X3D Graphics for Web Authors

# X3D-Edit Update

SIGGRAPH ASIA

Singapore, 10-13 December 2008

Don Brutzman

Naval Postgraduate School

Monterey California USA

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# Motivation

Teach X3D to anyone who can author HTML

Unlock all of the great work by Web3D partners

Learn by doing, help further X3D progress

# X3D Showcase DVD

## Contents

- Viewers
- Examples
- Content Creation Tools
- Case Studies
- Resources
- Join Web3D Consortium


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# X3D Showcase DVD

Production thanks!

- *Web3D:* Anita Havele
- *University of Sao Paolo:* Mario Nagamura, Marcia Kondo, Marcio Cabral, Olavo Belloc, Marcelo Zuffo
- *Naval Postgraduate School:* Byounghyun Yoo, Jeff Weekley, Don Brutzman

Sourceforge version control for easy updating


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X3D

# Teaching Goals

This work presents Extensible 3D (X3D) Graphics, the open, royalty-free, international standard for 3D graphics on the Web

Book and slideset goals include

- Show Web authors experienced with HTML and XML how to build and connect X3D models
- Teach students principles of Web-capable 3D graphics
- Serve as a ready-reference book for X3D experts

Explain broad principles and specific details of X3D for anyone learning how to build 3D models

# X3D Examples Archives

*X3D for Web Authors* 299 models

- Textbook on how to design and build X3D scenes

*Basic* 610 models

- Diverse scenes illustrating various X3D capabilities

*Conformance NIST* 732 models

- Strictly defined test examples for correct operation

*VRML 2.0 Sourcebook* 269 models

- Textbook on VRML97, examples converted to X3D

*Savage* 1226 models

- Open-source military models and tools

3100+ models available

# X3D-Edit Authoring Tool for Extensible 3D (X3D) Graphics

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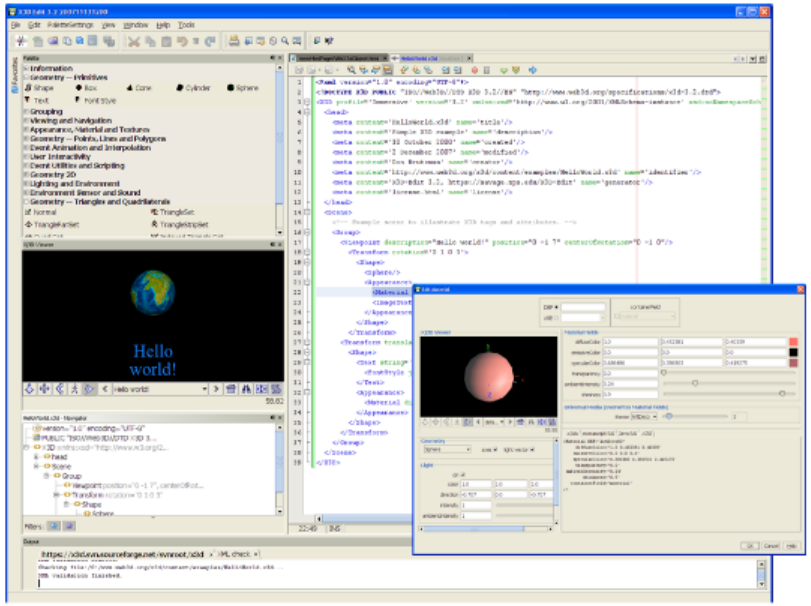
Open Standards for Real-Time 3D Communication



X3D-Edit is an Extensible 3D (X3D) Graphics authoring tool for simple error-free editing, authoring and validation of X3D scenes.

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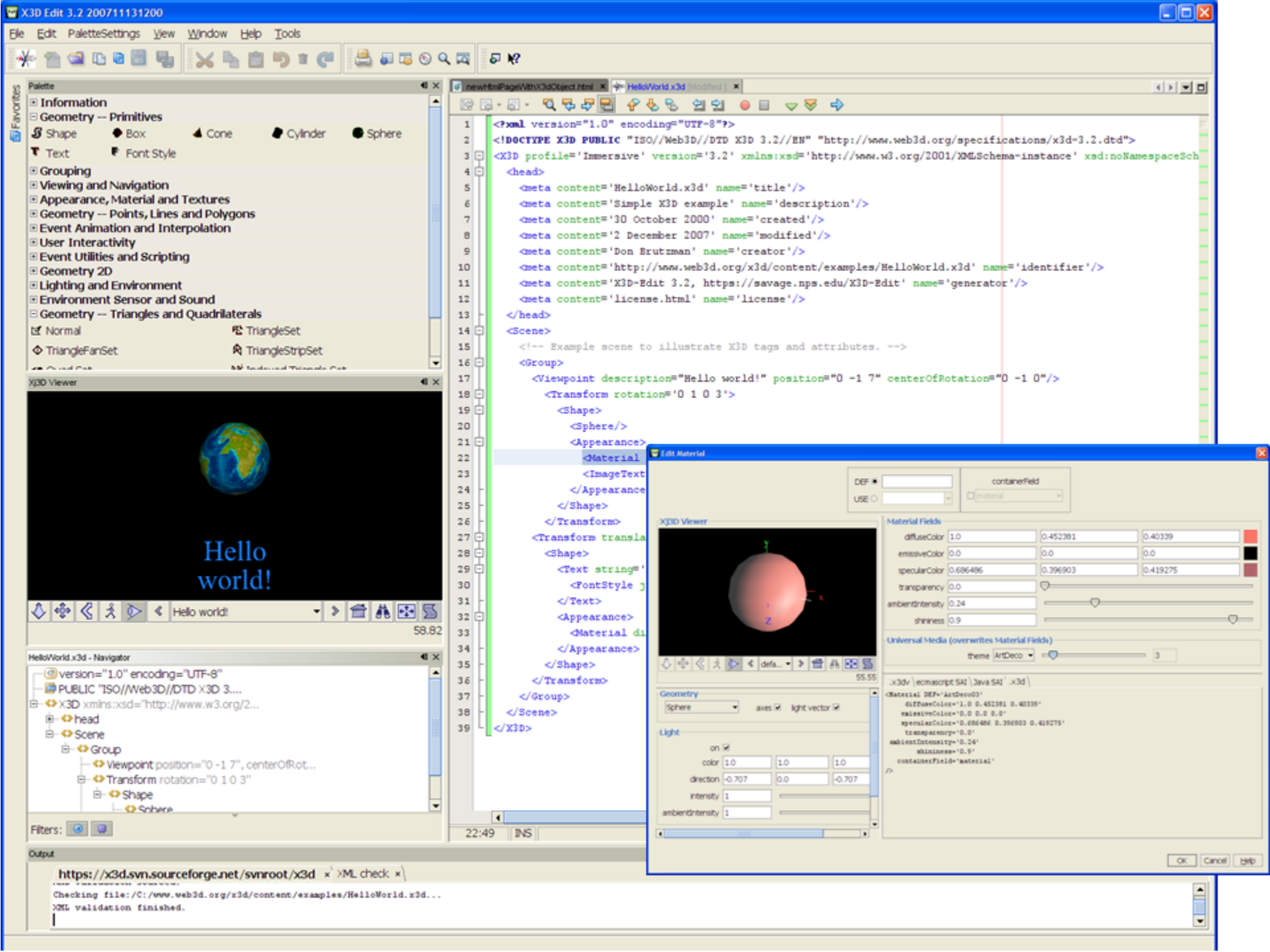
## Overview

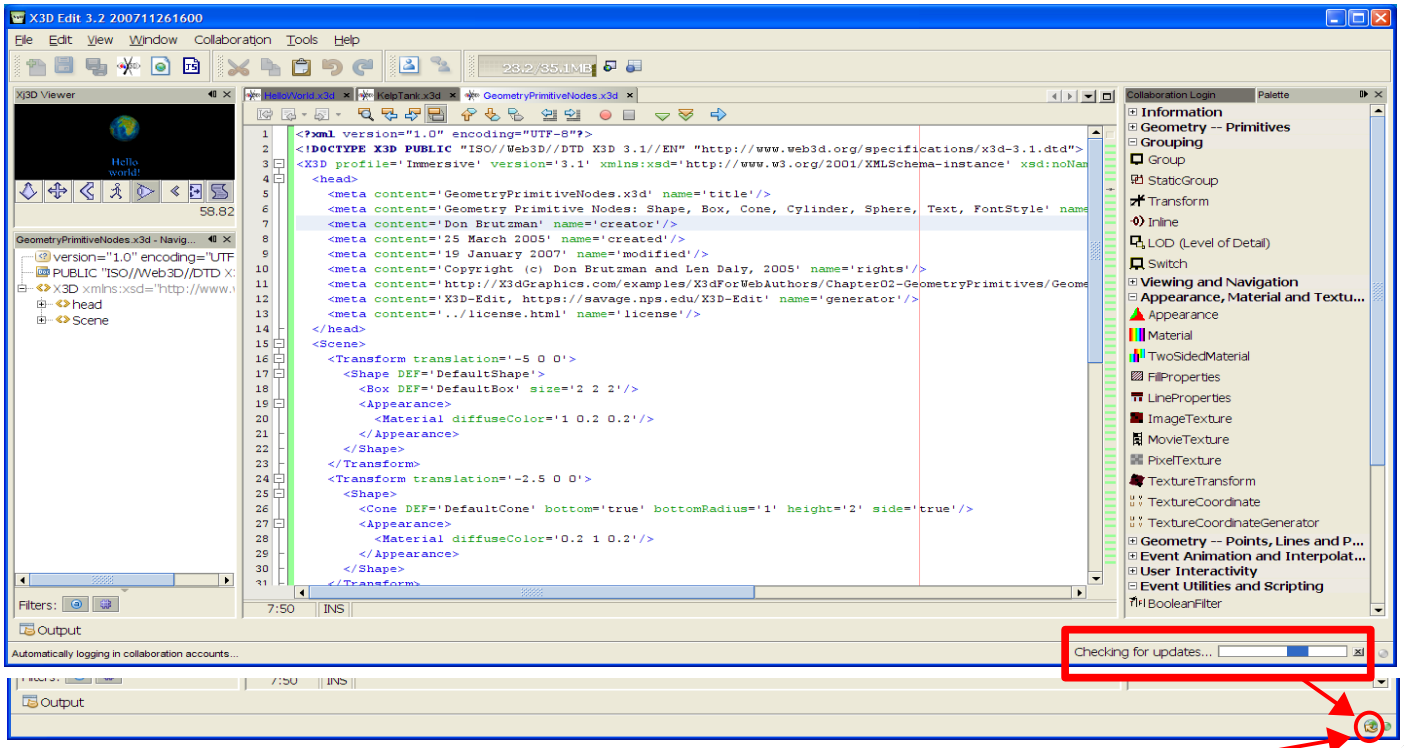
The X3D-Edit 3.2 Authoring Tool for Extensible 3D (X3D) Graphics supports the creation, checking, display and publication of X3D scenes. It is written in open-source Java and XML using the Netbeans platform, making it suitable both as a standalone application and as a plugin module for the Netbeans integrated development environment (IDE).

X3D-Edit features include direct editing of X3D scenes using the XML (.x3d) encoding, embedded visualization of scenes using the Xj3D viewer, XML validation against X3D DTDs and Schemas, drag-and-drop palette for X3D nodes, popup panels for node editing, and extensive help resources. Planned features include ClassicVRML and X3D compressed binary encoding support, encryption and digital-signature authentication using XML Security standards, and additional X3D scene authoring support.


X3D Edit 3.2 200711131200
File Edit PaletteSettings View Window Help Tools
Palette
Information
Geometry -- Primitives
Shape Box Cone Cylinder Sphere
Text Font Style
Grouping
Viewing and Navigation
Appearance, Material and Textures
Geometry -- Points, Lines and Polygons
Event Animation and Interpolation
User Interactivity
Event Utilities and Scripting
Geometry 2D
Lighting and Environment
Environment Sensor and Sound
Geometry -- Triangles and Quadrilaterals
Normal TriangleSet
TriangleFanSet TriangleStripSet
X3D Viewer
Hello world!
Hello world!
58.82
HelloWorld.x3d - Navigator
version="1.0" encoding="UTF-8"
PUBLIC "ISO//Web3D//DTD X3D 3....
X3D xmlns:xsd="http://www.w3.org/2...
head
Scene
Group
Viewpoint position="0 -1 7", centerOfRot...
Transform rotation="0 1 0 3"
Shape
Filters:
newHtmlPageWithX3dObject.html
HelloWorld.x3d
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE X3D PUBLIC "ISO//Web3D//DTD X3D 3.2//EN" "http://www.web3d.org/specifications/x3d-3.2.dtd">
<X3D profile='Immersive' version='3.2' xmlns:xsd='http://www.w3.org/2001/XMLSchema-instance' xsd:noNamespaceSch
<head>
<meta content='HelloWorld.x3d' name='title'/>
<meta content='Simple X3D example' name='description'/>
<meta content='30 October 2000' name='created'/>
<meta content='2 December 2007' name='modified'/>
<meta content='Don Brutzman' name='creator'/>
<meta content='http://www.web3d.org/x3d/content/examples/HelloWorld.x3d' name='identifier'/>
<meta content='X3D-Edit 3.2, https://savage.nps.edu/X3D-Edit' name='generator'/>
<meta content='license.html' name='license'/>
</head>
<Scene>
<!-- Example scene to illustrate X3D tags and attributes. -->
<Group>
<Viewpoint description="Hello world!" position="0 -1 7" centerOfRotation="0 -1 0"/>
<Transform rotation='0 1 0 3'>
<Shape>
<Sphere/>
<Appearance>
<Material
<ImageText
</Appearance
</Shape>
</Transform>
<Transform transla
<Shape>
<Text string='
<FontStyle j
</Text>
<Appearance>
<Material di
</Appearance>
</Shape>
</Transform>
</Group>
</Scene>
</X3D>
22:49 INS
Edit Material
DEF
USE
containerField
X3D Viewer
Material Fields
diffuseColor 1.0 0.452381 0.40339
emissiveColor 0.0 0.0 0.0
specularColor 0.686486 0.396903 0.419275
transparency 0.0
ambientIntensity 0.24
shininess 0.9
Universal Media (overwrites Material Fields)
theme ArtDeco
Geometry
Sphere
axes
light vector
Light
on
color 1.0 1.0 1.0
direction -0.707 0.0 -0.707
intensity 1
ambientIntensity 1
OK Cancel Help
Output
https://x3d.svn.sourceforge.net/svnroot/x3d
XML check
Checking file:/C:/www.web3d.org/x3d/content/examples/HelloWorld.x3d...
XML validation finished.

# X3D-Edit updates

Icon in lower-left corner of screen indicates when updates are available for automatic installation

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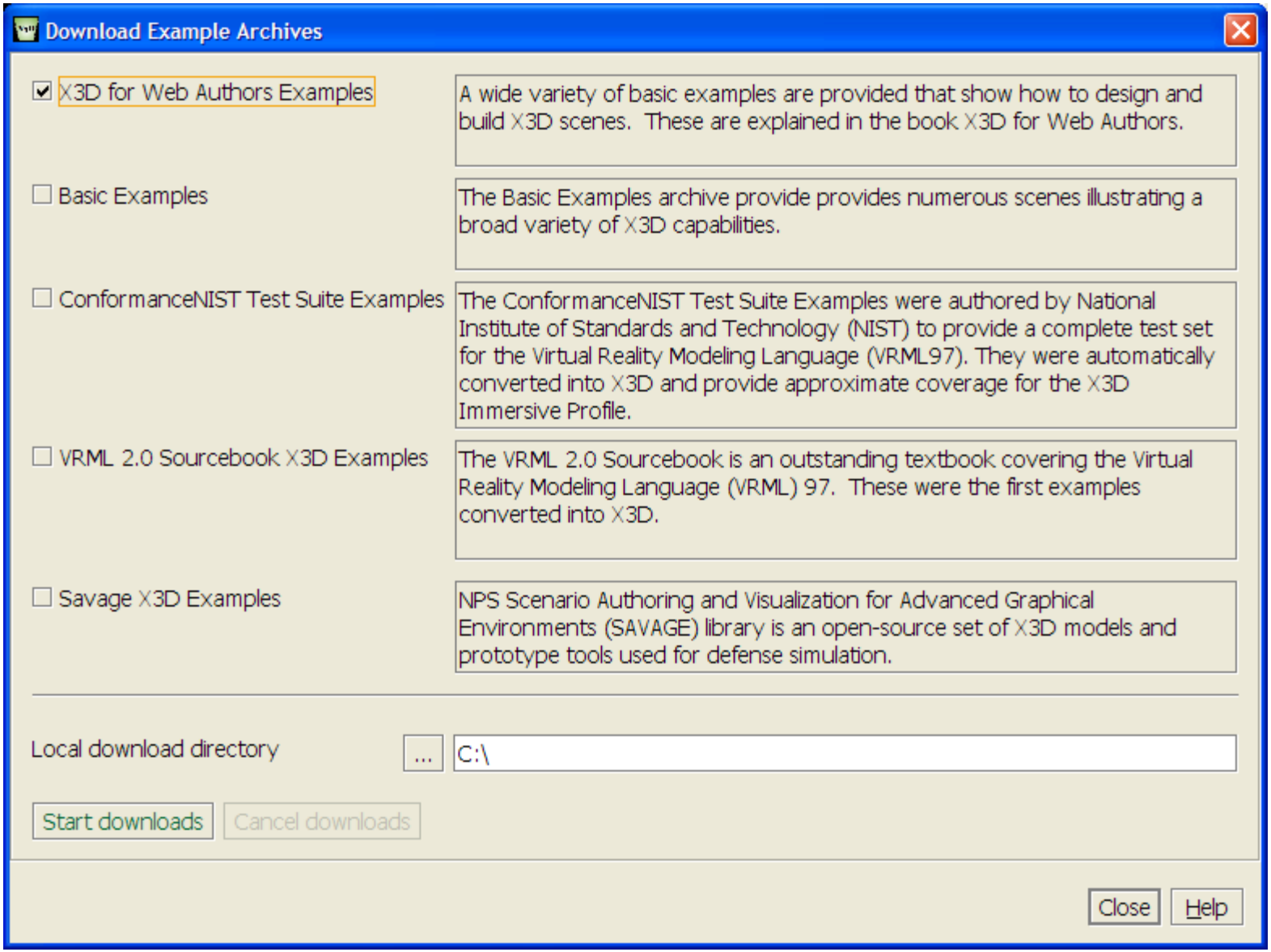
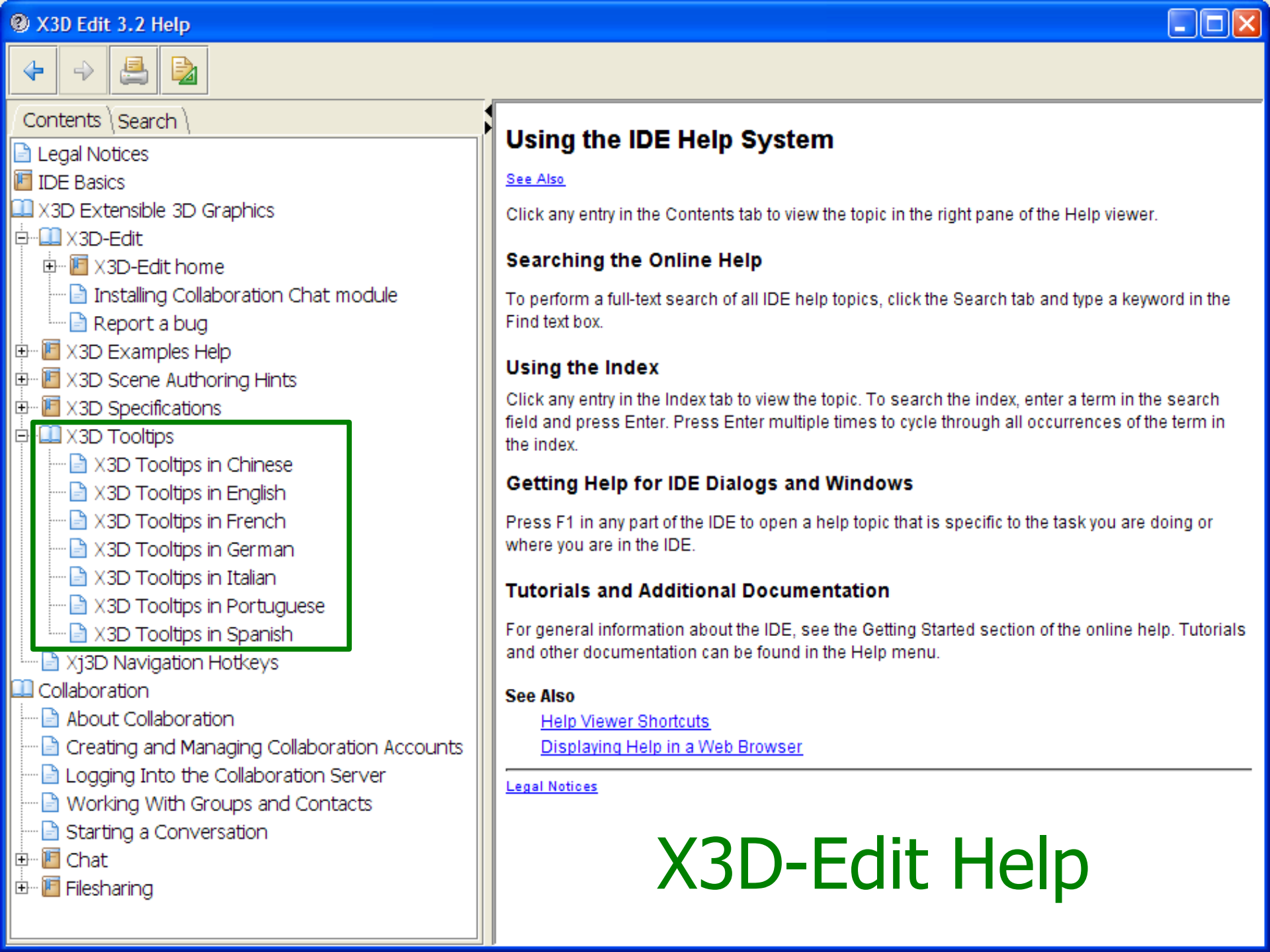
# X3D Examples download panel, X3D-Edit




X3D Edit 3.2 Help
Contents
Search
Legal Notices
IDE Basics
X3D Extensible 3D Graphics
X3D-Edit
X3D-Edit home
Installing Collaboration Chat module
Report a bug
X3D Examples Help
X3D Scene Authoring Hints
X3D Specifications
X3D Tooltips
X3D Tooltips in Chinese
X3D Tooltips in English
X3D Tooltips in French
X3D Tooltips in German
X3D Tooltips in Italian
X3D Tooltips in Portuguese
X3D Tooltips in Spanish
Xj3D Navigation Hotkeys
Collaboration
About Collaboration
Creating and Managing Collaboration Accounts
Logging Into the Collaboration Server
Working With Groups and Contacts
Starting a Conversation
Chat
Filesharing
Using the IDE Help System
See Also
Click any entry in the Contents tab to view the topic in the right pane of the Help viewer.
Searching the Online Help
To perform a full-text search of all IDE help topics, click the Search tab and type a keyword in the Find text box.
Using the Index
Click any entry in the Index tab to view the topic. To search the index, enter a term in the search field and press Enter. Press Enter multiple times to cycle through all occurrences of the term in the index.
Getting Help for IDE Dialogs and Windows
Press F1 in any part of the IDE to open a help topic that is specific to the task you are doing or where you are in the IDE.
Tutorials and Additional Documentation
For general information about the IDE, see the Getting Started section of the online help. Tutorials and other documentation can be found in the Help menu.
See Also
Help Viewer Shortcuts
Displaying Help in a Web Browser
Legal Notices
X3D-Edit Help

# Viewing alternatives for X3D

Default built-in viewer is open-source Xj3D

- High performance, implemented using Java OpenGL

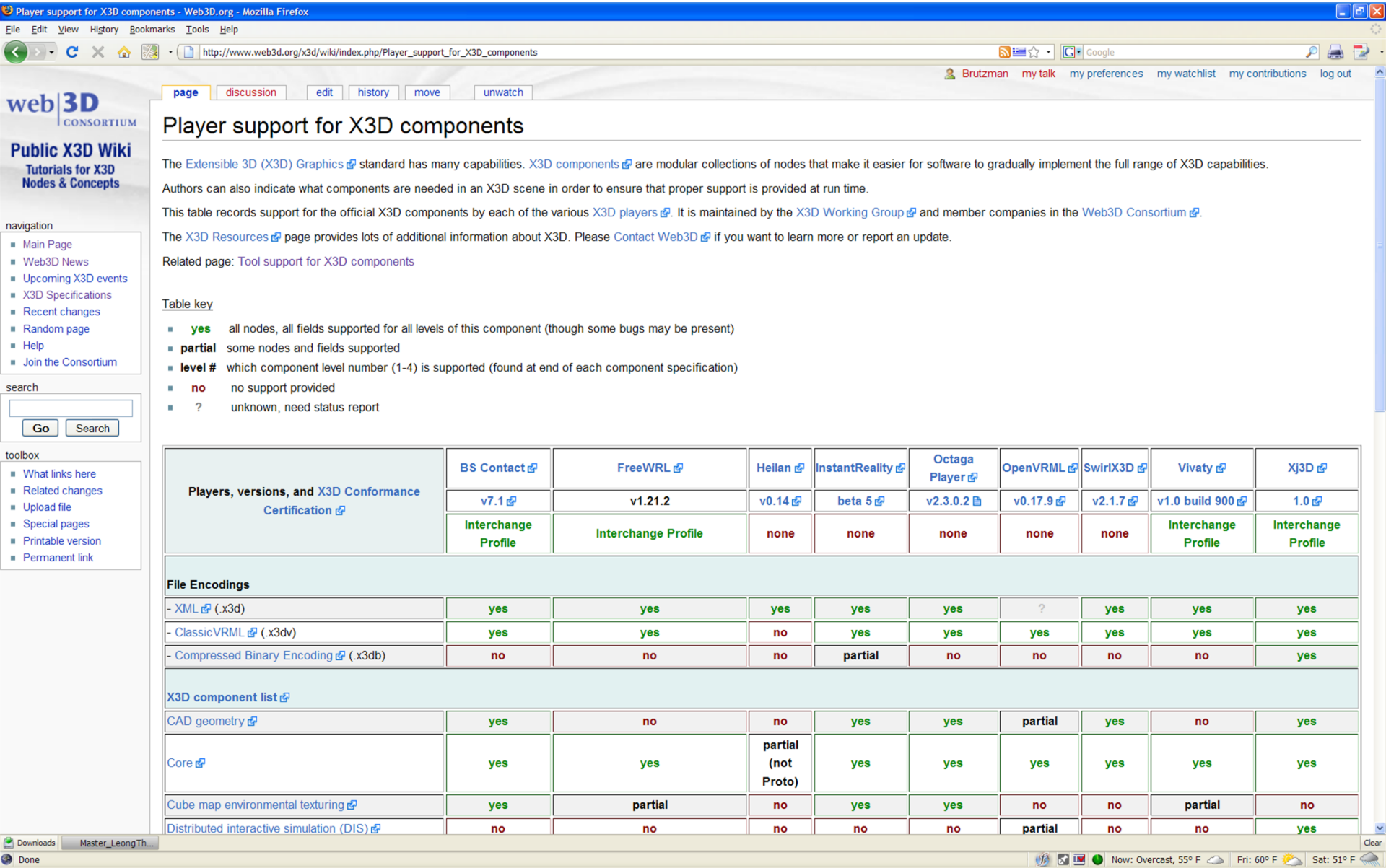
Can launch current scene into web browser

- Displays using any of your installed plugins
- "Launch all viewers" simplifies comparison testing

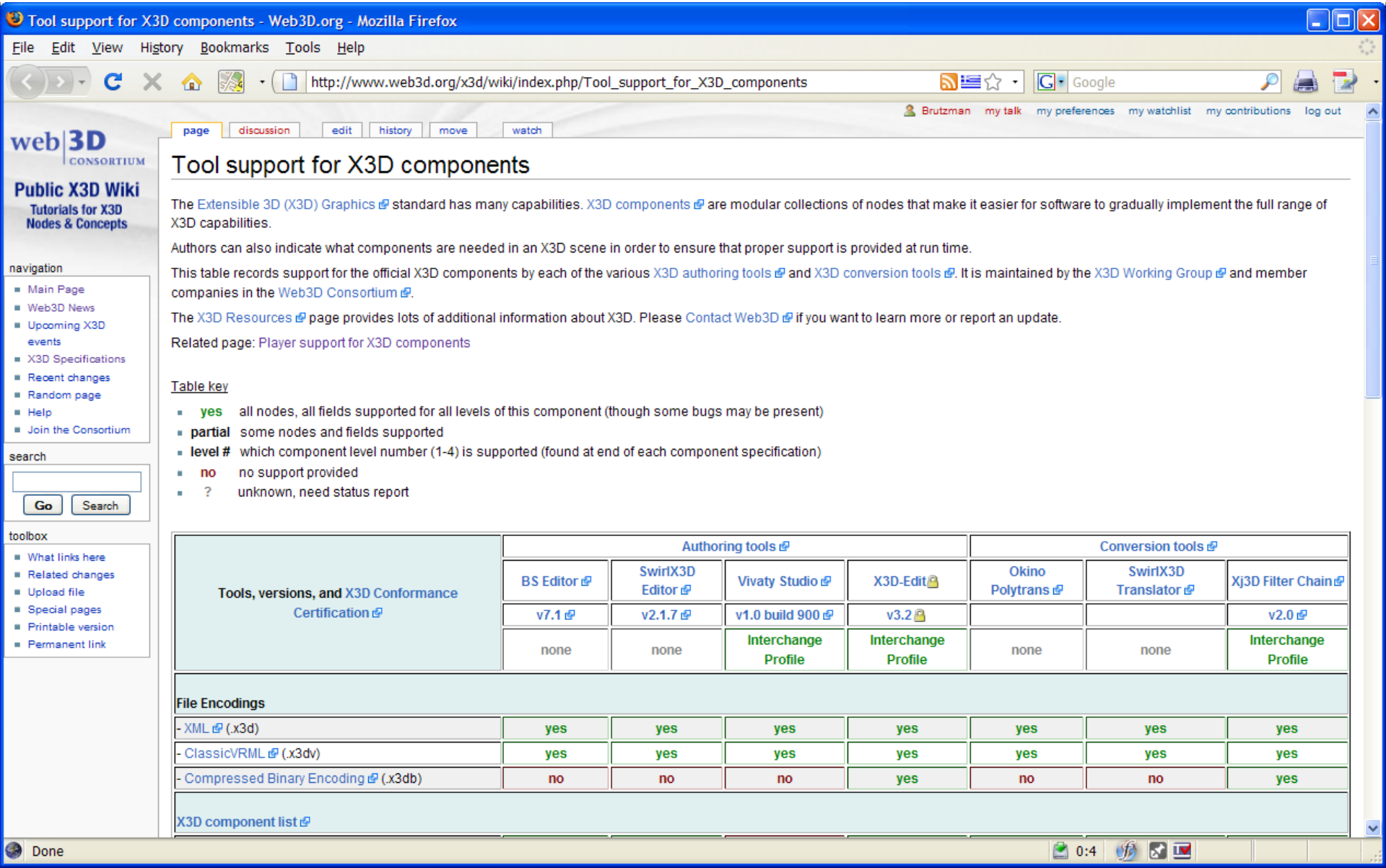
Can also launch into standalone applications

- Configuration panel simplifies download, install

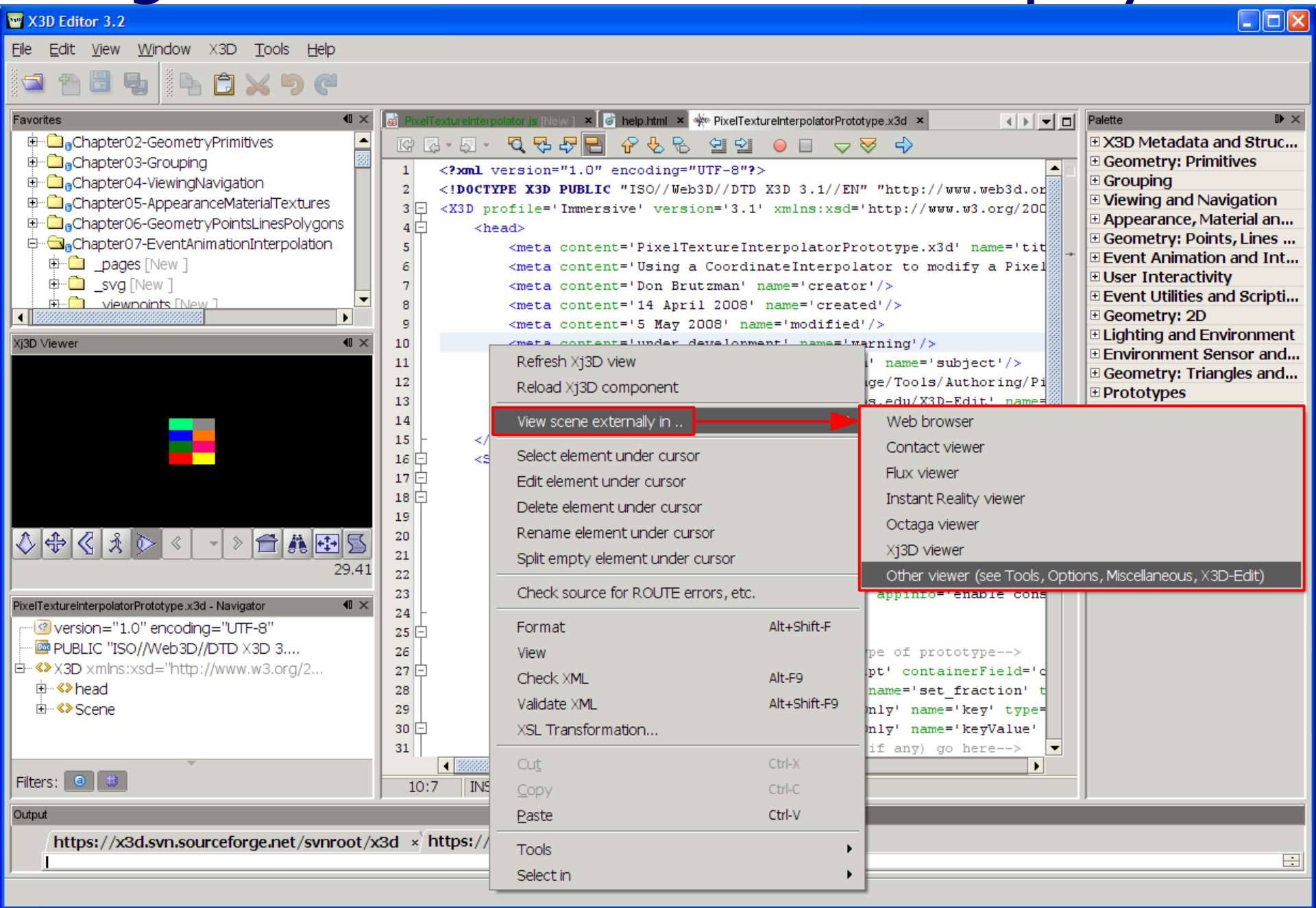
# Player support for X3D components



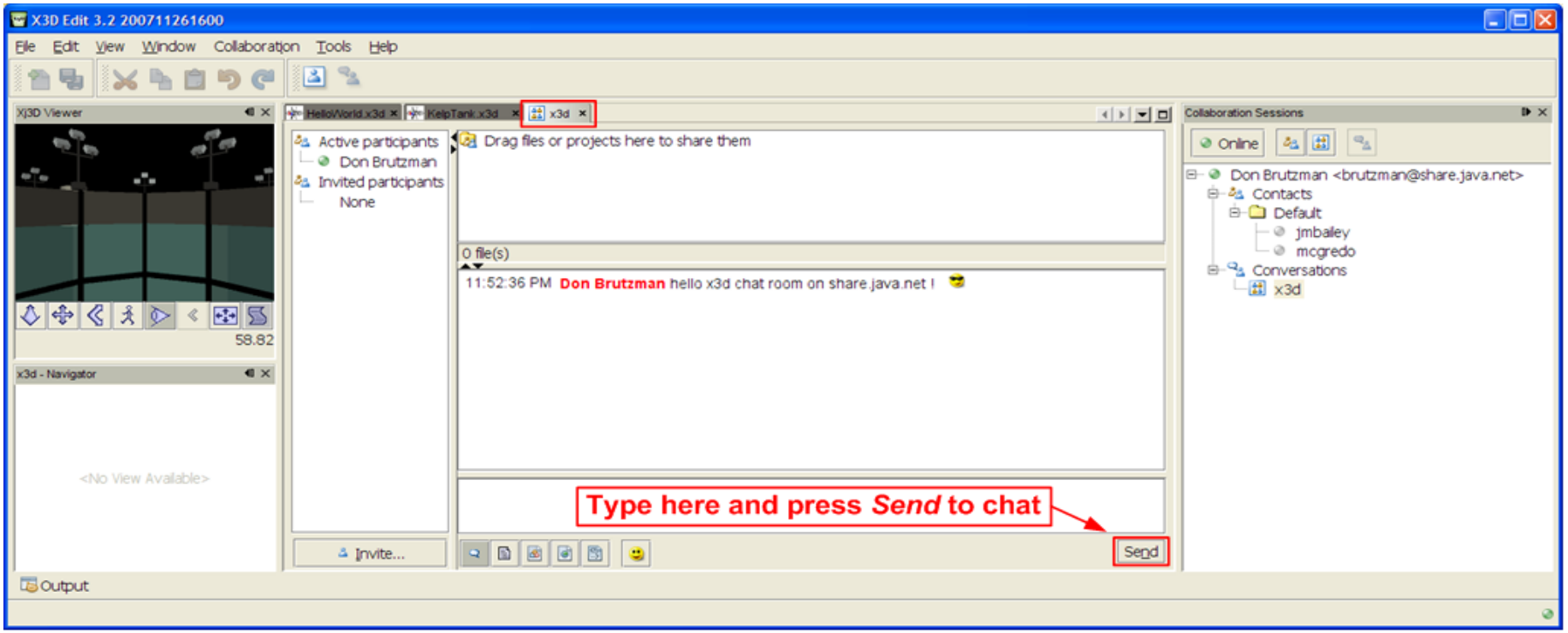
# Tool support for X3D components



# Right-click to launch external players



# X3D-Edit collaboration chat




XMPP JID for the chat channel is xmpp://x3d@muc.share.java.net

Subscription directions are provided on the installation page

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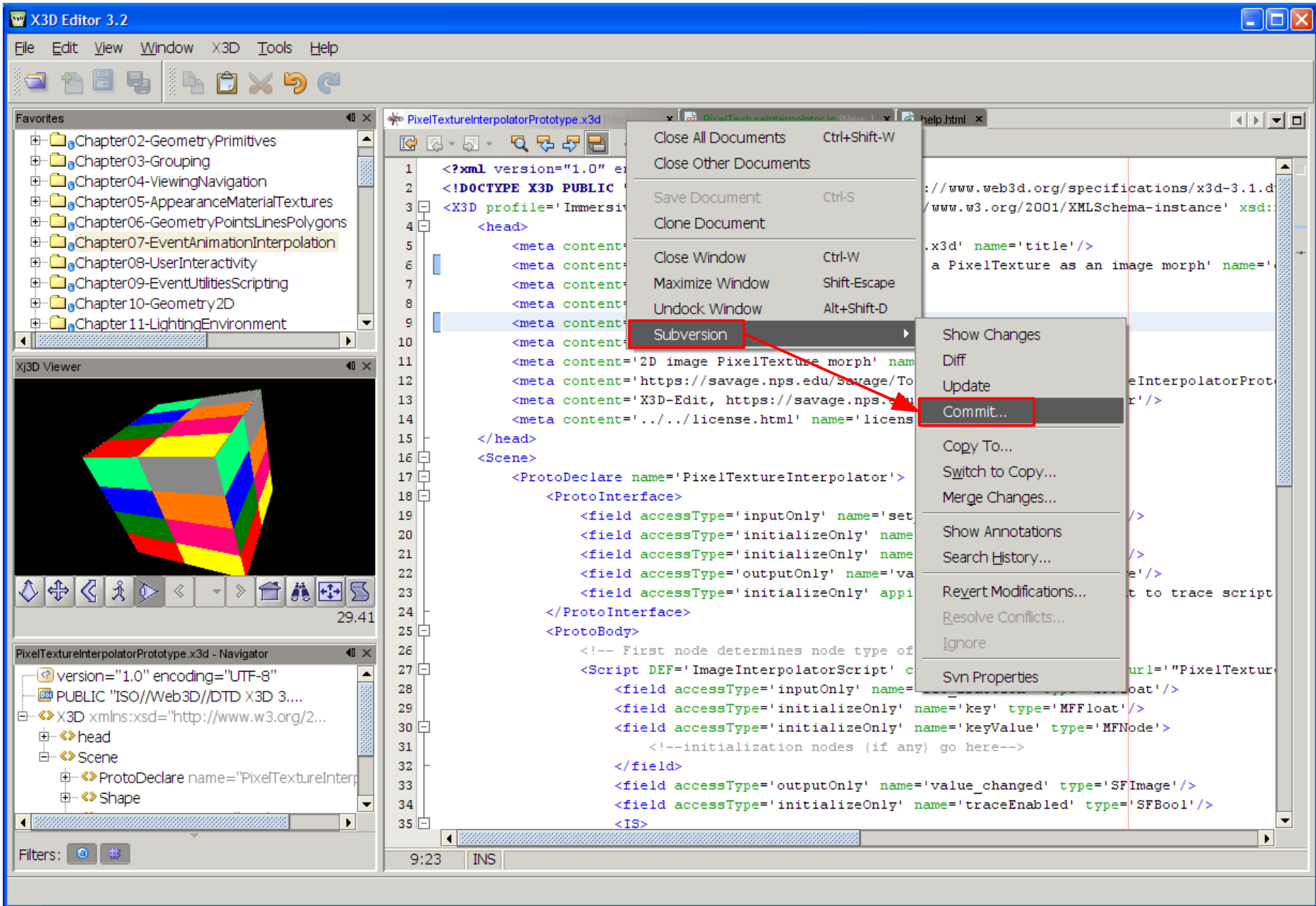
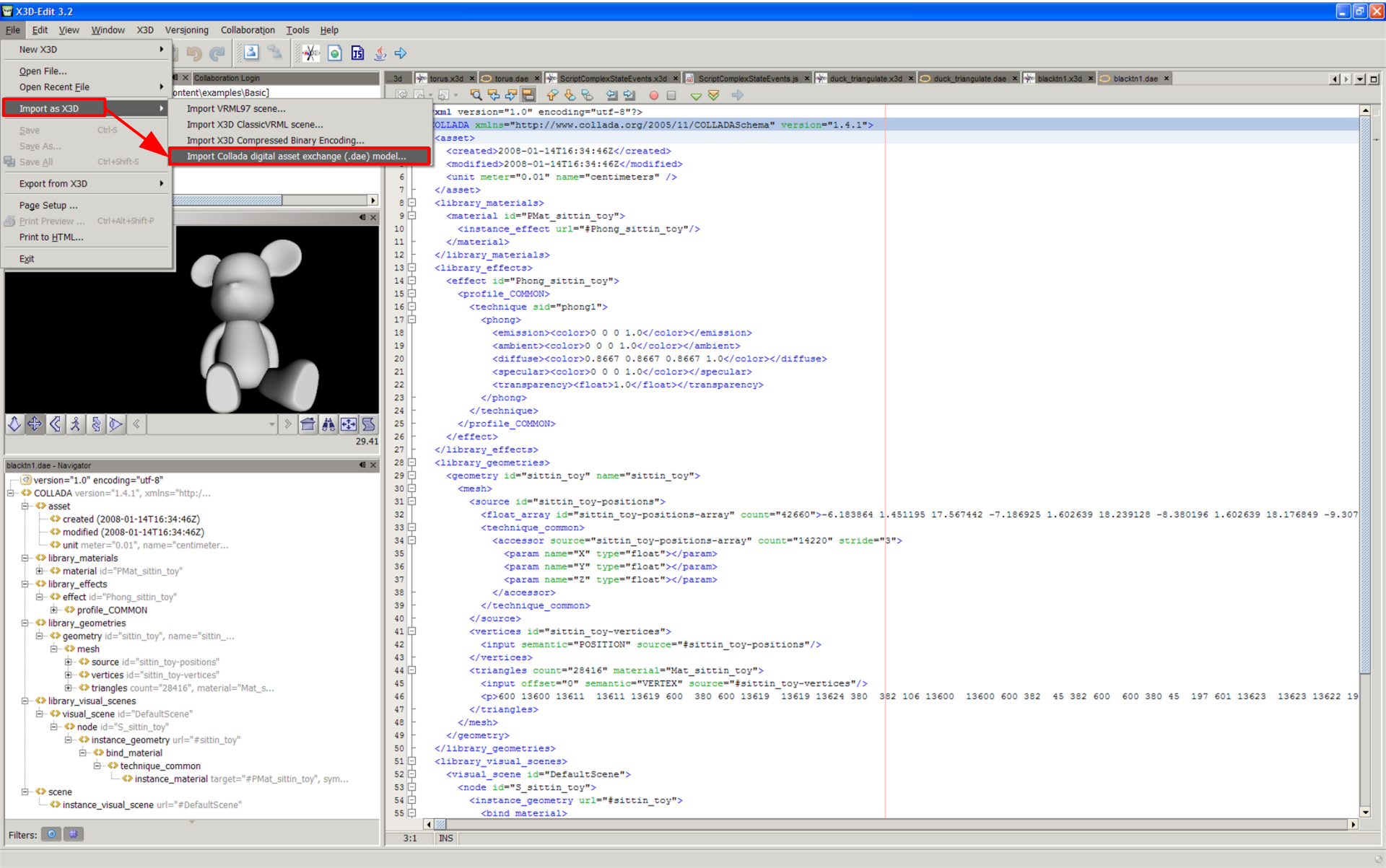
X3D

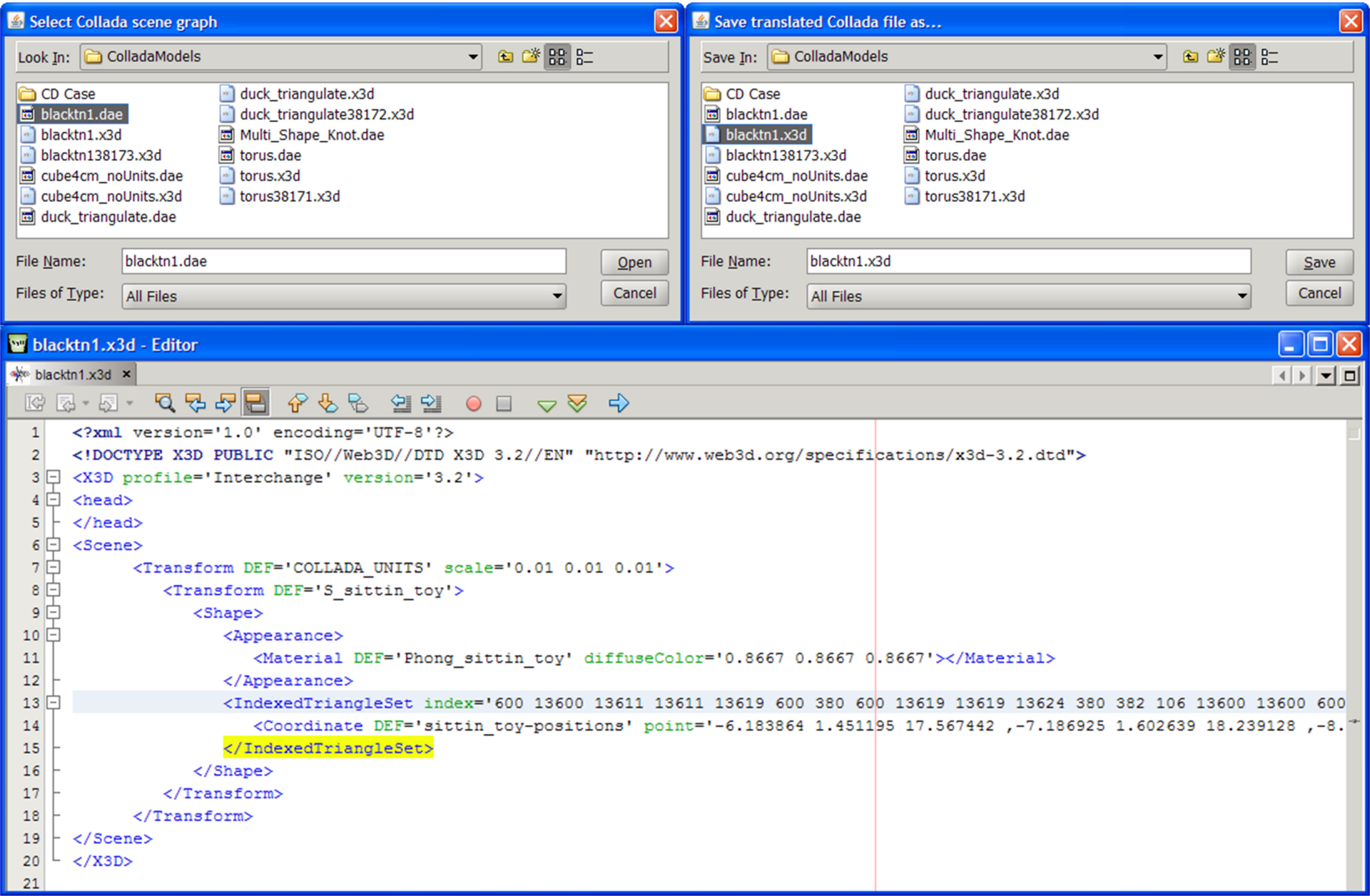
# Version control support included



# Collada .dae editing support



# Collada .dae import to X3D



# Distributed Interactive Simulation (DIS) Protocol

Long-running IEEE protocol used in military modeling + simulation applications

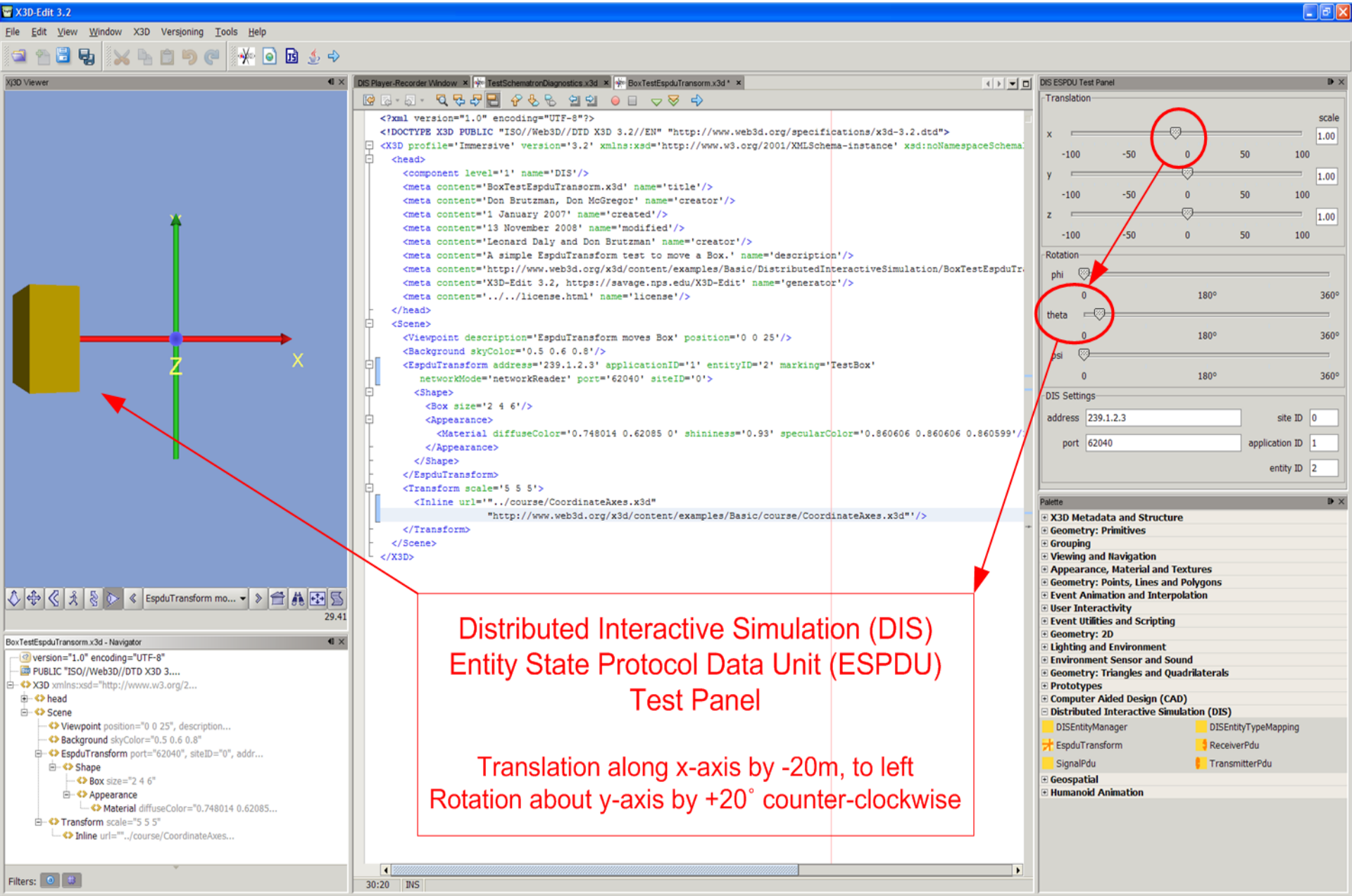
OpenDIS: open source implementations

- Java, C++
- Also DIS-XML that runs under XMPP jabber chat
- Available at Sourceforge http://sourceforge.net/projects/open-dis

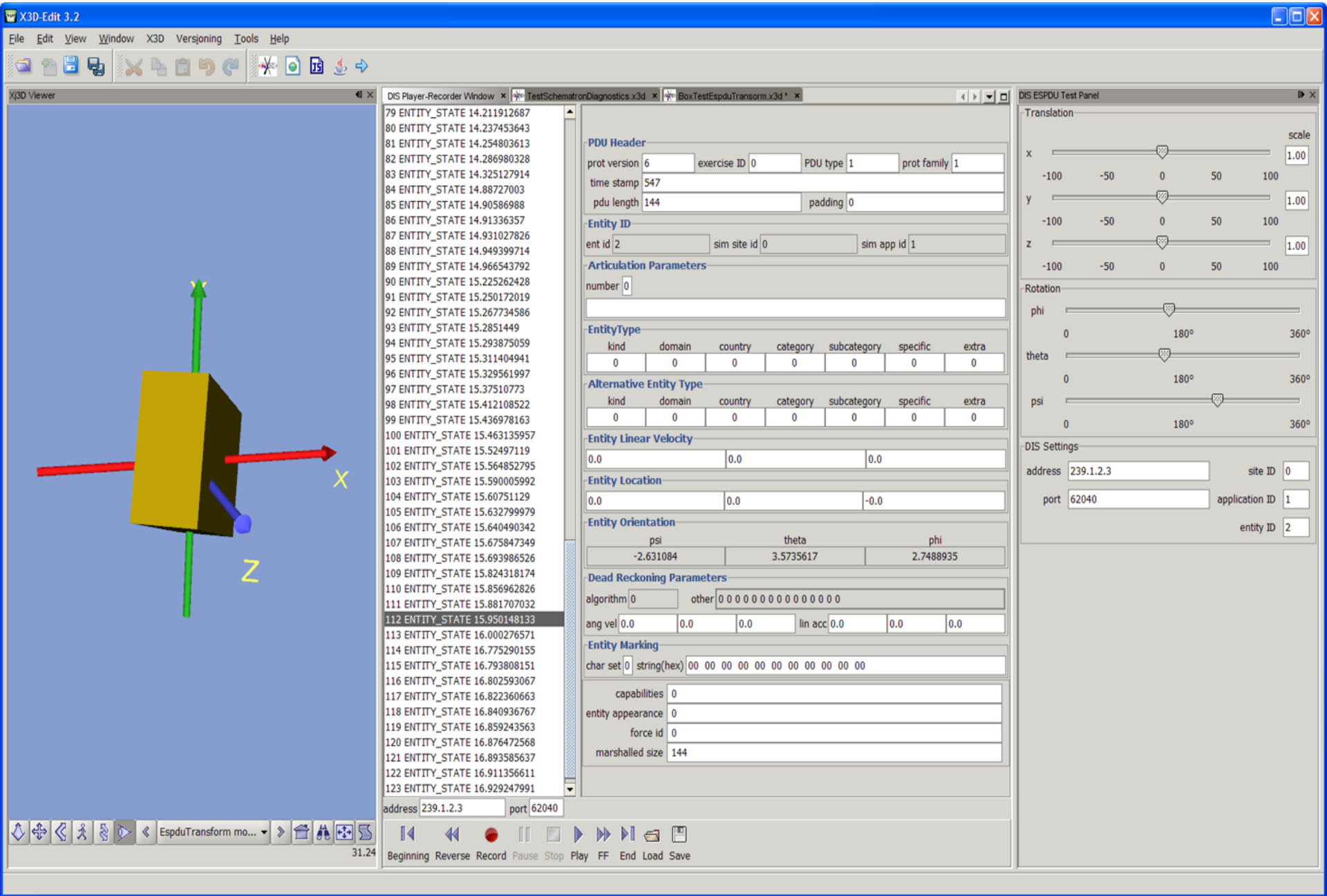
Integrate network test environment into X3D-Edit

- In progress
- Goal: aid development, testing of new protocols

# DIS Networking Test Panel

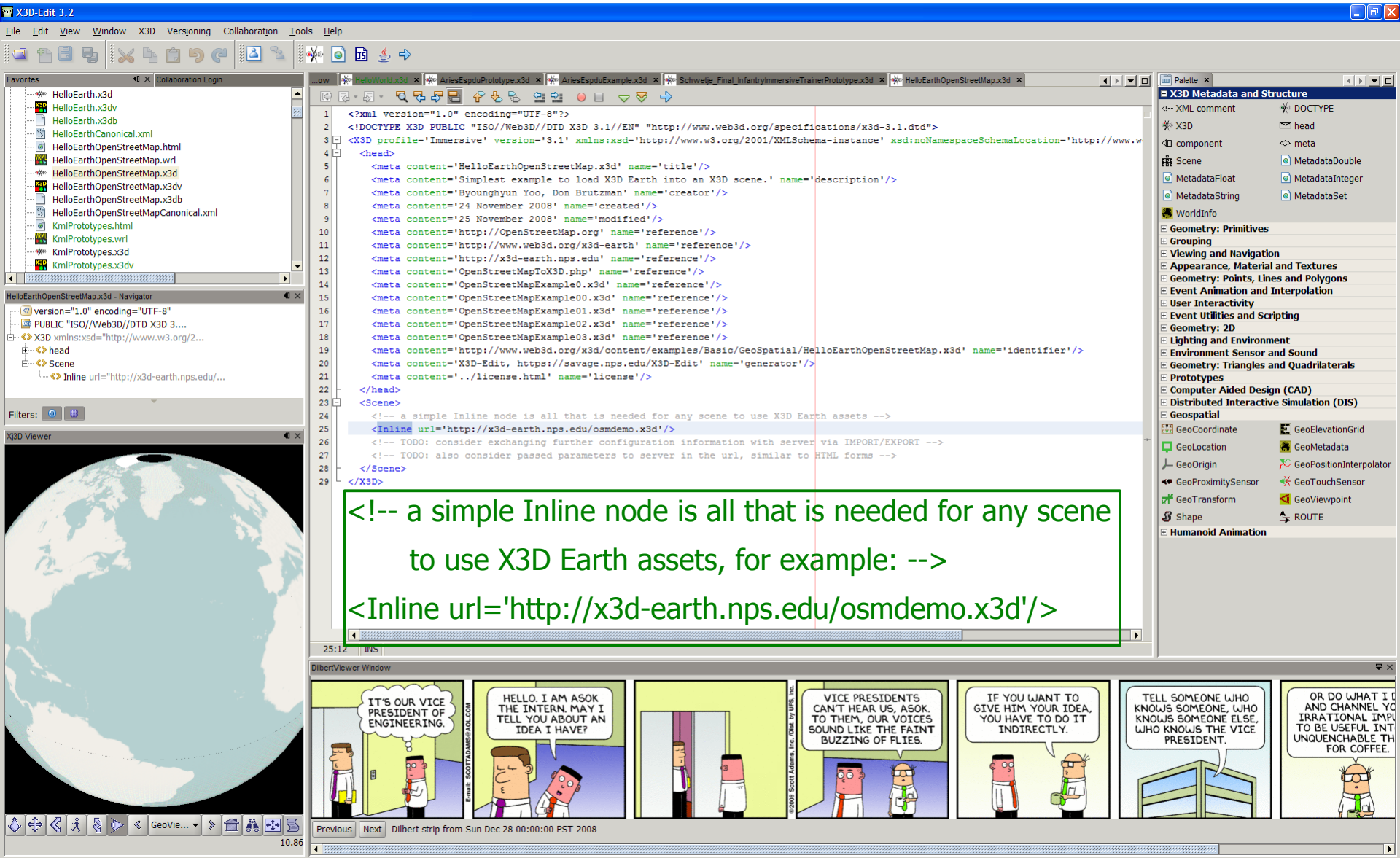


# DIS Networking Player-Recorder Panel



# X3D Earth, Geospatial Component

## Editing and authoring support provided



# Humanoid Animation (H-Anim)

ISO standard for human skeletons, skin

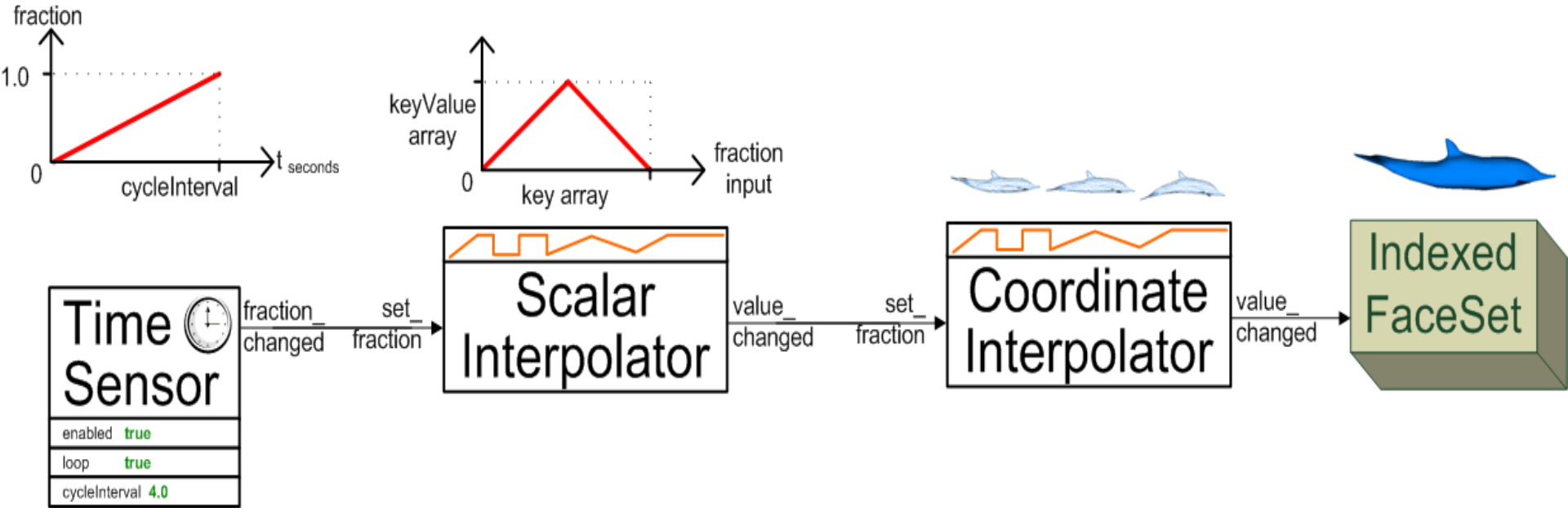
- Supported in X3D-Edit, other tools

Examining support for non-humanoid skeletons

NPS working on composable, reusable behaviors

- From motion capture (Vicon Peak system)?
- From different motion formats?

# Tool and example support




Edit CoordinateInterpolator

containerField: children

DEF: MorphInterpolator

USE:

Coordinate lists

508 coordinate(s) (column triples) | Add coordinate columns | Remove coordinate columns

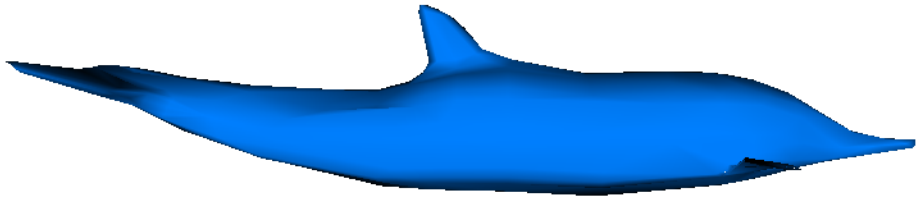
| key | | 0 | | | 1 | | | 2 | | | 3 | | | 4 | | | 5 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 0.406 | 1.049 | 7.905 | 0.595 | 2.957 | -10.3... | 0.592 | 2.263 | -10.7... | 1.246 | 2.823 | 5.21 | 1.352 | 0.918 | 5.384 | 1.336 | 3.003 | -1.028 | 1.311 |
| **0.5** | 0.406 | 0.431 | 7.729 | 0.595 | 1.561 | -10.4... | 0.592 | 0.769 | -10.4... | 1.246 | 2.58 | 5.322 | 1.352 | 0.67 | 5.216 | 1.336 | 3.003 | -1.028 | 1.311 |
| **1** | 0.406 | -0.354 | 7.585 | 0.595 | 0.257 | -10.3... | 0.592 | -0.511 | -10.1... | 1.246 | 2.012 | 5.391 | 1.352 | 0.121 | 5.105 | 1.336 | 3.003 | -1.028 | 1.311 |

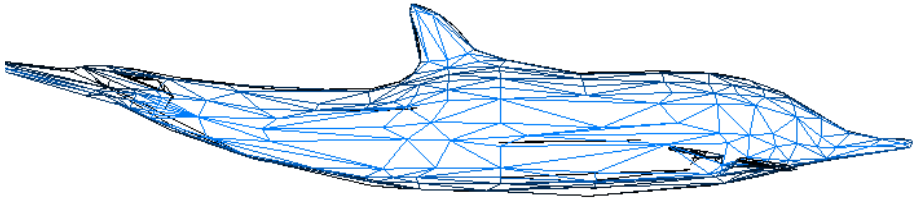
3 keyed coordinate list(s) (rows) | Add keyed coordinate list | Remove keyed coordinate list

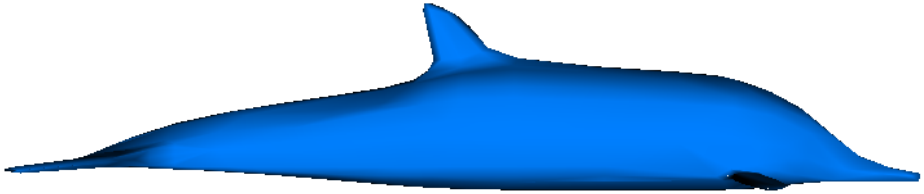
OK | Cancel | Help

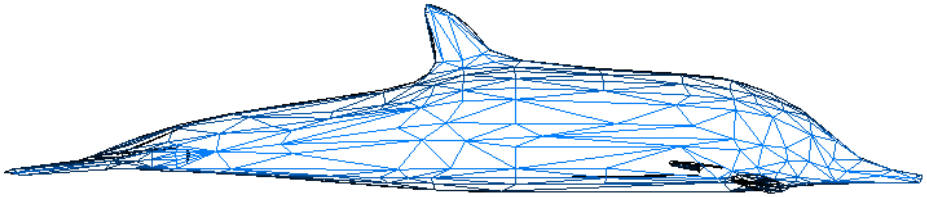
# Creating a morphable dolphin

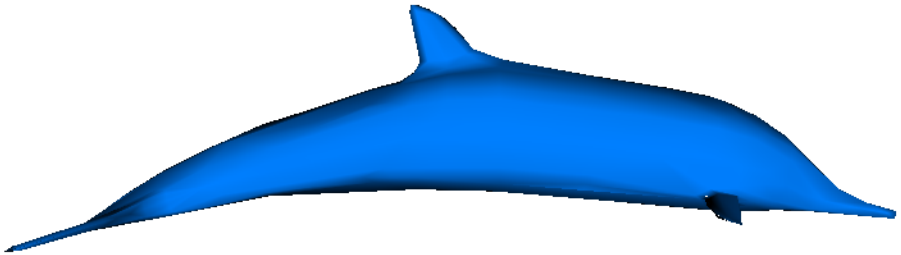
Chris Lang, Monterey High School

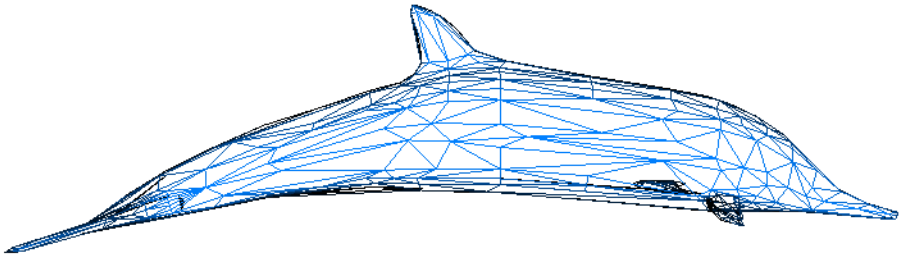












# X3D for Web Authors

Textbook, slidesets, examples, videos

http://x3dGraphics.com

e9780120885008.pdf - Adobe Reader

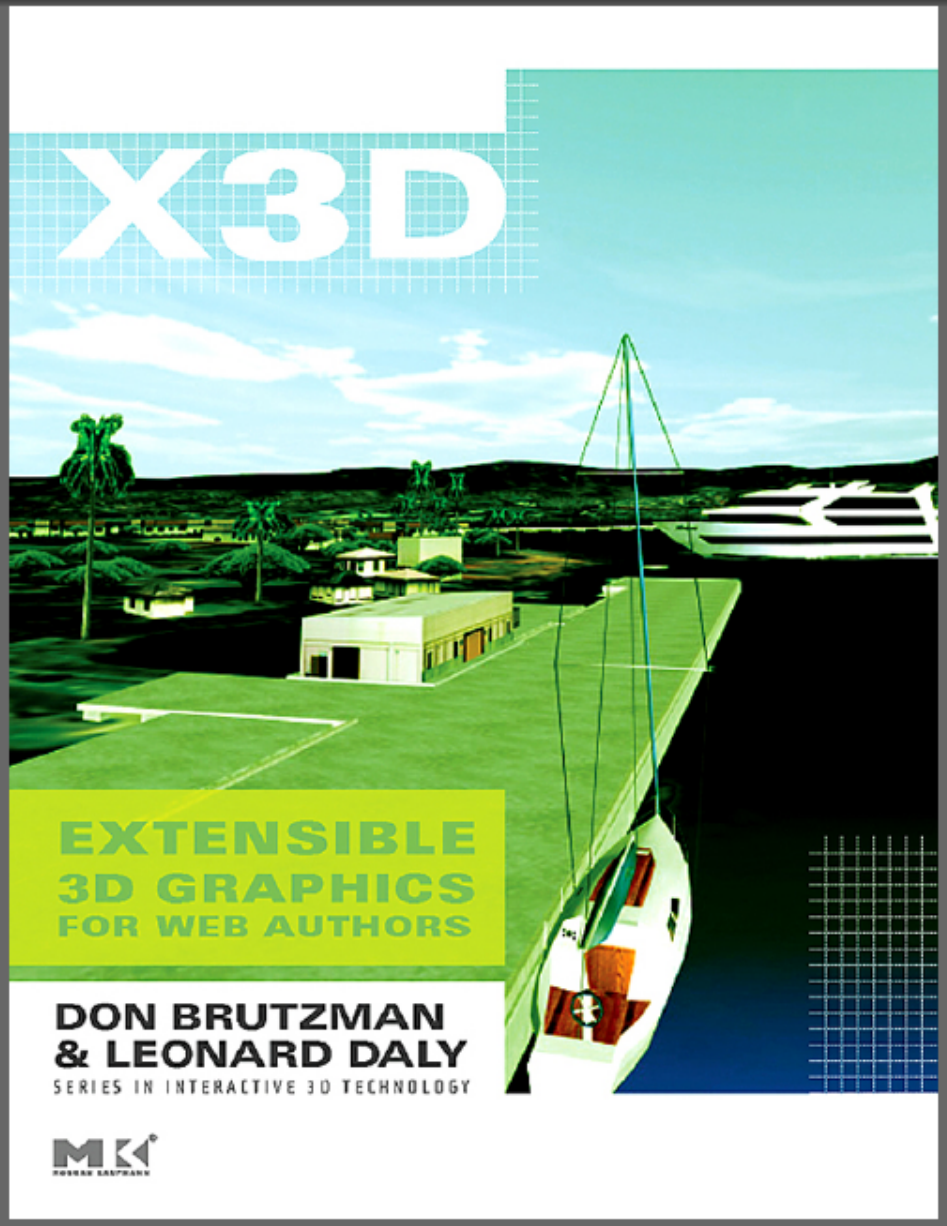
File Edit View Document Tools Window Help

Cover (1 of 471) 96.5% Find

Bookmarks

Options





# CGEMS

Computer Graphics Educational Material Source

- SIGGRAPH Education Committee
- Archives for teaching and learning 3D
- http://cgems.inesc.pt


Jury award, best submission 2008

- Book, course notes, X3D-Edit tool, examples

New learning resource:  course video podcasts!

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< X3D >

# Course Videos: X3D for Web Authors


These video lessons support the textbook X3D: Extensible 3D Graphics for Web Authors, which shows how to build and animate models using X3D.

Primary supporting materials for the book and these video lessons include the X3D-Edit authoring tool, example scenes, and chapter slidesets. Supplementary learning materials include X3D Resources, X3D Tooltips, and X3D Scene Authoring Hints.

These videos were produced as part of two Naval Postgraduate School (NPS) MOVES Institute courses: *Introduction to X3D Graphics* (MV3204) and *Advanced X3D Graphics* (MV4205). The course presenter is book coauthor Don Brutzman.

| Chapter Examples | Session | Description | .pdf |
|---|---|---|---|
| 0 | Getting Started | Goals and motivation, installing X3D-Edit authoring tool and example scenes, course introduction | slides |
| 1 | Technical Overview 1A | Introduction, historical background, Web3D Consortium, importance of standardization, X3D Specifications and International Organization of Standards (ISO), intellectual property rights (IPR) and open-source software, interoperability considerations | slides |
| | Technical Overview 1B | Browsers and players, models versus programming, scene graphs, behaviors and events, profiles and components, document metadata, fields | |
| | Technical Overview 1C | Importance of consistency, strong data typing, accessType, XML design patterns for X3D, compressed binary encoding, standards liaison organizations | |
| | Technical Overview 1D | X3D-Edit authoring tool development, functional testing, bug tracking, version control, Netbeans, help system | |
| 2 | Geometry Primitives 2A | Shape and geometry nodes, common geometry fields | slides |
| | Geometry Primitives 2B | Box and Cylinder nodes, X3D Tooltips | |
| | Geometry Primitives 2C | HelloWorld example, Cone Cylinder and Sphere nodes | |
| | Geometry Primitives 2D | Text node for flat 2D strings, launching an X3D scene into one or more external players, multiple-field MFString arrays, handling special characters using XML character entities | |
| | Geometry Primitives 2E | FontStyle node, open-source licenses | |
| 3 | Grouping 3A | Grouping node concepts, XML encoding | slides |
| | Grouping 3B | Inline node, url field | |
| | Grouping 3C | X3D resources and additional references, Inline node, url fields, level of detail (LOD) node | |
| | Grouping 3D | Switch node, review grouping node concepts, 3D grid resources | |
| 4 | Viewing Navigation 4A | Viewing, navigation, bindable nodes and binding operations example | slides |
| | Viewing Navigation 4B | Viewpoint node, viewing and navigation | |
| | Viewing Navigation 4C | NavigationInfo and Anchor nodes, uniform resource locator (url) | |
| 5 | Appearance 5A | Material and TwoSidedMaterial nodes, Universal Media materials library | slides |
| | Appearance 5B | Textures and ImageTexture node, texture coordinates, image copying and flipping to produce a continuously repeating texture, file formats | |
| | Appearance 5C | MovieTexture and PixelTexture nodes, LineProperties and FillProperties nodes | |
| | Appearance 5D | PixelTexture node, SFImage data type, PixelTexture image-import tool | |
| | Appearance 5E | More on PixelTexture node, MovieTexture node | |

# Summary

Many great resources are available for learning and using X3D

These community capabilities are good for business, educators, individuals

We welcome your active participation in Web3D Consortium

# Contact

**Don Brutzman**

*brutzman@nps.edu*

*http://web.nps.navy.mil/~brutzman*

Code USW/Br, Naval Postgraduate School
Monterey California 93943-5000 USA
1.831.656.2149 voice
1.831.656.7599 fax

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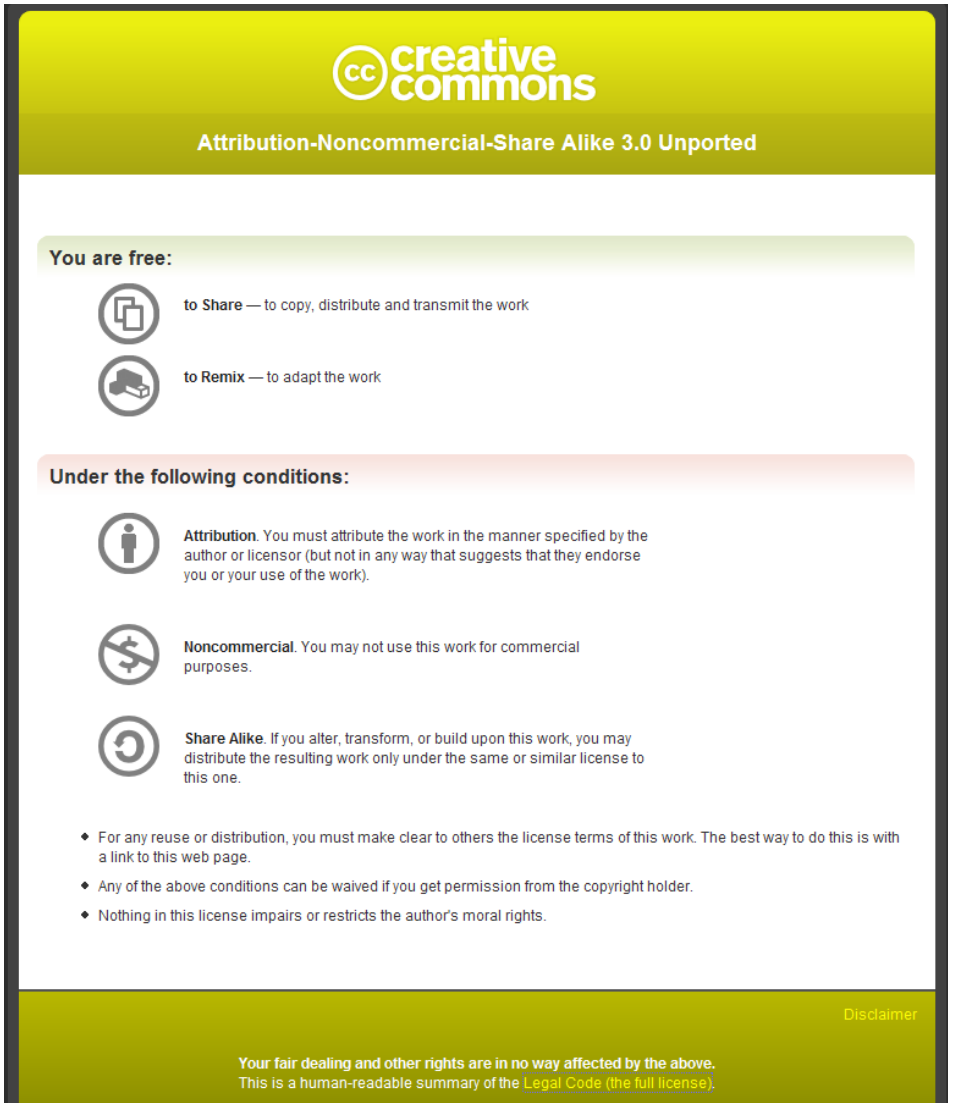
# Creative Commons open-source license

http://creativecommons.org/licenses/by-nc-sa/3.0



# Open-source license
# for X3D-Edit software and X3D example scenes

http://www.web3d.org/x3d/content/examples/license.html

X3D Graphics for Web Authors

# X3D-Edit Update

SIGGRAPH ASIA
Singapore, 10-13 December 2008

Don Brutzman
Naval Postgraduate School
Monterey California USA

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# Motivation

Teach X3D to anyone who can author HTML

Unlock all of the great work by Web3D partners

Learn by doing, help further X3D progress


# X3D Showcase DVD

Contents

- Viewers
- Examples
- Content Creation Tools
- Case Studies
- Resources
- Join Web3D Consortium


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<X3D>

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- *Naval Postgraduate School:* Byounghyun Yoo, Jeff Weekley, Don Brutzman

Sourceforge version control for easy updating


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# Teaching Goals

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Book and slideset goals include

- Show Web authors experienced with HTML and XML how to build and connect X3D models
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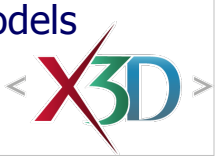


Excerpted and adapted from Chapter 1, *X3D Graphics for Web Authors*

http://x3dGraphics.com

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- Strictly defined test examples for correct operation

*VRML 2.0 Sourcebook* 269 models

- Textbook on VRML97, examples converted to X3D

*Savage* 1226 models

- Open-source military models and tools

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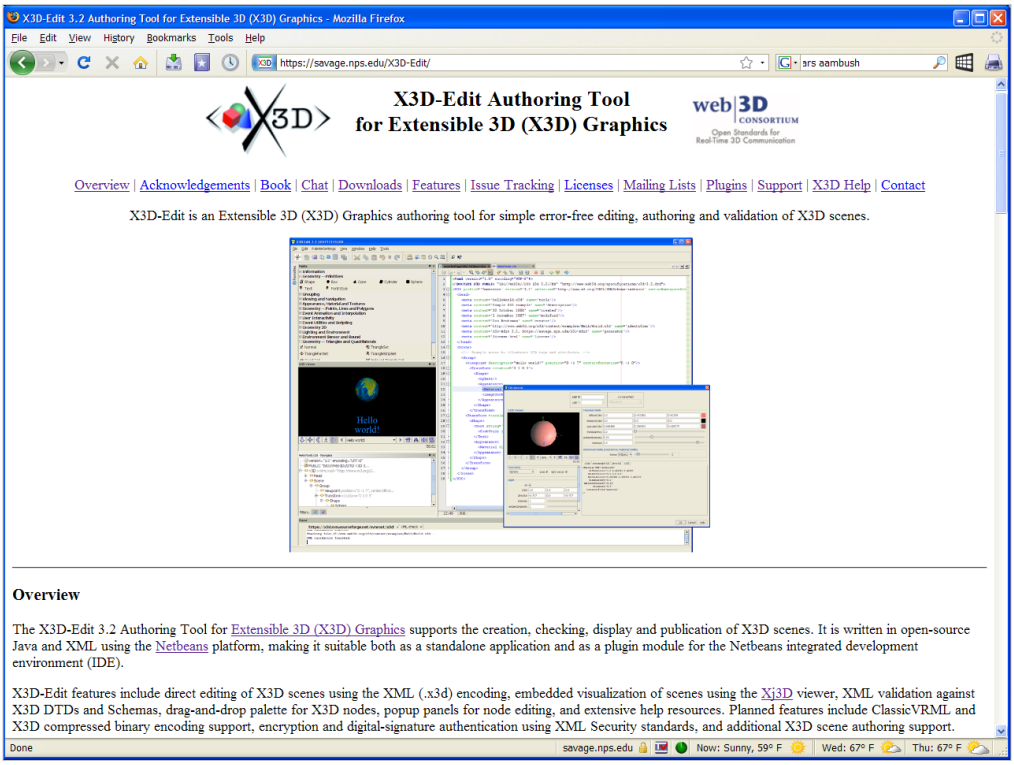
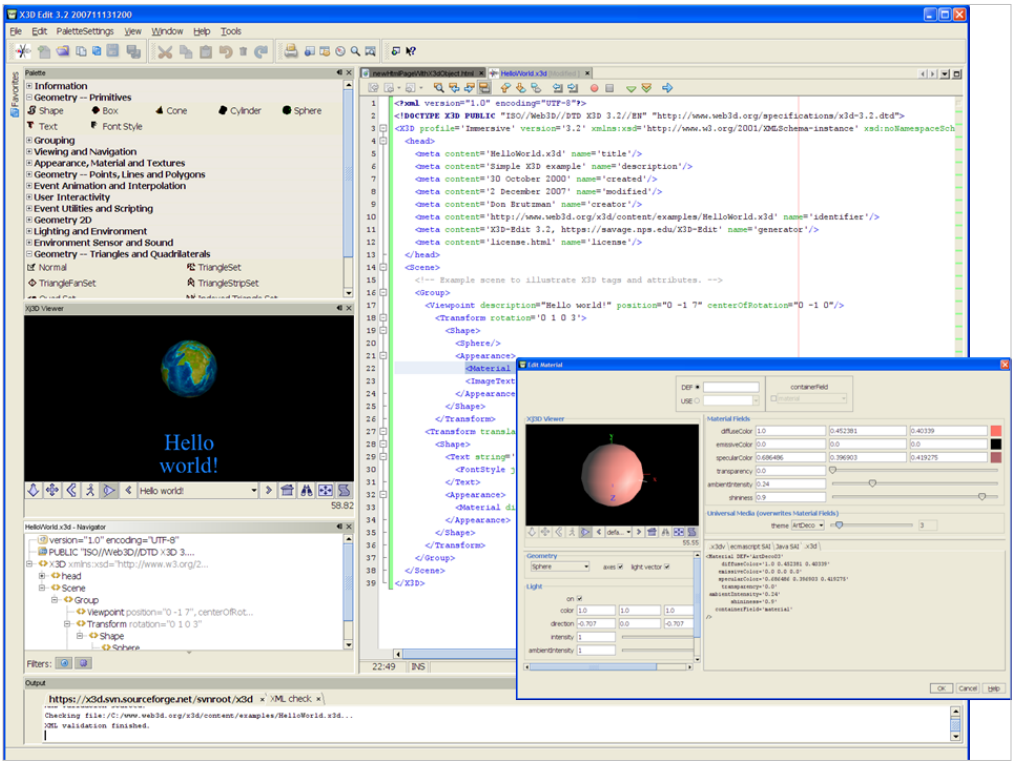
3100+ models available




X3D-Edit home page is online at https://savage.nps.edu/X3D-Edit



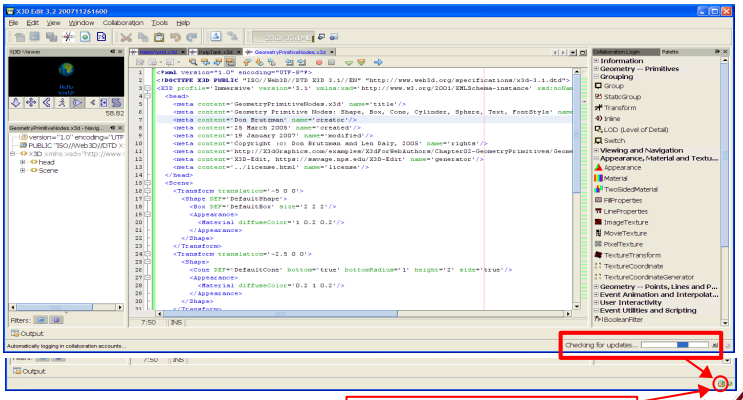

As the name implies, X3D-Edit is primarily oriented towards editing X3D text. Additional features include:

- Pop-up editors for each node
- Palette for dragging/dropping new nodes
- Xj3D scene visualization
- XML tree view
- Automatic code completion and element matching
- Validation and error checking
- Help system including multilingual tooltips, X3D specifications, examples help and X3D Scene Authoring Hints
- Automatic updates

https://savage.nps.edu/X3D-Edit

# X3D-Edit updates

Icon in lower-left corner of screen indicates when updates are available for automatic installation

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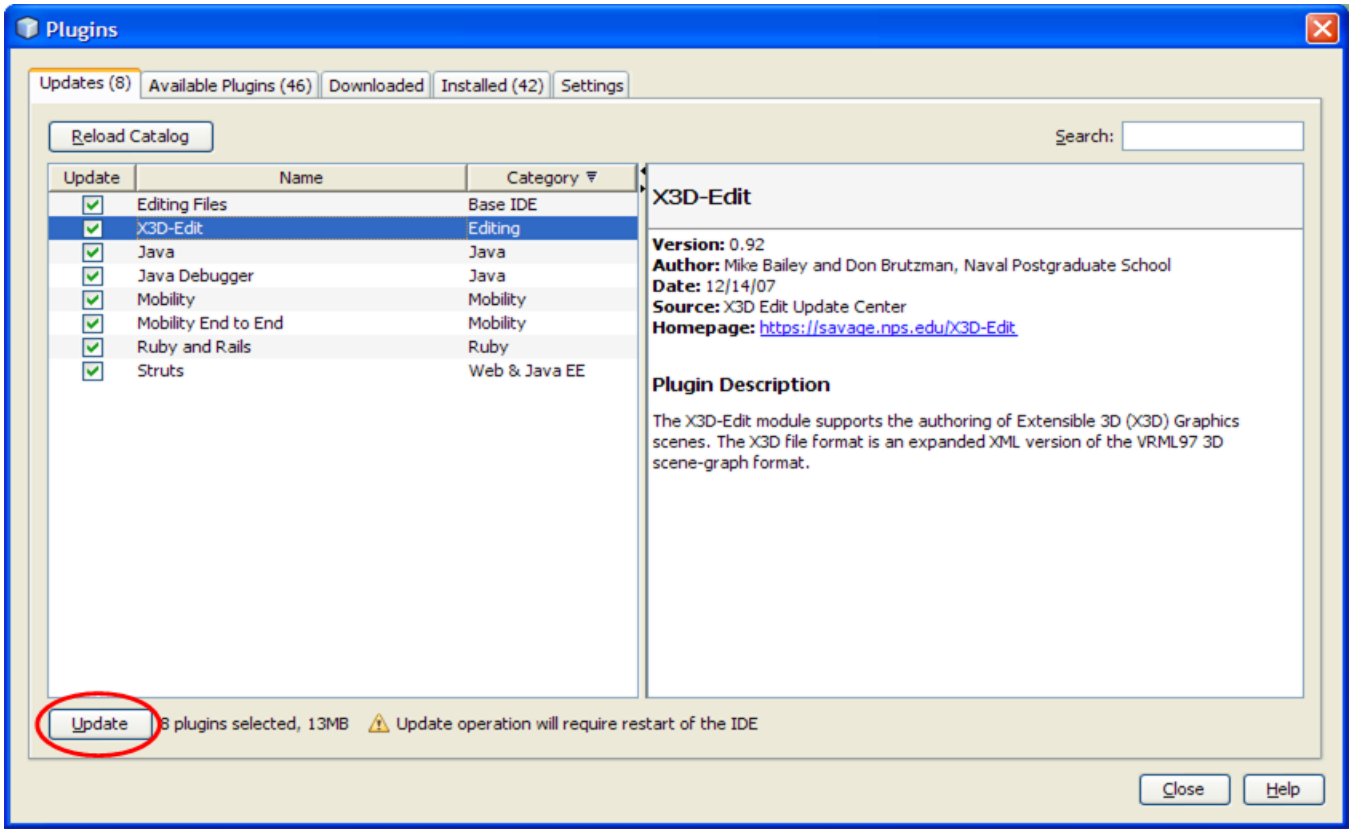
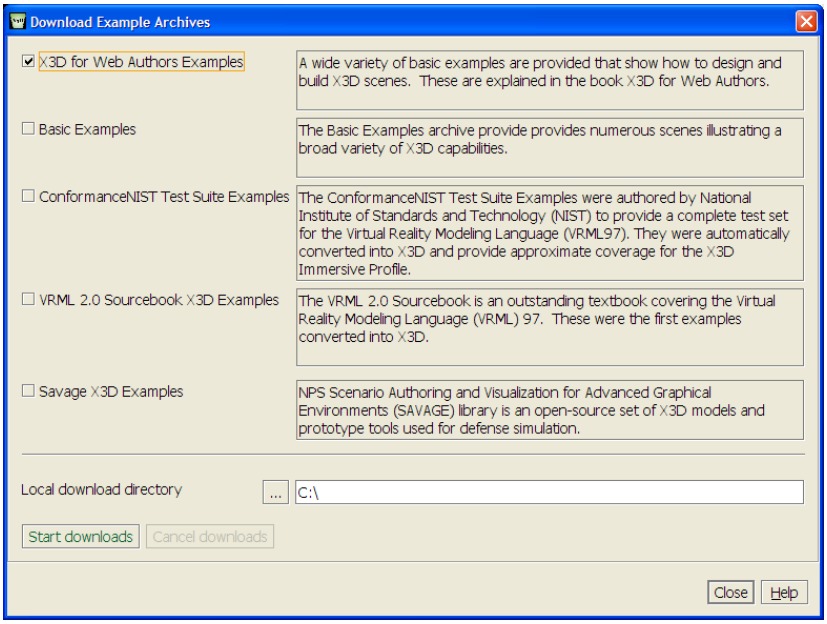
It is also possible to manually trigger an X3D-Edit update, if one is available.

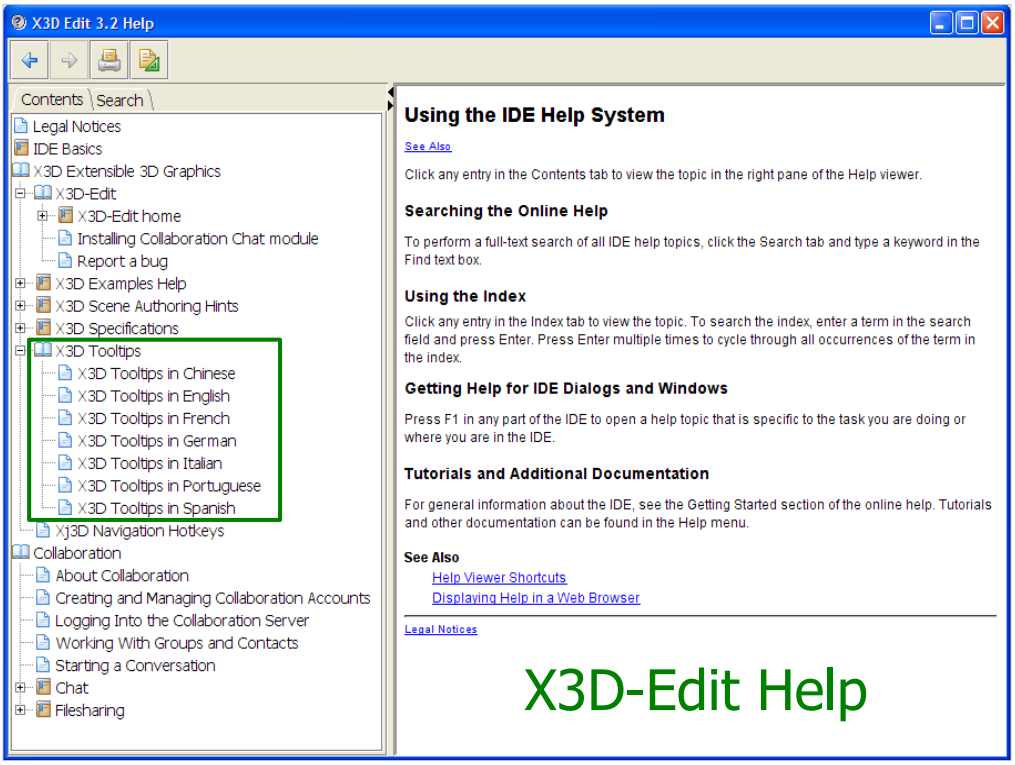
From top menu, select *Tools* > *Plugins* > *Updates* and then click the Update button.



## X3D Examples download panel, X3D-Edit




X3D-Edit includes this download panel. Select the top-level *Examples* menu, then *Download X3D Example Archives*.




F1 or the Help menu launches the JavaHelp system.

# Viewing alternatives for X3D

Default built-in viewer is open-source Xj3D

- High performance, implemented using Java OpenGL

Can launch current scene into web browser

- Displays using any of your installed plugins
- "Launch all viewers" simplifies comparison testing

Can also launch into standalone applications

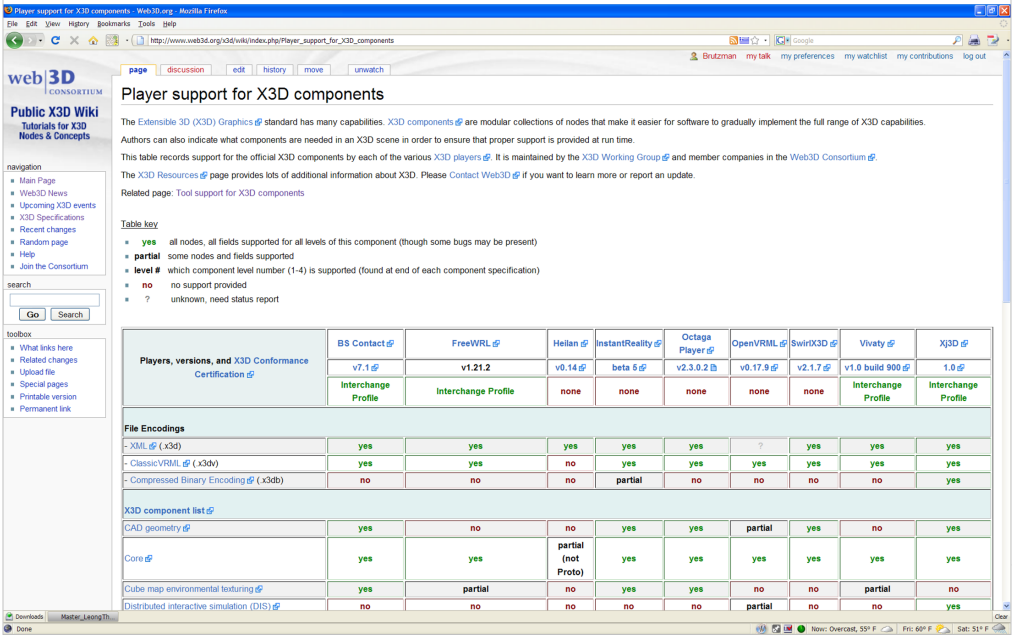
- Configuration panel simplifies download, install



http://www.xj3d.org

http://www.web3d.org/x3d/content/examples/help.html#Applications

# Player support for X3D components



Player support for X3D components - Web3D.org - Mozilla Firefox

http://www.web3d.org/x3d/wiki/index.php/Player_support_for_X3D_components

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Public X3D Wiki
Tutorials for X3D
Nodes & Concepts

page | discussion | edit | history | move | unwatch

## Player support for X3D components

The Extensible 3D (X3D) Graphics standard has many capabilities. X3D components are modular collections of nodes that make it easier for software to gradually implement the full range of X3D capabilities.

Authors can also indicate what components are needed in an X3D scene in order to ensure that proper support is provided at run time.

This table records support for the official X3D components by each of the various X3D players. It is maintained by the X3D Working Group and member companies in the Web3D Consortium.

The X3D Resources page provides lots of additional information about X3D. Please Contact Web3D if you want to learn more or report an update.

Related page: Tool support for X3D components

Table key

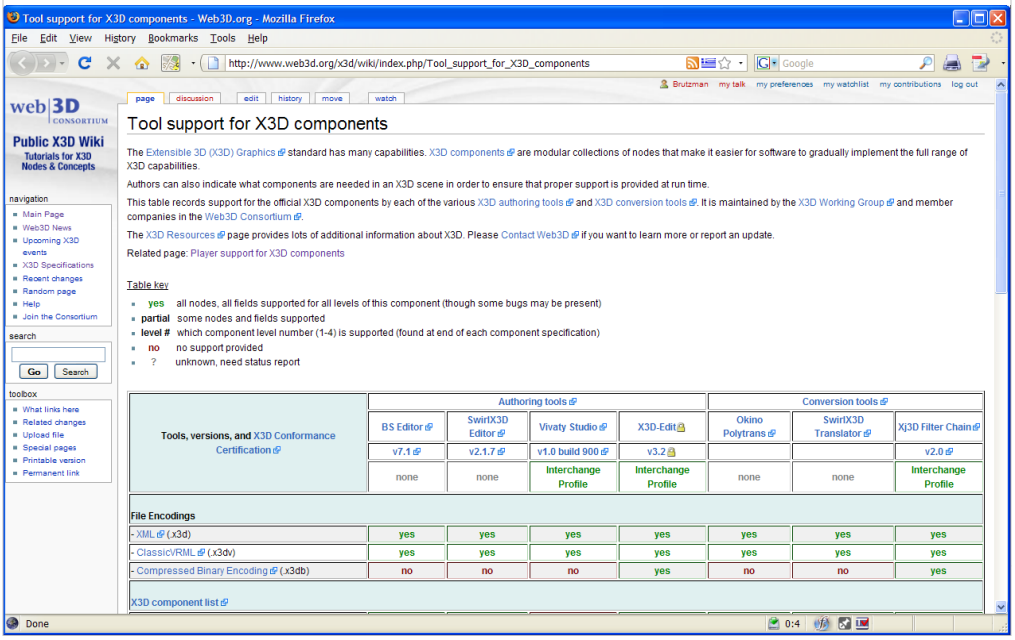
- **yes** all nodes, all fields supported for all levels of this component (though some bugs may be present)
- **partial** some nodes and fields supported
- **level #** which component level number (1-4) is supported (found at end of each component specification)
- **no** no support provided
- ? unknown, need status report

| Players, versions, and X3D Conformance Certification | BS Contact | FreeWRL | Heilan | InstantReality | Octaga Player | OpenVRML | SwirlX3D | Vivaty | Xj3D |
|---|---|---|---|---|---|---|---|---|---|
| | v7.1 | v1.21.2 | v0.14 | beta 5 | v2.3.0.2 | v0.17.9 | v2.1.7 | v1.0 build 900 | 1.0 |
| | Interchange Profile | Interchange Profile | none | none | none | none | none | Interchange Profile | Interchange Profile |
| **File Encodings** | | | | | | | | | |
| - XML (.x3d) | yes | yes | yes | yes | yes | ? | yes | yes | yes |
| - ClassicVRML (.x3dv) | yes | yes | no | yes | yes | yes | yes | yes | yes |
| - Compressed Binary Encoding (.x3db) | no | no | no | partial | no | no | no | no | yes |
| **X3D component list** | | | | | | | | | |
| CAD geometry | yes | no | no | yes | yes | partial | yes | no | yes |
| Core | yes | yes | partial (not Proto) | yes | yes | yes | yes | yes | yes |
| Cube map environmental texturing | yes | partial | no | yes | yes | no | no | partial | no |
| Distributed interactive simulation (DIS) | no | no | no | no | no | partial | no | no | yes |

Accessed 13 December 2008

http://www.web3d.org/x3d/wiki/index.php/Player_support_for_X3D_components

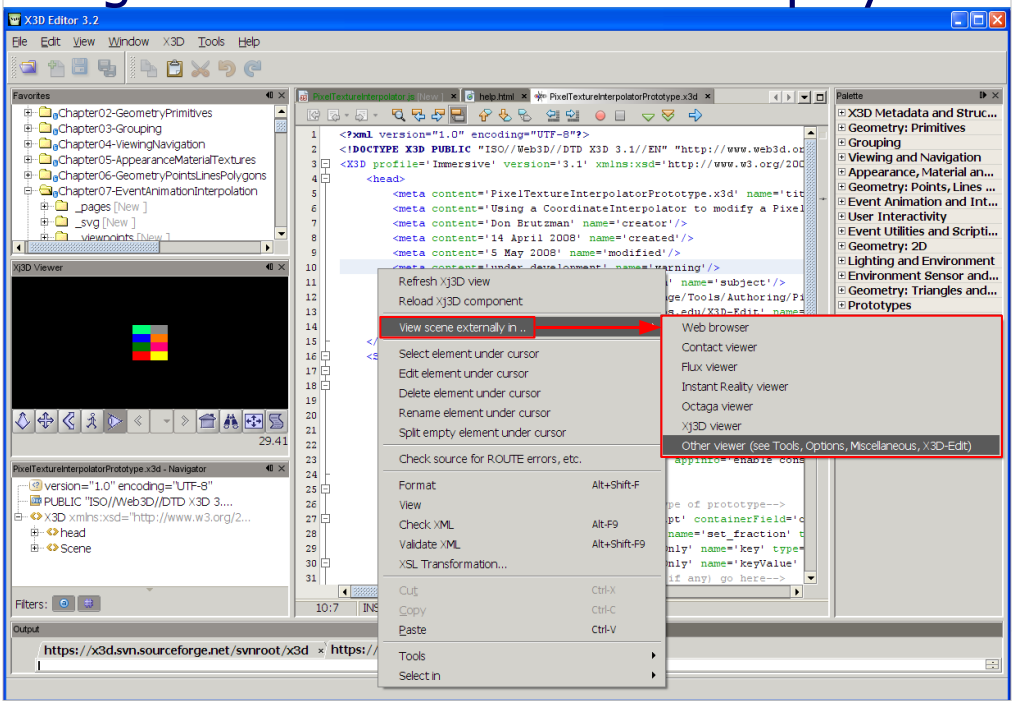
# Tool support for X3D components



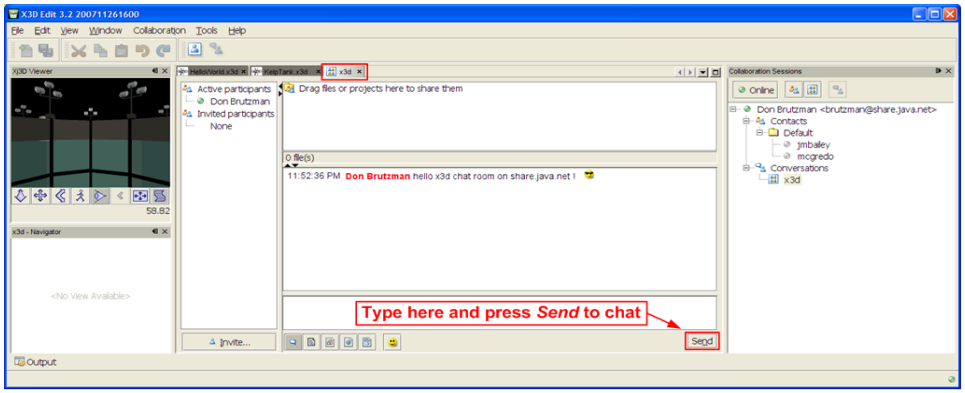

Accessed 13 December 2008

http://www.web3d.org/x3d/wiki/index.php/Tool_support_for_X3D_components

# Right-click to launch external players



# X3D-Edit collaboration chat




XMPP JID for the chat channel is xmpp://x3d@muc.share.java.net

Subscription directions are provided on the installation page

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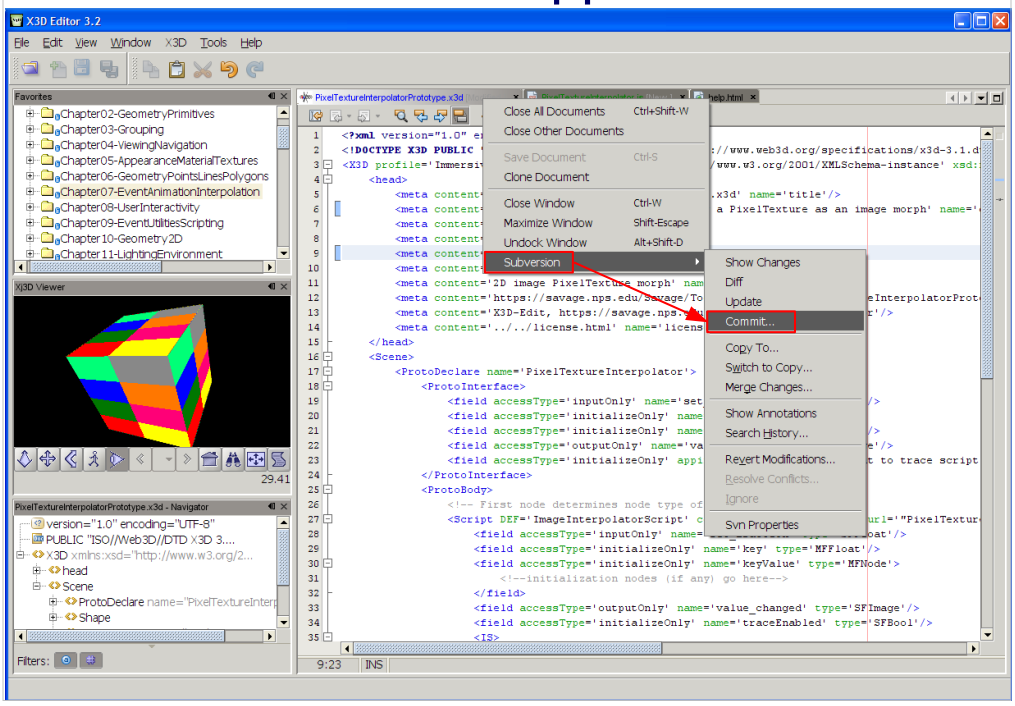
X3D-Edit collaboration chat installation page available at

- https://savage.nps.edu/X3D-Edit/XmppChatCollaborationModule.html

# Version control support included

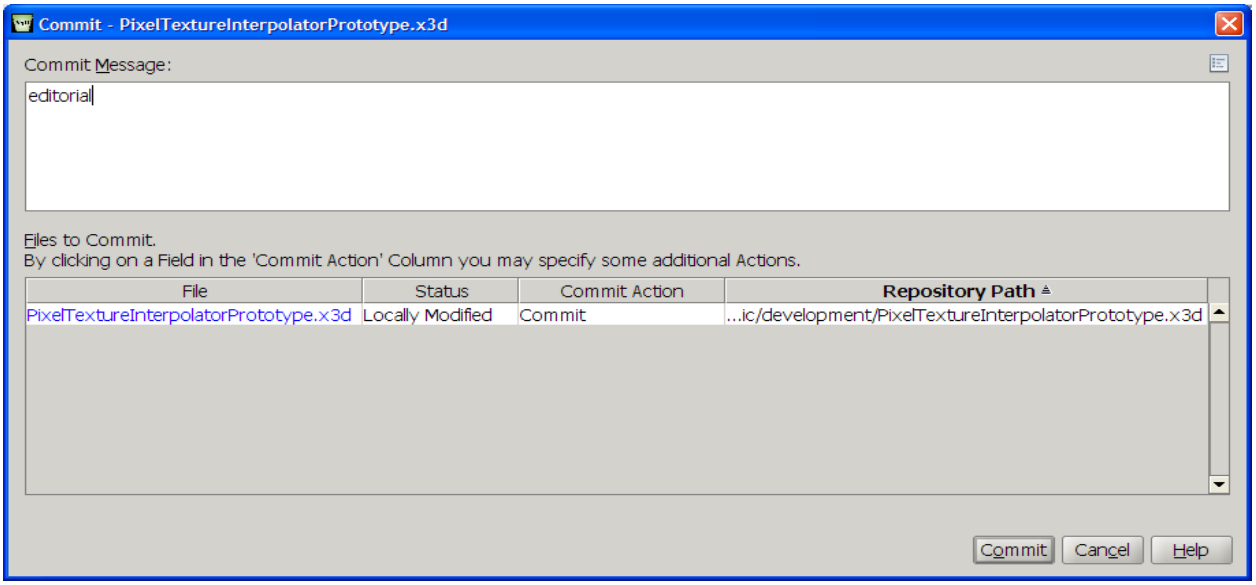



Version control allows multiple authors to share updates and work together. Prerequisite: you must have the Collabnet subversion client installed.

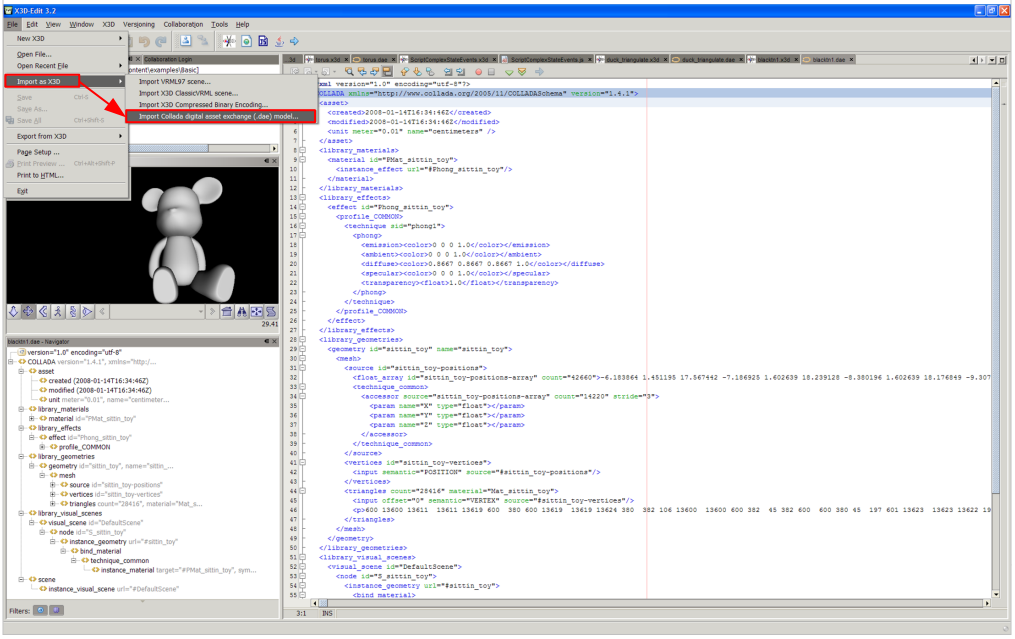
If the file being edited is under version control, the Netbeans platform detects that and offers Subversion or CVS version control (as appropriate) without further setup.

Developers can work with X3D-Edit directly to update, diff (difference compare) and commit any file changes. X3D-Edit 3.2 subversion master source is at

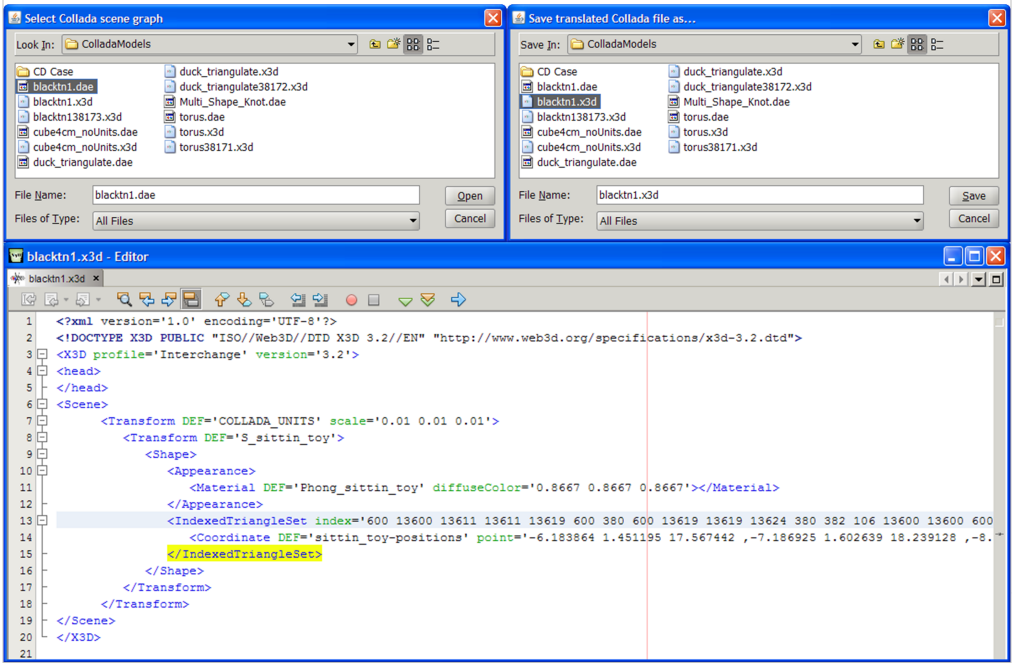
http://x3d.svn.sourceforge.net/viewvc/x3d/www.web3d.org/x3d/tools/X3dEdit3.2



# Collada .dae editing support



# Collada .dae import to X3D



## Distributed Interactive Simulation (DIS) Protocol

Long-running IEEE protocol used in military modeling + simulation applications

OpenDIS: open source implementations

- Java, C++
- Also DIS-XML that runs under XMPP jabber chat
- Available at Sourceforge http://sourceforge.net/projects/open-dis

Integrate network test environment into X3D-Edit

- In progress
- Goal: aid development, testing of new protocols

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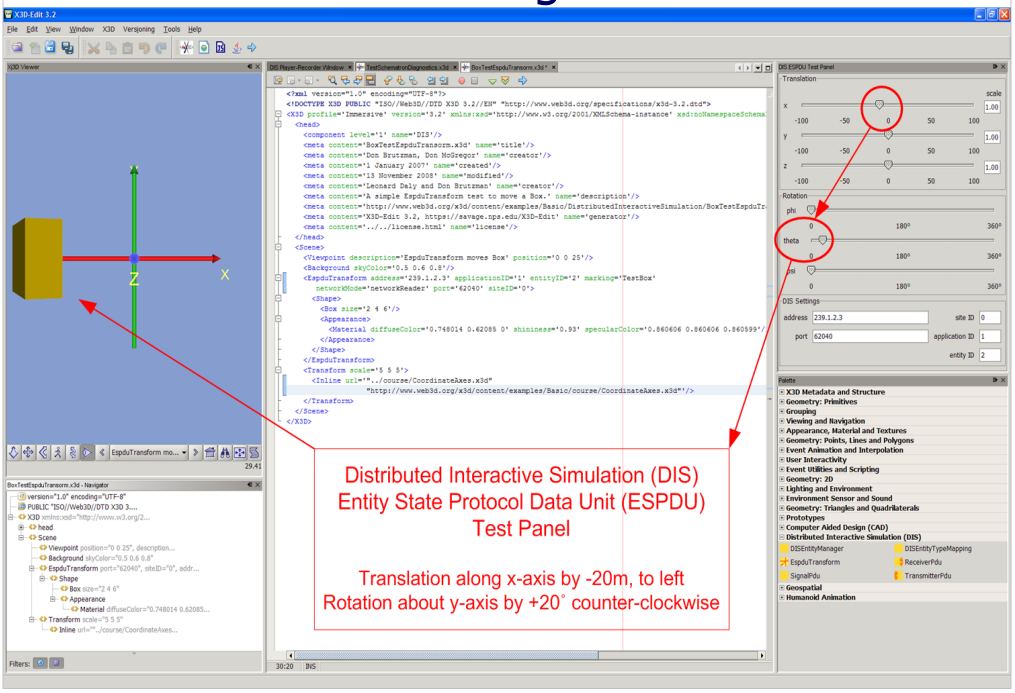
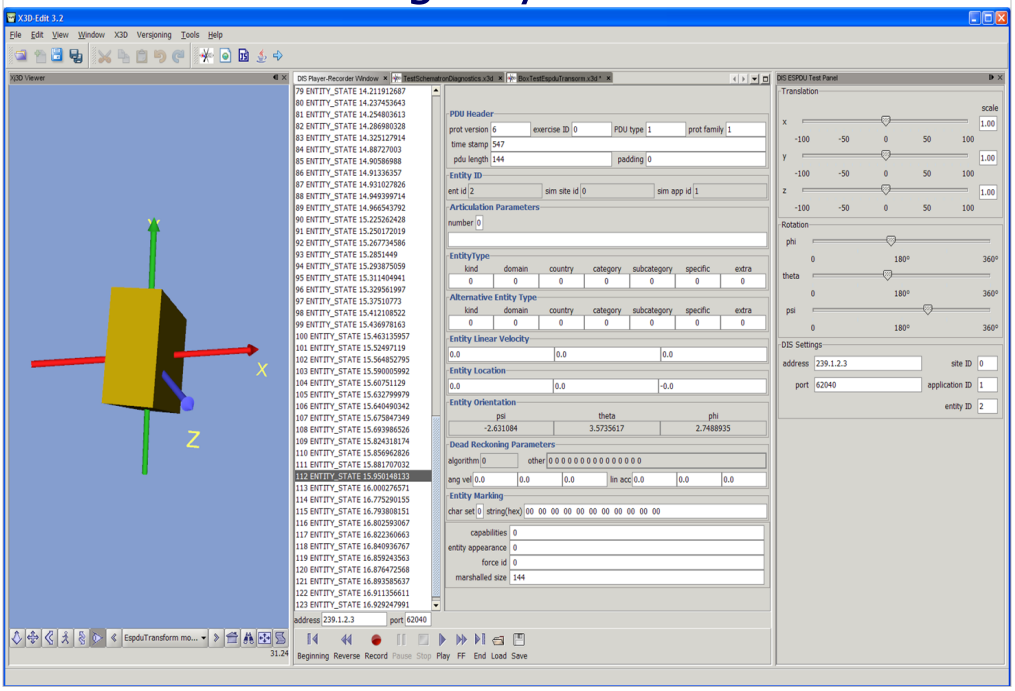
# DIS Networking Test Panel

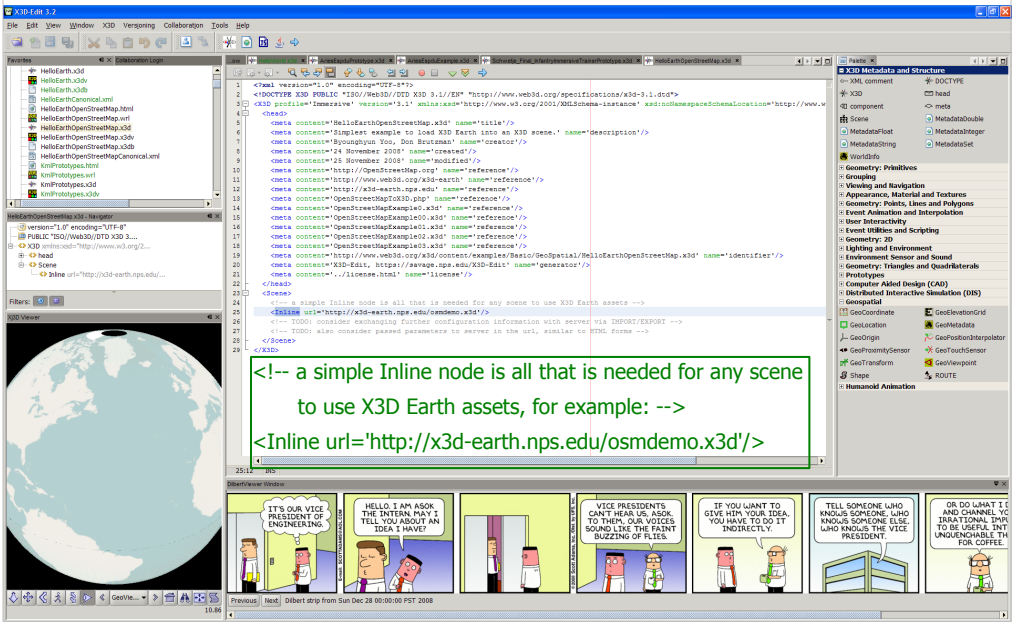


# DIS Networking Player-Recorder Panel



# X3D Earth, Geospatial Component

## Editing and authoring support provided



# Humanoid Animation (H-Anim)

ISO standard for human skeletons, skin

- Supported in X3D-Edit, other tools

Examining support for non-humanoid skeletons

NPS working on composable, reusable behaviors

- From motion capture (Vicon Peak system)?
- From different motion formats?

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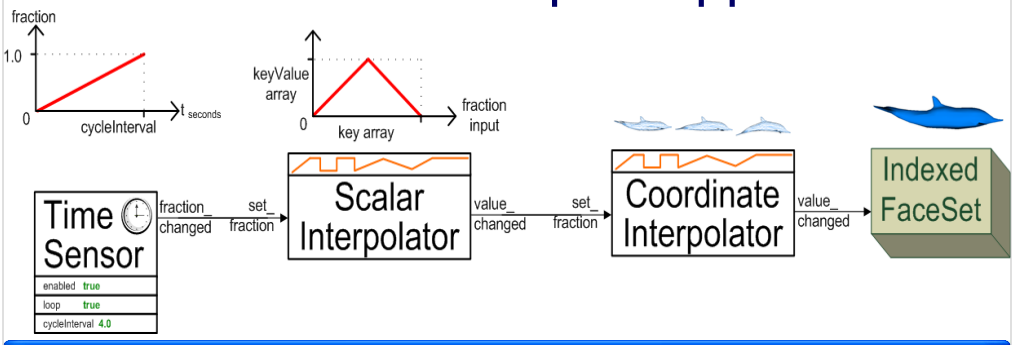
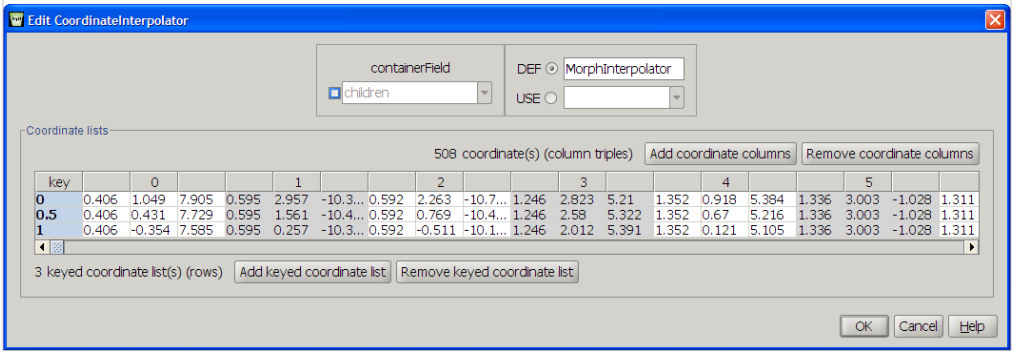
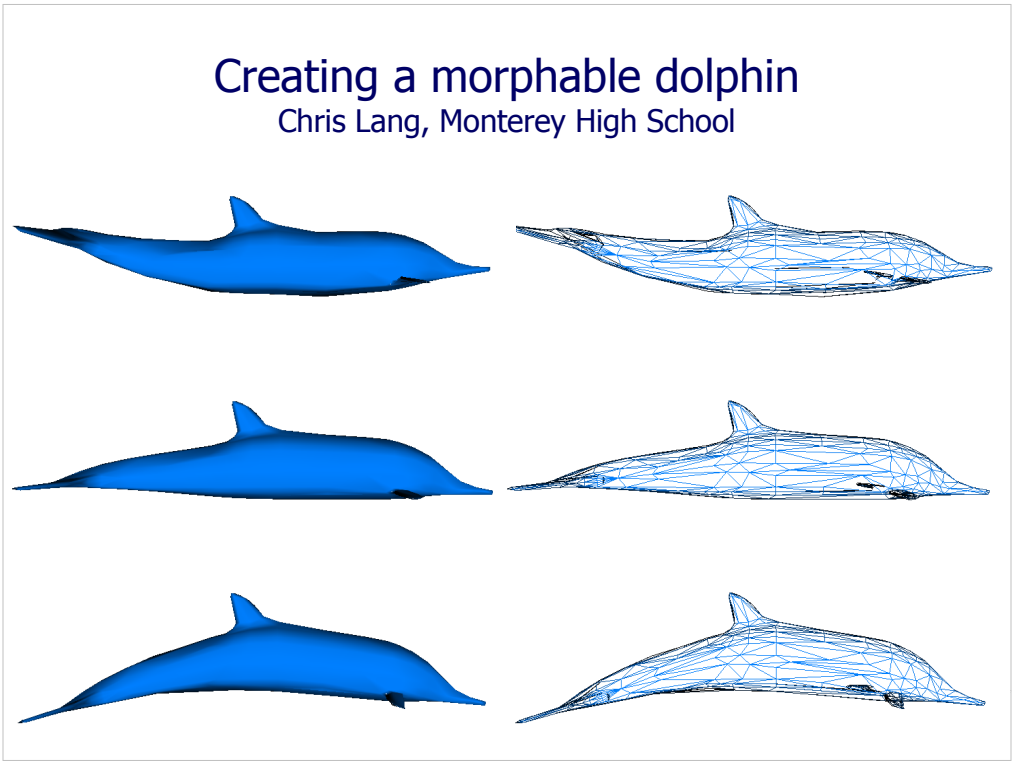
# Tool and example support






https://savage.nps.edu/Savage/Biologics/Dolphin/DolphinPose02.x3d
https://savage.nps.edu/Savage/Biologics/Dolphin/DolphinPose01.x3d
https://savage.nps.edu/Savage/Biologics/Dolphin/DolphinPose03.x3d

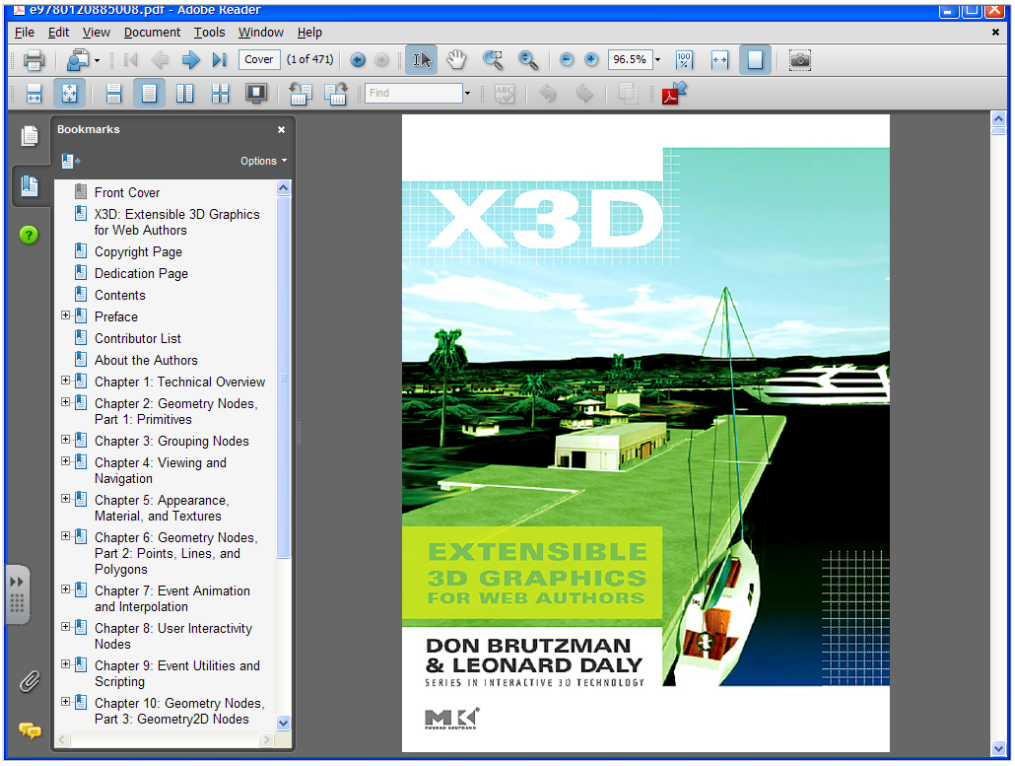
X3jD viewer wireframe mode is toggled with key Alt-w

back to Table of Contents

# X3D for Web Authors

Textbook, slidesets, examples, videos

http://x3dGraphics.com



e9780120885008.pdf - Adobe Reader
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Cover (1 of 471)
96.5%
Find
Bookmarks
Options
Front Cover
X3D: Extensible 3D Graphics for Web Authors
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Dedication Page
Contents
Preface
Contributor List
About the Authors
Chapter 1: Technical Overview
Chapter 2: Geometry Nodes, Part 1: Primitives
Chapter 3: Grouping Nodes
Chapter 4: Viewing and Navigation
Chapter 5: Appearance, Material, and Textures
Chapter 6: Geometry Nodes, Part 2: Points, Lines, and Polygons
Chapter 7: Event Animation and Interpolation
Chapter 8: User Interactivity Nodes
Chapter 9: Event Utilities and Scripting
Chapter 10: Geometry Nodes, Part 3: Geometry2D Nodes
X3D
EXTENSIBLE
3D GRAPHICS
FOR WEB AUTHORS
DON BRUTZMAN
& LEONARD DALY
SERIES IN INTERACTIVE 3D TECHNOLOGY

# CGEMS

Computer Graphics Educational Material Source

- SIGGRAPH Education Committee
- Archives for teaching and learning 3D
- http://cgems.inesc.pt


Jury award, best submission 2008

- Book, course notes, X3D-Edit tool, examples

New learning resource: course video podcasts!


# Course Videos: X3D for Web Authors


These video lessons support the textbook X3D: Extensible 3D Graphics for Web Authors, which shows how to build and animate models using X3D.

Primary supporting materials for the book and these video lessons include the X3D-Edit authoring tool, example scenes, and chapter slidesets. Supplementary learning materials include X3D Resources, X3D Tooltips, and X3D Scene Authoring Hints.

These videos were produced as part of two Naval Postgraduate School (NPS) MOVES Institute courses: *Introduction to X3D Graphics* (MV3204) and *Advanced X3D Graphics* (MV4205). The course presenter is book coauthor Don Brutzman.

| Chapter<br>Examples | Session | Description | .pdf |
|---|---|---|---|
| 0 | Getting Started | Goals and motivation, installing X3D-Edit authoring tool and example scenes, course introduction | slides |
| 1 | Technical Overview 1A | Introduction, historical background, Web3D Consortium, importance of standardization, X3D Specifications and International Organization of Standards (ISO), intellectual property rights (IPR) and open-source software, interoperability considerations | slides |
| | Technical Overview 1B | Browsers and players, models versus programming, scene graphs, behaviors and events, profiles and components, document metadata, fields | |
| | Technical Overview 1C | Importance of consistency, strong data typing, accessType, XML design patterns for X3D, compressed binary encoding, standards liaison organizations | |
| | Technical Overview 1D | X3D-Edit authoring tool development, functional testing, bug tracking, version control, Netbeans, help system | |
| 2 | Geometry Primitives 2A | Shape and geometry nodes, common geometry fields | slides |
| | Geometry Primitives 2B | Box and Cylinder nodes, X3D Tooltips | |
| | Geometry Primitives 2C | HelloWorld example, Cone Cylinder and Sphere nodes | |
| | Geometry Primitives 2D | Text node for flat 2D strings, launching an X3D scene into one or more external players, multiple-field MFString arrays, handling special characters using XML character entities | |
| | Geometry Primitives 2E | FontStyle node, open-source licenses | |
| 3 | Grouping 3A | Grouping node concepts, XML encoding | slides |
| | Grouping 3B | Inline node, url field | |
| | Grouping 3C | X3D resources and additional references, Inline node, url fields, level of detail (LOD) node | |
| | Grouping 3D | Switch node, review grouping node concepts, 3D grid resources | |
| 4 | Viewing Navigation 4A | Viewing, navigation, bindable nodes and binding operations example | slides |
| | Viewing Navigation 4B | Viewpoint node, viewing and navigation | |
| | Viewing Navigation 4C | NavigationInfo and Anchor nodes, uniform resource locator (url) | |
| 5 | Appearance 5A | Material and TwoSidedMaterial nodes, Universal Media materials library | slides |
| | Appearance 5B | Textures and ImageTexture node, texture coordinates, image copying and flipping to produce a continuously repeating texture, file formats | |
| | Appearance 5C | MovieTexture and PixelTexture nodes, LineProperties and FillProperties nodes | |
| | Appearance 5D | PixelTexture node, SFImage data type, PixelTexture image-import tool | |
| | Appearance 5E | More on PixelTexture node, MovieTexture node | |

# Summary

Many great resources are available for learning and using X3D

These community capabilities are good for business, educators, individuals

We welcome your active participation in Web3D Consortium


# Contact

**Don Brutzman**

*brutzman@nps.edu*

*http://web.nps.navy.mil/~brutzman*

Code USW/Br, Naval Postgraduate School
Monterey California 93943-5000 USA
1.831.656.2149 voice
1.831.656.7599 fax

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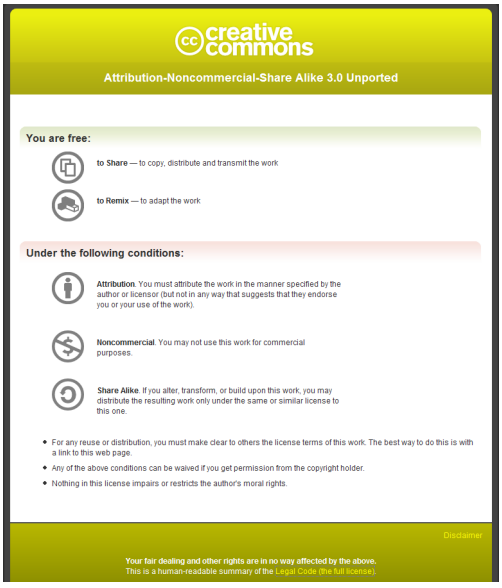


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# Open-source license
## for X3D-Edit software and X3D example scenes

http://www.web3d.org/x3d/content/examples/license.html

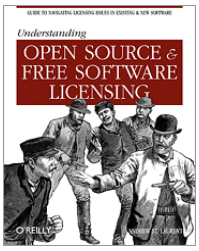


License available at

http://www.web3d.org/x3d/content/examples/license.txt

http://www.web3d.org/x3d/content/examples/license.html

Good references on open source:




Andrew M. St. Laurent, *Understanding Open Source and Free Software Licensing*, Oreilly Publishing, Sebastopol California, August 2004. http://oreilly.com/catalog/9780596005818/index.html


Herz, J. C., Mark Lucas, John Scott, *Open Technology Development: Roadmap Plan*, Deputy Under Secretary of Defense for Advanced Systems and Concepts, Washington DC, April 2006. http://handle.dtic.mil/100.2/ADA450769