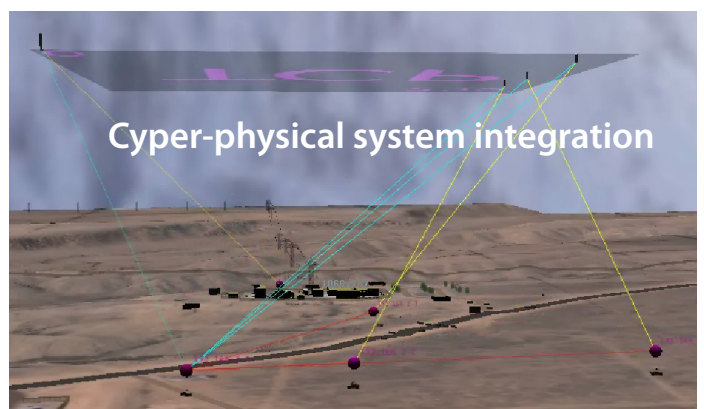
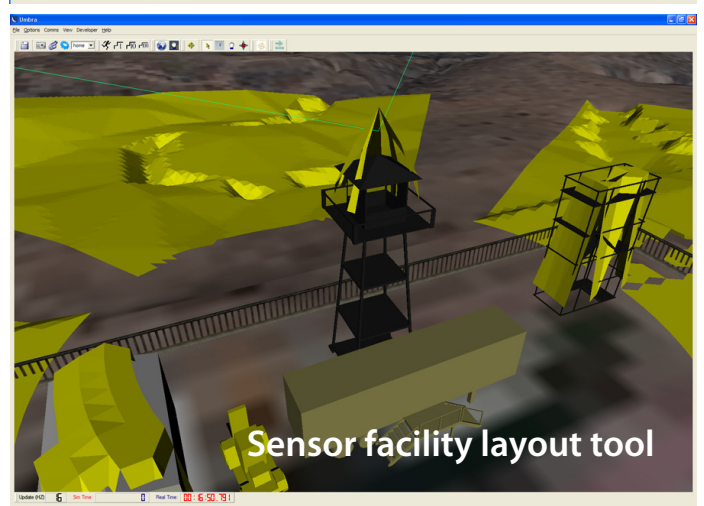
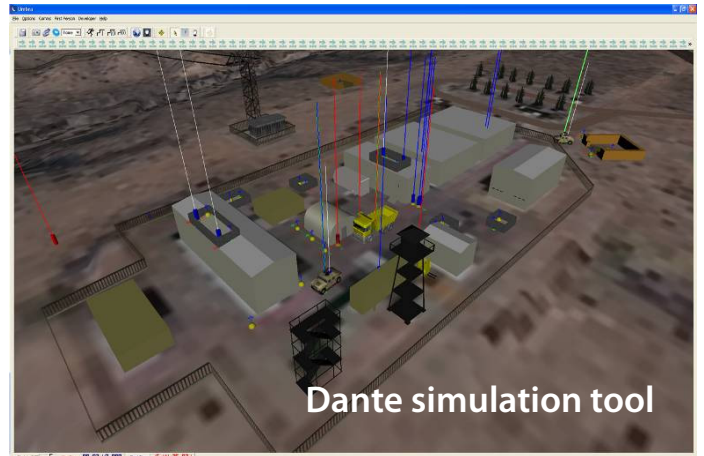
FACT SHEET

Umbra is a flexible tactical hybrid simulation engine and framework that can integrate physical, cyber, and behavioral elements at variable fidelity in a 3D environment. It regularly works the range of LVC (Live-Virtual-Constructive) environments including faster than real time simulation calculations for generative analysis and real-time interactions that incorporate live external data feeds or human interaction.

Umbra supports a large library of existing elements, is composable, modular, and supports reuse. A wealth of 3D geometric viewing and analysis capabilities exist. Umbra has been used to solve specific problems itself and to develop focused applications. Initial exploration of concepts in Umbra can often take only hours or days because of its ability to quickly decompose complex system problems into fundamental simulation constructs.

Umbra integrates well with other simulations directly or may communicate through interfaces such as DIS (Distributed Interactive Simulation), HLA (High Level Architecture), or TENA (Test and Training Enabling Architecture).

It has also been used as a framework to integrate other simulations, hardware, and communications. Umbra supports time-stepped, discrete-event, and interrupt activity. It operates on Windows and Linux in a desktop or cluster environment. A Java-based core, or "Jumbra," has also been developed.

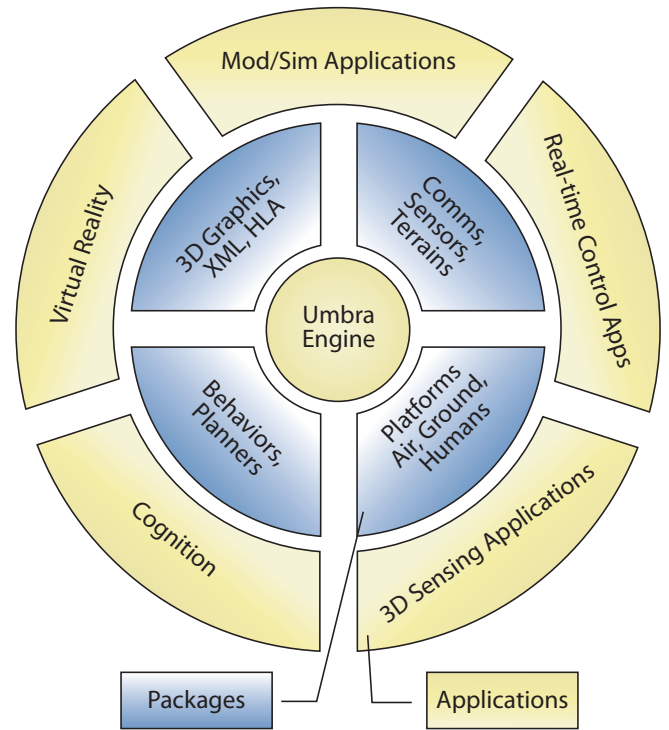


One uniqueness of Umbra is a formal “Worlds abstraction” to support modularization of any world model (US Patent No. 7,085,694). This is in contrast to many simulation environments which rely upon a fixed set of data structures or a global variable space. Such approaches limit the practical scale and scope of problems to which these codes can be applied. Umbra uses world modules to provide realistic physical environments. It also provides event order optimization.

Agents operate in various heterogeneous scenarios that include environment (terrains, weather, plumes, communications, ...), objects (vehicles, devices, cyber-systems, ...), sensed phenomena (magnetic, acoustic, seismic, radiation, ...), behavior (state based, cognitive, ...), or external simulations. These environments can co-exist in the same simulation environment and share data in a loosely coupled relationship. Due to Umbra’s modular Worlds abstraction, it is straight-forward to combine models that use any or all of these Worlds into one functioning simulation.

Umbra is supported by the Interactive Systems Simulation & Analysis Department at Sandia that both conducts Umbra development for customers and supports customer’s use and development in Umbra. This group provides updates, technical support, training, advice, and user group resources relating to Umbra. Support can be obtained from Sandia or industry partners.

Umbra can be licensed from Sandia and is available to U.S. Government activities free of charge. Additional technical or programmatic information can be obtained on the Umbra website or by contacting Sandia.



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