

X3D Earth Web Viewing and Authoring Requirements

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Abstract

This document describes Media Machines' involvement in the X3D Earth initiative being led by the Naval Postgraduate School and the Web3D Consortium in partnership with Web3D vendors and affiliate organizations. Our specific areas of focus in this research are the deployment of X3D Earth content within web browsers, developing high-performance and lightweight implementations for rendering and interaction, and providing affordable authoring solutions for integrating 3D models and geospatial data into real-time scenes.

Introduction

The Naval Postgraduate School and the Web3D Consortium are spearheading the development of X3D Earth, a standards based geospatial visualization system usable by governments, industry, scientists, academia and the general public. X3D mappings of world terrain, cartography and imagery will be made available for use in any scene, making it easy to geospatially reference and share X3D models.

X3D Earth will employ open standards, web architectures, XML languages and open protocols throughout, and emphasize best practices. Vendors with closed- and open-source code bases will be able to participate. The Web3D Consortium is forming an X3D Earth working group to guide and manage the various activities related to the development of standards and best practices for the project.

Media Machines is participating in X3D Earth at several levels: as a strategic partner interested in advancing the project's long-term goals; as a developer creating low-cost, accessible solutions for the web; and as a long-time contributor to the architecture and development of the X3D standard. This paper outlines Media Machines' participation in the project, including our business goals, product development plans, technical requirements, and the challenges that lay ahead.

Strategic Goals

Media Machines' mission is to establish our Flux™ technology as a premier platform for 3D web content and experiences. The company believes that geospatial visualization can greatly enhance those experiences, and that geospatial applications delivered on the web represent a significant commercial opportunity. The key to unleashing that opportunity is an open, web-based platform that allows geospatial data to be integrated with other web- and 3D data into a seamless experience.

X3D Earth promises to develop an open, standards-based infrastructure for earth visualization. Media Machines is primarily interested in participating in the initiative to achieve the following strategic goals:

- **Web-based Earth viewing for all**, via a simple plug-in to web browsers. Earth viewing should not be trapped inside a “walled garden” or point-product solution but should be deployable within a web browser;
- **AJAX and “mashup” support**. The geospatial data delivered within a web browser must be programmable via web scripting languages, and able to be integrated visually with other web page elements and web-based information services;
- **Open, web-based data format**. The geospatial data itself should be based on open standard formats, deliverable over standard HTTP and accessible via AJAX and other request methods (such as X3D SAI createXXX calls).

Requirements for X3D Earth Technical Architecture and Shared Implementations

For this project, Media Machines will focus on requirements for web-based presentation and data access. These include:

- Full support for the existing X3D Geospatial rendering component, as well as extensions to that component deemed necessary to achieve quality rendering at the level of Google Earth or NASA World Wind;
- Improvements to the viewing, navigation and interaction models within X3D browsers;
- Specification and development of streaming delivery, programmatic access and other dynamic aspects of the architecture, with a particular focus on Ajax and lightweight Web deployment;
- Full support for the proposed X3D Earth (“X3DE”) component of the X3D specification, and demonstrated interoperability with other X3DE-conformant browsers

Media Machines Assets Available to Contribute to This Effort

Media Machines is a leading developer of open source, web-based solutions based on X3D. Our specific business focus is on software for developing consumer-grade content and applications in entertainment, e-commerce and social networking. We have several platform technologies and products that we can bring to bear in this project:

- **Flux Player** – an open source, X3D-conforming lightweight web plugin for Firefox and Internet Explorer;
- **Flux Studio** – an easy to use authoring and publishing package for creating X3D content, free for personal/academic use and affordable for professionals;
- **Flux Widgets** – an online service that allows X3D content creators to upload and share 3D models, scenes and applications, hosted at www.mediamachines.com;
- **Ajax3D** – An open initiative, led by Media Machines, to develop Ajax-based libraries, development frameworks and best practices for web-based 3D application deployment – hosted at www.ajax3d.org.

Access and Intellectual Property Rights (IPR) Restrictions

Media Machines does not have any intellectual property restrictions that will impact this project.

Team; Related Work

Media Machines has been involved in several projects, past and ongoing, that are related to the X3D Earth initiative:

ARIVA Project. Media Machines is a subcontractor on the NPS ARIVA (Advanced Research in Interactive Visualization for Analysis) X3D Earth project. Our specific development tasks for that project are as follows:

- Assist preparing X3DE Component documentation for Web3D and ISO approval; specifically review for feasibility rendering on Windows/DirectX.
- Add proven geospatial extensions and X3D-Earth support to Flux web browser plug-in for Windows clients, Internet Explorer and Firefox browsers
- Extend FluxStudio authoring tool to support proven geospatial extensions and X3D-Earth
- Develop sample lightweight X3DE Global Viewer capable of running in a web page, based on AJAX architecture ("AJAX3D")

City of St. Paul Mapping Prototype. Media Machines has been contracted by the City of St. Paul, MN, to develop an X3D-based web prototype to visualize the city's terrain data with layers that include satellite imagery, streets and other infrastructure.

Team. Media Machines' technical team includes leading X3D specification team members and web pioneers: CEO Tony Parisi, Engineering Vice President Keith Victor , CTO Jay Weber, and senior engineer Dave Arendash, all of whom have made significant contributions to X3D and other web standards and protocols. Our team is also leading the charge in open web3D development with the Ajax3D initiative and the innovative information services hosted at www.mediamachines.com

Unresolved Technical Challenges

Media Machines has identified several technical challenges for this project, as follows:

- Intuitive earth-based navigation interface
- Multi-resolution terrain rendering
- Data layering – optimizing performance and rendering
- Client-server networking – architectures for delivering data
- User interface design within Flux Studio, for easy placement of geospatially located objects