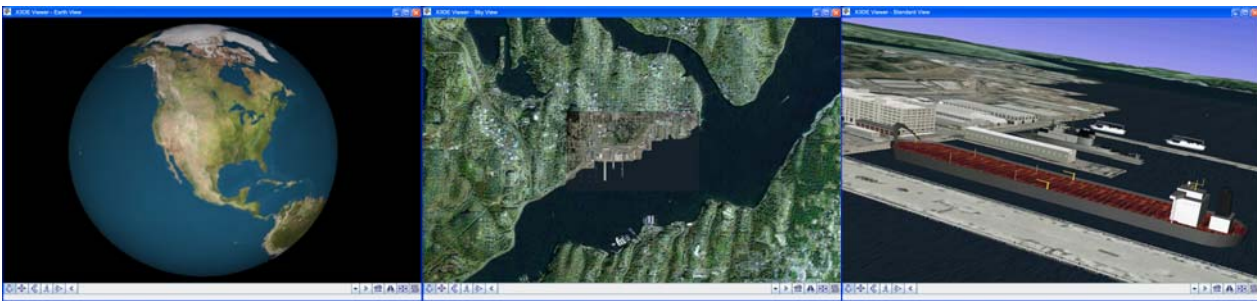


X3D EARTH: Archivable Composed Collaborative Web-Based 3D Visualization With Global Geospatial Context for Complex Analysis and Evaluation of Intelligence Products

X3D Earth Project

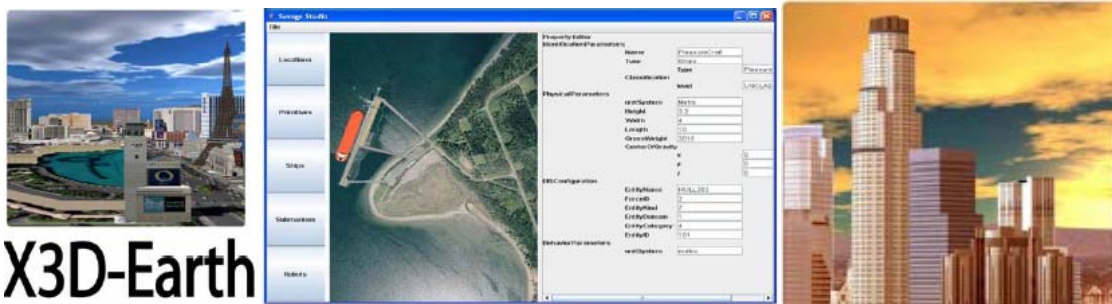
The Extensible 3D (X3D) Earth project will provide the large-scale integrated analytical visualization framework needed to support the Advanced Research in Interactive Visualization for Analysis (A-SpaceX) Program. It brings enabling and empowering technologies for mutual benefit to all participants through open standards facilitating interchange and interoperability across diverse systems for collaborating teams of intelligence analysts. The creation of open pathways to sharing of visual information in a global geospatial context will prove to be a truly disruptive technology leading to greater intelligence capabilities.



X3D Earth Vision

Imagine...

- ... a visualization environment where all data sources are integrated into a single world-view, giving users the ability to view information associated with any location;
- ... an ability to navigate the data referenced to any desired timeframe: seeing the world as it was from recorded historical information or as it is perceived to be based on sensors and reports or perhaps as it may become based on the simulations that project new world conditions;
- ... a visualization environment where all products from the A-SpaceX Program and multiple developers that are fully integrated and interoperable, and readily exchanging information supporting the past, present and future visualization of the world-space;
- ... a visualization environment where multiple analysts can view the same world picture with shared geospatial and temporal context, and have access to the innovative visual interface mechanisms to search, zoom, select, and manipulate information directly;
- ... all these capabilities provided as compatible, straightforward XML extensions of existing Web-based data strategies.



Expected Payoff

Expected outcomes include better analytic products based on real-world geospatial visualization, better informed by compatibly growing mountains of XML and X3D-based content, better visualized using more-commonplace 3D interaction techniques, and better suited for collaborative development based on interoperable (and even archival) Web standards.

Approach

The X3D Earth project is creating a standards-based 3D infrastructure for geospatially visualizing all manner of real-world objects and information constructs. The following efforts help to reach that goal:

- Demonstrate interoperability and geospatial capabilities by mapping selected existing A-SpaceX project capabilities to this common-denominator interchange format
- Present distinct 3D visualization approaches in a common complementary display used by one or more analysts
- Enable 3D visualization approaches with linked analytic functionality within a shared geospatial environment
- Enable shared project environments using X3D within a Web-based framework
- Engage in a well-defined open process that ensures continued improvement provided by an active industry/academic/government community. Ensure sustainable progress through X3D and X3D Earth working groups, combined with NPS technical partners
- Introduce novel user metaphors for navigation and manipulation of 3D data showing consistent and repeatable usage by diverse users within the Web-browser context
- Perform formal usability studies to prove and document benefits of proposed 3D visualization framework, also identifying next-step challenges.

Our Experience

This is a high-water mark in a decades-long group-driven technical undertaking.

- 15 years of documented development of web architecture
- 12 years of developing VRML and X3D graphics standards together with an open community
- 10 years of proven large-scale project development by NPS team
- 10 years of research on Human Factors issues and collaborative work enabled through virtual environments
- 6 years of research and deployment of emerging technological solutions used in learning and training

Resources

Numerous NPS, Web3D Consortium and web-based resources will be used.

Other complementary projects and partners are likely to emerge during this effort.

- X3D Earth Technical Requirements Workshop November 2006 reports on detailed technical issues
- Web3D Consortium has started the X3D Earth Working Group <http://www.web3d.org/x3d-earth>
- Large body of Web3D, W3C, OGC standards that are all well defined and ready for synthesis
- Multiple existing NPS and Web3D open source code bases, primarily on SourceForge
- Newly available XML and X3D compression algorithms and implementations
- Proven projects, process and technical world view with Web3D Consortium partners
- NPS high-capacity internet/intranet infrastructure with .mil, .smil and .edu connectivity
- Defense Research and Engineering Network (DREN) High-Performance Computing (HPC) access
- Diverse NPS technical curricula provides broad-spectrum expertise to intelligence community
- Existing (and emerging) X3D conversion capabilities, authoring tools and applications

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