



GREEN
BUILDING STUDIO

Green Building XML

Enabling disruptive
technologies today!

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President & CTO
Green Building Studio, Inc.

Green Building XML History

- Data exchange between 3D-CAD and Green analysis applications
- Development started Dec. 1999
- Published June 2000
- Funding
 - CEC PIER – Energy Analysis Module Project
 - Green Building Studio, Inc. – Ongoing
 - PG&E - Promotion

Ownership & Support

- Non-proprietary data standard
- Maintained by an industry consortium
- Similar model as LandXML

Main Objective

- Green Building Analysis Focus
- Minimize human interpretation
- Relieve Pain



Market Research

- Web Surveys
 - 400+ in 1999 & 2000
 - 600+ in 2004
 - 700+ in 2005
- 60+ Key Informant Interviews
- 36 Secondary Sources Reviewed
- Technical Colloquium
- 3D-CAD User Focus Group
- Pilot User Studies
- Task Analysis

Technologies Reviewed

- Simulation Engines & Interfaces
 - DOE-2.1e, DOE-2.2, EnergyPlus, COMIS, MOIST, Contam96, Trnsys, RADIANCE, PowerDOE, eQuest, VisualDOE, Fluent, Energy10, FAST
- Geometry Formats
 - VRML, 3DMF, DXF, X3D, IAI-IFCs
- XML Schema
 - Biztalk, aecXML, PIPE, X3D
- Data Formats & Databases
 - IAI-IFCs, IES-Photometric, HVAC Catalogs & performance data, FTC-EnergyGuide, CEC-Appliance & HVAC databases, EPA - EnergyStar databases, BEES, ASHRAE 90.1, Title-24
- All Major Architectural 3D-CAD applications
 - AutoCAD, Architectural Desktop, ArchiCAD, Triforma, VectorWorks, AllPlan, FormZ, 3D-Studio, DesignWorkshop

Data Capabilities

- 3D planar polygon geometry
- 2D rectangular polygon geometry
- Opaque constructions and materials
 - Thermal and emission properties, recycled content,
 - Costs including LCA (embodied, first, and future)
- Glazing, shades, and their operation
- Internal and external equipment
 - Energy, power, efficiencies, water use, physical characteristics
 - Costs including LCA (embodied, first, and future)
- Lighting and controls

Data Capabilities, cont'd.

- HVAC equipment
- Weather design data
- Ventilation requirements
- Operation schedules
 - Occupancy, lighting, equipment, HVAC, temperatures.
- Infiltration
- Transportation types, location, & schedule
- Vegetation types, location, & water use.
- Versioning and change history

gbXML Support

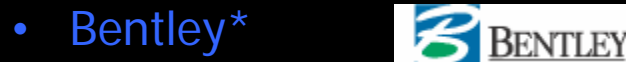
- CAD



- Autodesk
 - ◆ ADT 2004, 2005, 2006
 - ◆ ABS 2005, 2006
 - ◆ Revit 6.1, 7
 - ◆ Revit Building 8.x



- ◆ 8.0, 8.1, 9.0
- ◆ Mac and Windows



- ◆ Architecture
- ◆ HVAC



- ◆ DesignWorkshop

- HVAC/Energy

- Trane
 - ◆ TRACE 700
- Green Building Studio
- DOE-2.2
 - ◆ eQuest
- EnergyPlus
- Carmel Software
- IES VE
- Carrier*
- York*
- Elite Software*
- ECOTECT*
- Energy Soft*



*Announced Support

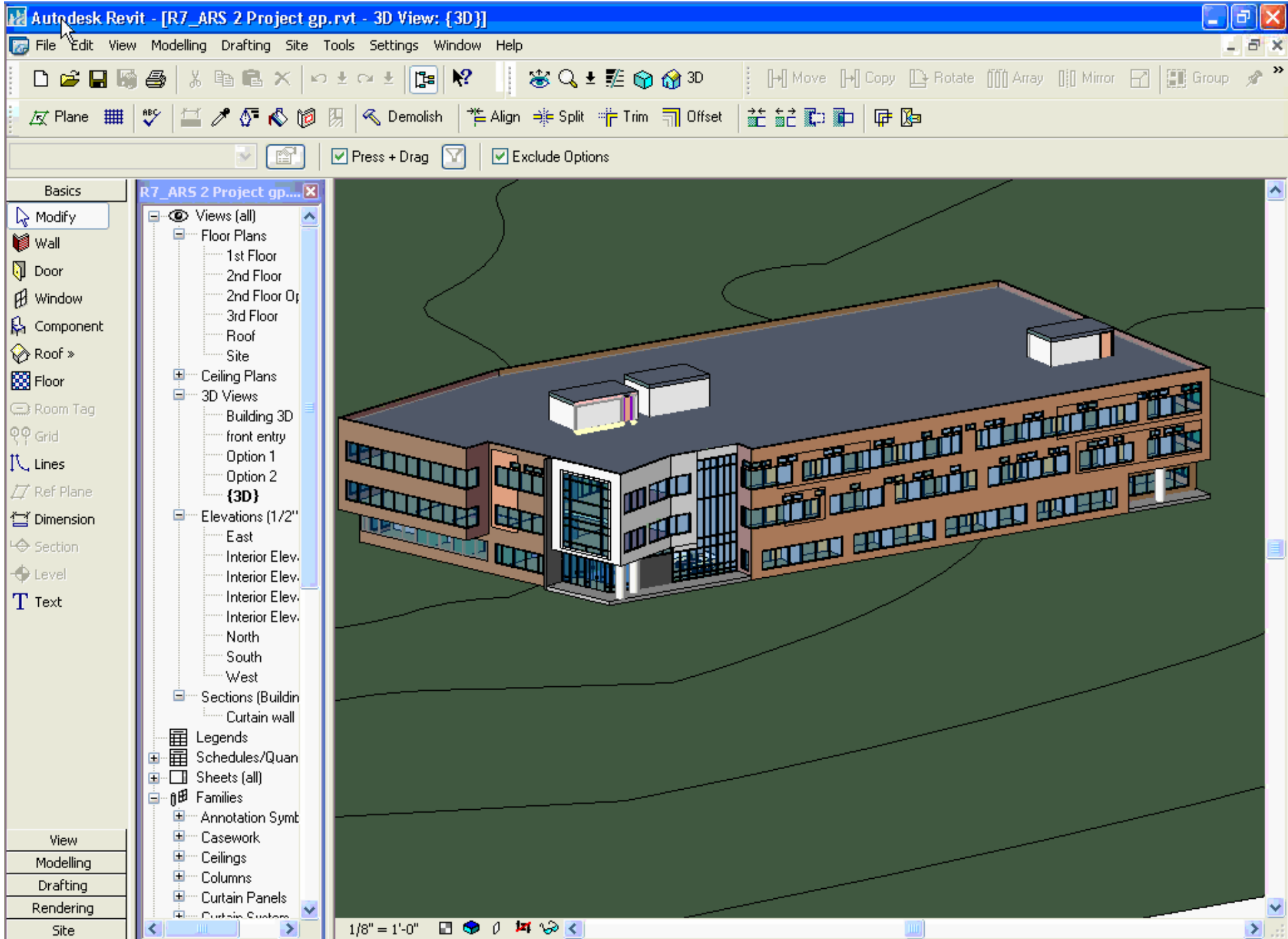
Top Reasons for Support

- Simple to implement
 - TRANE spent < 1 month FTE
- Intuitive structure
- Wide availability of parsers (XML)
- Major CAD vendor support

gbXML In Action

- Sample building in Autodesk Revit.
- Energy Results with Green Building Studio.
- Open DOE-2.2 file in eQuest
- Import into Trane's TRACE 700.

- Two weeks of work in 15 minutes



Taylor Engineering

- UC Berkeley – Bancroft Library \$38 mil. renovation
- Days saved with using ABS-gbXML-TRACE 700
- Firm's practice changed to fully utilize gbXML
- Nearly every project has ABS model built, gbXML file exported and imported into Trace 700
- Average of two days saved on every project



Issues

- BIM not fully understood
- BIM tools lacking depth
- Legacy habits - Please no lines
- BIM tools need embedded guidance

The Future

- Continue to evolve with industry input
- Attempt to standardize terminology
 - HVAC Components and Systems
- ASHRAE data - 2006
 - Materials and weather data in gbXML format

Getting Started

Visit www.gbxml.org for schema and more information