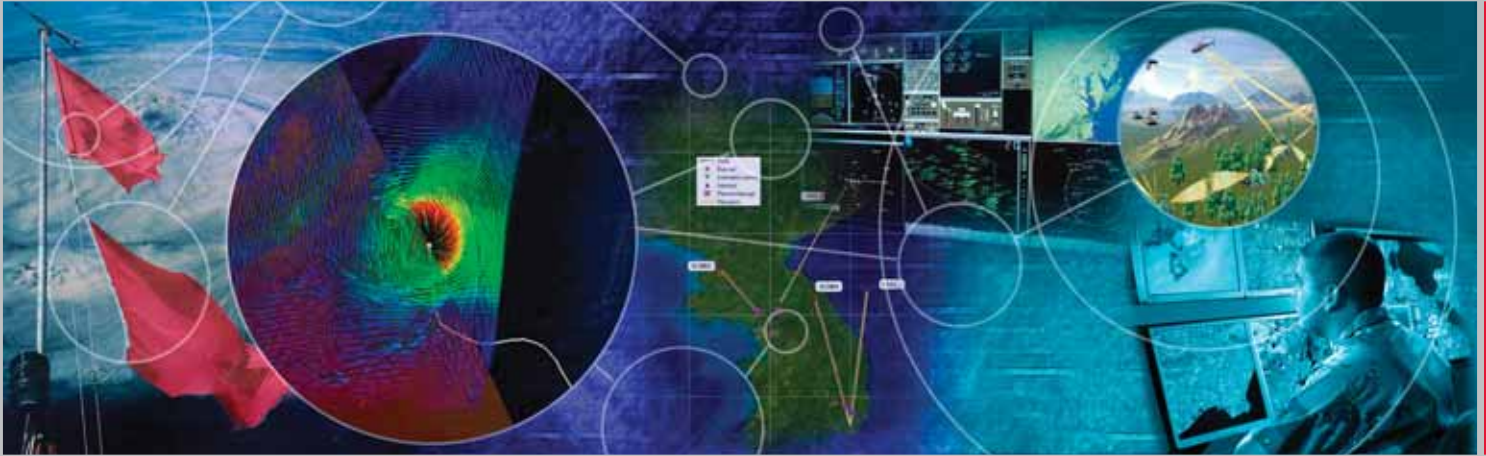


Modeling and Simulation Advanced Technology for Delivering Reliable Systems



Customer Benefits

- Apply sophisticated modeling and simulation capabilities that are changing the world's approach to today's challenges—from weather forecasting and environmental policy formation, to missile defense and aviation management.
- Apply advanced visualization capabilities, including innovative 5D technologies, to optimize modeling and simulation presentations, data analysis and decision support.
- Lead all phases of the integrated modeling and simulation lifecycle—from conceptual design animation to assimilation and data fusion, projection and post-processing.
- Deliver collaborative and immersive virtual reality environments and tools to improve the understanding of data, prediction and decision making.

Modeling, simulation and visualization are key to successfully prototype, test and develop our Nation's critical systems, from weather forecasting to defense applications and national security. Raytheon has been deeply involved with all phases of modeling and simulation, from the design and development of models and simulation systems to their deployment in real world, mission-critical applications.

Reliable Experience

With more than 20 years of experience in integrated modeling and simulation, Raytheon has provided advanced technology, IT and operational support services to NASA, NOAA, intelligence agencies and the Department of Defense. As a leading global defense and aerospace company, Raytheon itself uses advanced modeling and simulation techniques in the design and development of key products

such as missiles, radars and sophisticated ground networks. More recently, Raytheon has taken a leadership position in visualization to ensure decision-makers have access to actionable, clear and concise information.

Accurate and Flexible Systems

Leveraging advanced modeling and simulation technology, Raytheon has developed systems for the Joint Services battlefield simulations to accurately model any and all existing and future battlefield assets. Unlike other modeling tools, Raytheon's advanced modeling and simulation technology is not bound to one type of asset, but is capable of accurately simulating any asset using the unique rule set language and specific hardware parametric values.

Innovation and Practical Application

Raytheon developed an interactive 5D hurricane visualization that

allows researchers and forecast specialists to compute and display the interaction and correlation of time-synchronized data from multiple sources, improving hurricane forecasting, tracking and warnings. We have also worked with the largest distributed simulation environment in the world, supporting the development and testing of aircraft systems for NASA. Raytheon's modeling and simulation systems provide practical applications that are changing how the government improves and protects American lives—from improving weather forecasts and warnings, to developing the world's most advanced missile defense systems.

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Raytheon's Advanced Modeling and Simulation Engineering (AMSE)

Raytheon's AMSE team provides highly advanced simulation, analysis services and decision support tools for mission assessment, systems acquisition and training. This world-class team developed the proven AMSE[®] System, a high-fidelity, PC-based simulation environment used in defense testbeds and civilian systems. The AMSE System led to impressive advancements and improvements in some of the world's most critical systems:

5D Hurricane

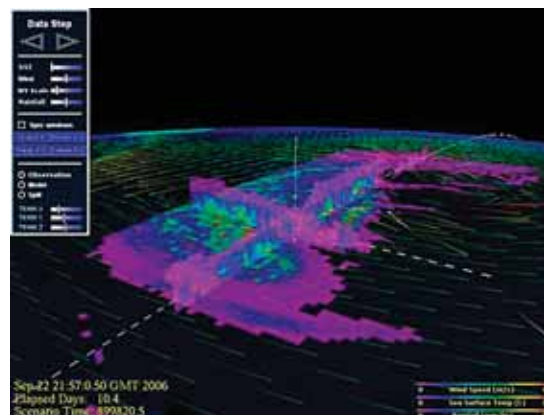
Raytheon worked with the scientists at NASA's Jet Propulsion Laboratory to develop the Interactive 5D visualization and analysis system to enable experts from around the world to collaborate towards improving weather forecasting. The Data Instrument and

Analysis Graphic User Interface (DIAG) is time-synchronized with visualization to allow users to compute and display data from multiple sources. Leveraging existing technologies and a rapid prototyping environment, Raytheon developed the system in three months. The visualization and DIAG provide an interactive comparison of satellite sensor data, and weather and research forecasting model. The 5D hurricane visualization and simulation capabilities enhance the display, analysis and study of environmental and weather data, and will lead to improved hurricane forecasts, tracking and warnings.

Missile Defense

Raytheon supports the critical Department of Defense testing of integrated missile defense components and systems. With a flexible infrastructure that can be configured for real-

time execution, extensive data capture and surface-to-space representation, the modeling and simulation capabilities are key in supporting testing, demonstration, experimentation, evaluation and prototyping requirements.



Developing the Next Generation Air Transportation Systems

Raytheon is helping NASA develop and maintain the Langley Research Center (LaRC) Airspace and Traffic Operations Simulation (ATOS) system, one of the largest distributed simulation environments in the world. ATOS uses realistically modeled aircraft and Communication, Navigation and Surveillance (CNS) systems to develop and test concepts for the Next-Generation Air Transportation System (NextGen).

The ATOS system consists of a federation of more than 400 high-fidelity workstation-based aircraft simulators networked together, and linked with external laboratories at NASA LaRC, NASA Ames Research Center, FAA and other compliant facilities, in support of Human-In-The-Loop and Automated simulations. Raytheon helps NASA use ATOS to perform research on advanced concepts and technologies for the NextGen System that will significantly and efficiently improve the National Airspace System capacity, safety and flexibility. Raytheon also supports the development of a high-fidelity Weather Scenarios Generator and Server based on historical

weather data to enable NASA to test these concepts in realistic environmental conditions.

Raytheon supported NASA's Pilots-In-The-Loop experiments on a concept called Flight Deck Merging and Spacing. The algorithms tested with the help of the ATOS system makes use of onboard aircraft surveillance to provide flight deck spacing commands allowing aircrafts to follow one another at the safest, most efficient interval possible from cruise altitude to the runway. This technology, which is currently being rolled out to industry, will provide more consistent aircraft spacing while increasing capacity and efficiency within the terminal airspace.



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Customer Success Is Our Mission