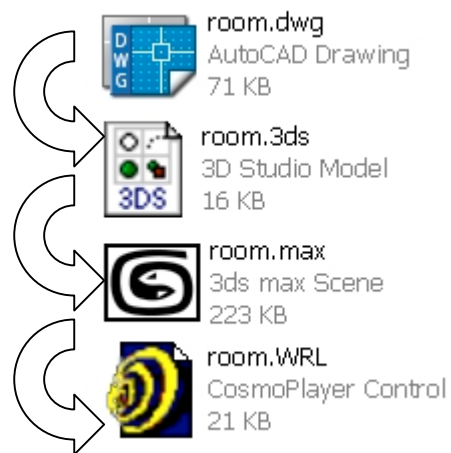


3ds max to VRML - exporter tutorials



(Cut and pasted from: <http://www.dform.com/inquiry/tutorials/3dsmax/>)

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VRML run down

What is VRML?

Compare HTML to VRML. HTML integrates different media which can be linked to the rest of the Internet. It's open protocol, so no one has to license it and it can be composed with a text editor. VRML shares these qualities with HTML and takes it a step further. While both HTML and VRML can conjure up text, graphics, animations, and audio, VRML is used to describe 3D spaces within which these different kinds of media can live.

VRML stands for Virtual Reality Modeling Language. The "Virtual Reality" in VRML has to do with the metaphor which it pursues: human space. That space is 3-dimensional and defines the ways we move, perceive and communicate. Thus, VRML includes many of the things that go into making a world: a way of describing geometry which creates objects and spaces you can move and move around in, as well as light, texture and sound which you can approach and view from whatever angle. It's also from this "worldly" imitation that VRML files get their name: you call them "worlds" and their file ending is ".wrl" The second part, "

Modeling Language", is about the process of making VRML. While much of VRML is composed and tweaked in the text, So, VRML authors use modeling programs which are designed to create 3D geometry in a graphical format. The models are then translated to VRML and viewed in a VRML Browser. Browsers render the VRML turning it into perceivable space which you can navigate through and interact with. So if you've downloaded a VRML file, the interaction you have with it is because your machine is rendering the space on the fly. It's not some movie streaming off your Internet connection.

What is VRML 1.0?

VRML 1.0 is the first generation of VRML. It describes the foundations of a networked world: geometry, lighting, colour, texture and linking. In VRML, the

geometry can be linked to the net as well as to other VRML worlds. This is along the lines of the idea of "cyberspace", an important part of VRML

philosophy. VRML 1.0 has special capabilities like Inlining and LOD's (Level of Detail) which allow you to optimize your world for limited bandwidth and

processing power. In addition, the VRML 1.0 Specification is a ripe nine months old and is a stable language which has full browser support.

What is VRML 2.0?

VRML 2.0 is the current generation of VRML, also called VRML 97. It fills out the "world metaphor" more fully, with a richer level of interactivity. Animation, spatial sound, collision detection and scripting are supported in addition to all the VRML 1.0 features.

General notes on 3ds max to VRML conversion.

Key things.

There are several key things to consider about VRML when constructing your 3ds max file:

Polygons

You want to make your file able to be rendered in real time on an average users machine. A maximum of 3000 in your scene is a good limit. You can get creative with the number of polygons by implementing Anchors and LOD's .

Animations

You can do any type of transform or "morphing" animation with the 2.0 exporter.

Transform animation (translation, rotation and scale) tend to be lighter on files.

"Morphing" or Coordinate Interpolation produces larger files because each vertex must be accounted for. Use sparingly.

Materials

You add materials as you normally would in 3ds max. "Wire" materials will export as Indexed Line Sets.

Texture Maps

VRML will accept .gifs and .jpegs as texture maps. Texture maps also tend to produce large files. Use sparingly.

Lighting

3ds max will export lighting to VRML.

Cameras

At least one camera in your file is necessary. Create an "entry view" for every file so that your models will load in view and you wont have to hunt around for them. Cameras are exported as Viewpoints in VRML. The name you give the camera is what your Viewpoint will be called in the VRML file. Users can navigate through viewpoints in a file, moving from one to another.

The basic steps for creating a VRML file in Max.

- Create your geometry.
- Assign Materials, Lighting, Texture Maps and Cameras.
- Make your animations.
- Under "Helpers" on the "Create" Command Panel choose one of the VRML Helper sections to create VRML nodes.
- Place your VRML nodes in the scene and link them appropriately.
- Select File/Export and export your file as a ".wrl" file.
- Configure the export dialogue box and press OK.
- Check out your file in your VRML browser.

You might want to open the file in your text editor at this point as well. You can look at the code, edit and save it and look at it again in the browser.

You will often be going back and forth between the browser, the text editor and 3ds max.

Exporter Dialogue Box:

Output Language- Select VRML 2.0, 1.0 or VRBL depending on your scene.
Initial View- Lists all cameras in the scene with the initial view on top.

Generate:

Normals - Use if you need normal info for your file. It can make a file significantly larger.

Fields- Arranges layout of Fields in VRML file

Indentation- Creates indentation in the layout of the VRML file

Primitives- exports the cone, sphere, cube and cylinder as VRML primitives.
Using this feature when you have primitives in your scene can cut down its size considerably.

VRML 2.0 Options:

Initial Navigation Info: Select the Nav Info you'd like the world to begin with.

Initial Background: Select the Background you'd like the world to begin with.

Initial Fog: Select the Fog you'd like the world to begin with. (This node is not supported by any browsers yet)

Coordinate Interpolators:

Transform Controllers-

Once per Animation Frame - assigns a key value for each frame

Custom - Choose the frames per second. This allows you to reduce the number of key values (and the file size)

Coordinate Interpolators-

Once per Animation Frame - assigns a key value for each frame

Custom - Choose the frames per second. This allows you to reduce the number of key values (and the file size).
Coordinate Interpolators can create huge files.

Experiment here to see if a lower FPS setting will lower your file size while keeping your animation intact.

Up Direction

Z-axis -

Y-axis -

The 3ds max convention

The VRML convention. This is usually the choice you want.

Digits of precision-

How precise do you want the file to be? Higher digits of precision can mean much larger files because it effects every value in the geometry. Four digits is a good number

Bimap URL prefix Directs the browser to the directory with your textures.

Implementing VRML nodes into 3ds max files.

NavigationInfo

TimeSensor

TouchSensor

Background

ProximitySensor

Anchor

Inline

Sound

LOD

Billboard

NavigationInfo

What is it?

The NavigationInfo node describes physical characteristics of the browser and the scene. This node specifies to the viewer/browser what type of navigation to use, how fast the navigation will be, if a headlight is on, the size parameters of an avatar, and the users visibility limit. For more details about this node, check out the VRML 2.0 Spec.

Create the scene and add Cameras

1) First create a scene with all the objects and materials that are needed. To the right, we have created a simple world for you to use as an example.

2) Next it is a good idea to add at least one 'Camera' which will be a 'Viewpoint' in the VRML file, but the file will still work without Viewpoints. NOTE:

The more Viewpoints the better in VRML files. The different browsers have various navigation abilities and restraints, therefore the Viewpoints are the one consistent way the user can view the file.

3) To add a Camera, go to the Creation panel/press the 'Camera' button and Choose 'Target' as the Object Type.

- 4) With your mouse, drag the Camera in the 'Top' viewport and stretch it out.
- 5) To view what the Camera is seeing, go to the Perspective viewport and press 'c' on the keyboard. And there you are from the Cameras point of view.
- 6) The Camera is easy to adjust with the Move and Rotate buttons, so test them out.
- 7) Also it is good to name your Cameras. The Camera name is what the user sees in the VRML browser as the name of the Viewpoint. Otherwise it will default to Camera01, Camera02 etc. which is pretty boring, if you have a great viewpoint to show off.
- 8) Viewpoints help tell a story in the VRML file, because you can lead the viewer to ideal viewing points of the model which they might not otherwise explore.

How to implement a NavigationInfo into a 3ds max file:

- 9) Now move on to implement a NavigationInfo node. Go to the 'Creation' panel and choose 'Helpers' Under 'Helpers' use the pull down the menu and choose VRML 2.0. Then choose Object Type 'NavInfo'.
- 10) Then go to your scene and drag the mouse anywhere. You will see an icon that signals to you that you have placed the NavigationInfo node.
- 11) Then specify what Type of navigation and movement you want in the scene. 3ds max offers the list of:
WALK, EXAMINE, FLY, NONE.
As of this writing VRML browsers only support WALK and EXAMINE viewers. Test them out in an exported file to see which suits your scene the best.
- 12) The Headlight places a directional light in the direction the user is looking. Unless there are other lights in the scene, make sure you check the box for the Headlight--or else you will see nothing in the browser window.
- 13) Experiment with the navigation Speed--which is how fast the user travels through the scene. The default speed is a bit slow so a higher speed will help the file, ex. speed=5.
- 14) You can specify the user's Visibility Limit--the furthest distance a user can see. Objects will not be visible after this point. To see everything in the scene set the Visibility Limit to zero.
- 15) You can also specify the user's dimensions with the Avatar parameters (avatarSize). The avatarSize gives physical dimensions in the world which relate mostly to Collision Detection issues.

Collision-This is the distance between the user and a piece of geometry, with collision detection applied to it, before collision is detected.

Terrain-This is the height to stay above a surface when travelling along a terrain.

Step Height-This is the highest piece of geometry that can be travelled over without colliding.

16) NOTE: All of the above parameters are implemented by default into the .wrl file. So make sure that the settings are how you want them.

17) In the Icon Size box, you can designate a larger or smaller icon size for the NavInfo node. This is only for the 3ds max file and has no bearing on the VRML file.

18) Now you have entered all possible information for the 'NavInfo' node. If you need to go back, after leaving the Creation panel, and alter any of the parameters, then go to the 'Modify' panel and adjust.

19) Now you have successfully implemented the NavigationInfo node into your file.

20) To check, go to the 'Selection' menu! NOTE: You can name your NavigationInfo node in the same way as every other object in 3ds max in the 'Name' field.

How to Export 3ds max files to VRML:

21) Now skinny on over to 'File' and choose 'Export'. The Exporter knows that you are referring to the file that is open and requests that you name your =file.

22) So first choose '.wrl' file type Then name your file, i.e. 'SuchAndSuch.wrl'

23) Suggestion: Because you might need to go back to the 3ds max file and adjust part of your world, it is a good idea to keep the filename between to two files the same.

Here are the official Fields and Events, for the NavigationInfo node in the VRML text, according to the VRML2 Spec:

```
NavigationInfo {
  eventIn      SFBool    set_bind
  exposedField MFFloat   avatarSize      [ 0.25, 1.6, 0.75 ]
  exposedField SFBool    headlight       TRUE
  exposedField SFFloat   speed           1.0
  exposedField MFString  type            "WALK"
  exposedField SFFloat   visibilityLimit  0.0
  eventOut     SFBool    isBound
}
```

TimeSensor

What is it?

The TimeSensor node assists in coordinating animations and timing sound files. With this node, you can specify beginning and ending times of the particular event, looping and level of user activity. For more details about this node, check out the VRML 2.0 Spec.

Create the scene and add Cameras

1) First plan out a scene with all the objects, materials, animations and NavigationInfo that are needed. To the right, we have created a simple world for you to use as an example.

2) Next it is a good idea to add at least one 'Camera' which will be a 'Viewpoint' in the VRML file, but the file will still work without Viewpoints. NOTE:

The more Viewpoints the better in VRML files. The different browsers have various navigation abilities and restraints, therefore the Viewpoints are the one consistent way the user can view the file.

3) To add a Camera, go to the Creation panel/press the 'Camera' button and Choose 'Target' as the Object Type.

4) With your mouse, drag the Camera in the 'Top' viewport and stretch it out.

5) To view what the Camera is seeing, go to the Perspective viewport and press 'c' on the keyboard. And there you are from the Cameras point of view.

6) The Camera is easy to adjust with the Move and Rotate buttons, so test them out.

7) Also it is good to name your Cameras. The Camera name is what the user sees in the VRML browser as the name of the Viewpoint. Otherwise it will default to Camera01, Camera02 etc. Which is pretty boring, if you have a great viewpoint to show off.

8) Viewpoints help tell a story in the VRML file, because you can lead the viewer to ideal viewing points of the model which they might not otherwise explore.

How to implement a TimeSensor into a 3ds max file:

9) To implement the TimeSensor into the scene successively, it is necessary to solidify the Grouping and Heirarchy levels and to define which parts will be moving.

10) If you want an animation to occur within a subgroup, but not to the entire parent group then follow these directions to implement the TimeSensor before moving on to the Parent group.

11) For example, if you want a particular subgroup to animate and loop AND the parent group to animate but not loop, then you must place the TimeSensor into the lowerlevel grouping first before adding an additional TimeSensor to the Parent group.

12) OTHERWISE just plan that if you want any animation or sound files in subgroups, you will have to 'Open' the top level group, do the animation and add the TimeSensor, and then 'Close' the group while objects in the original group are still selected.

13) For the TimeSensor node go to the 'Creation' panel and choose 'Helpers' Under 'Helpers' use the pull down the menu and choose VRML 2.0. Then choose the Object Type 'TimeSensor'.

14) Then go to your scene and drag the mouse anywhere. You will see an icon that signals to you that you have placed the TimeSensor.

15) Select the Pick Objects button to select the animated objects that will be coordinated by the TimeSensor. Select the objects or sound files with a mouse click OR press the keyboard letter 'H'. The selected objects will appear in the 'Pick Objects' box. Turn off the 'Pick Objects' button by pressing it again to get out of the selection mode.

16) Now you can choose loop--and the animation will run continuously, start on load--the animation will begin once the file is loaded, startTime & stopTime--where you correspond TimeSensor times to animation frames to provide for smooth animation.

17) In the Icon Size box, you can designate a larger or smaller icon size for the TimeSensor node---but this is only for the 3ds max file and has no bearing on the VRML file.

18) Now you have entered all possible information for the 'TouchSensor' node. If you need to go back, after leaving the Creation panel, and alter any of the parameters, then go to the 'Modify' panel and adjust.

19) Now you have successfully implemented a TimeSensor into your file.

20) To check, go to the 'Selection' menu! NOTE: You can name your TimeSensor in 3ds max in the 'Name' field.

How to Export 3ds max files to VRML:

21) Now go to 'File' and choose 'Export'. The Exporter knows that you are referring to the file that is open and requests that you name your file.

22) So first choose '.wrl' file type Then name your file, i.e. 'SuchAndSuch.wrl'

23) Suggestion: Because you might need to go back to the 3ds max file and adjust part of your world, it is a good idea to keep the filename between to two files the same.

24) Check out a more elaborate sample file that demonstrates the TimeSensor.

Here are the official Fields and Events, for the TimeSensor node in the VRML text, according to the VRML2 Spec:

```
TimeSensor {
  exposedField STime    cycleInterval 1
  exposedField SFBool   enabled      TRUE
  exposedField SFBool   loop         FALSE
  exposedField STime    startTime    0
  exposedField STime    stopTime     0
  eventOut    STime    cycleTime
  eventOut    SFFloat  fraction_changed
  eventOut    SFBool   isActive
  eventOut    STime    time
}
```

TouchSensor

What is it?

The TouchSensor node is a trigger event activated by the user through a mouse click or drag. The TouchSensor causes an animation or sound file to launch.

For more details about this node, check out the VRML 2.0 Spec.

Create the scene and add Cameras

1) First create a scene with all the objects, materials and NavigationInfo that are needed. Decide which parts will be moving and animate those objects.

2) Next it is a good idea to add at least one 'Camera' which will be a 'Viewpoint' in the VRML file, but the file will still work without Viewpoints. NOTE:

The more Viewpoints the better in VRML files. The different browsers have various navigation abilities and restraints, therefore the Viewpoints are the one consistent way the user can view the file.

3) To add a Camera, go to the Creation panel/press the 'Camera' button and Choose 'Target' as the Object Type.

4) With your mouse, drag the Camera in the 'Top' viewport and stretch it out.

5) To view what the Camera is seeing, go to the Perspective viewport and press 'c' on the keyboard. And there you are from the Cameras point of view.

6) The Camera is easy to adjust with the Move and Rotate buttons, so test them out.

7) Also it is good to name your Cameras. The Camera name is what the user sees in the VRML browser as the name of the Viewpoint. Otherwise it will default to Camera01, Camera02 etc. Which is pretty boring, if you have a great viewpoint to show off.

8) Viewpoints help tell a story in the VRML file, because you can lead the viewer to ideal viewing points of the model which they might not otherwise explore.

How to implement a TouchSensor into a 3ds max file:

9) Go to the 'Creation' panel and choose 'Helpers' Under 'Helpers' use the pull down the menu and choose VRML 2.0. Then choose the Object Type 'TouchSensor'.

10) Then go to your scene and drag the mouse anywhere. You will see an icon that signals to you that you have placed the TouchSensor.

11) Select the Pick Trigger Objects button and pick the object that you want the user to click to start an animation or sound file (note: the trigger can be any object).

12) Select with your mouse OR press the keyboard letter 'H'. The selected objects will appear in the 'Pick Trigger Objects' box. And don't forget to turn off the 'Pick Objects' button by pressing it again.

3ds max to VRML

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13) And you must select Pick Action Object. Here choose the animated pieces of geometry, cameras, lights or sound files. Select in the same way as above.

14) Make sure the Enabled box is checked.

15) In the Icon Size box, you can designate a larger or smaller icon size for the TouchSensor node---but this is only for the 3ds max file and has no bearing on the VRML file.

16) Now you have entered all possible information for the 'TouchSensor' node. If you need to go back, after leaving the Creation panel, and alter any of the parameters, then go to the 'Modify' panel and adjust.

17) Now you have implemented a TouchSensor into your file.

18) To check, go to the 'Selection' menu! NOTE: You can name your TouchSensor in 3ds max in the 'Name' field.

19) You may also want to implement a TimeSensor. A TimeSensor is needed if you want the animation or sound to start immediately on loading the file, loop or if the events should stop at specified times.

How to Export 3ds max files to VRML:

20) Now Skinny on over to 'File' and choose 'Export'. The Exporter knows that you are referring to the file that is open and requests that you name your file.

21) So first choose '.wrl' file type Then name your file, i.e. 'SuchAndSuch.wrl'

22) Suggestion: Because you might need to go back to the 3ds max file and adjust part of your world, it is a good idea to keep the filename between to two files the same.

23) Check out a more elaborate sample file that demonstrates the TouchSensor.

Here are the official Fields and Events, for the TouchSensor node in the VRML text, according to the VRML2 Spec:

```
TouchSensor {
  exposedField SFBool   enabled TRUE
  eventOut      SFVec3f hitNormal_changed
  eventOut      SFVec3f hitPoint_changed
  eventOut      SFVec2f hitTexCoord_changed
  eventOut      SFBool   isActive
  eventOut      SFBool   isOver
  eventOut      SFTIME   touchTime
}
```

Background

What is it?

The Background node is a parameter where you can create a Sky and/or Ground backdrop for your world. This is different than just setting a background colour, because with the Ground specifications, a horizon is created which then gives a worldly feel so that your VRML objects are not simply floating around in space. For more details about this node, check out the VRML 2.0 Spec

Create the scene and add Cameras

1) First create a scene with all the objects, materials and NavigationInfo that are needed. To the right, we have created a simple world for you to use as an example.

2) NOTE: The placement of the 'Background' node does not depend on any other VRML node. Therefore you can specify these parameters anytime after your world is created.

3) Next it is a good idea to add at least one 'Camera' which will be a 'Viewpoint' in the VRML file, but the file will still work without Viewpoints. NOTE:

The more Viewpoints the better in VRML files. The different browsers have various navigation abilities and restraints, therefore the Viewpoints are the one consistent way the user can view the file.

4) To add a Camera, go to the Creation panel/press the 'Camera' button and Choose 'Target' as the Object Type.

5) With your mouse, drag the Camera in the 'Top' viewport and stretch it out.

6) To view what the Camera is seeing, go to the Perspective viewport and press 'c' on the keyboard. And there you are from the Cameras point of view.

7) The Camera is easy to adjust with the Move and Rotate buttons, so test them out.

8) Also it is good to name your Cameras. The Camera name is what the user sees in the VRML browser as the name of the Viewpoint. Otherwise it will default to Camera01, Camera02 etc. Which is pretty boring, if you have a great viewpoint to show off.

9) Viewpoints help tell a story in the VRML file, because you can lead the viewer to ideal viewing points of the model which they might not otherwise explore.

How to implement the Background node into a 3ds max file:

10) Now for the Background node, go to the 'Creation' panel and choose 'Helpers'. Under 'Helpers' use the pull down the menu and choose VRML 2.0. Then choose the Object Type 'Background'.

11) Then go to your scene and drag the mouse anywhere. You will see an icon that signals to you that you have placed the Background node.

12) A panel for the Sky, Ground, and Image parameters will roll out. Please note that, as of this writing, there is no known browser that supports setting an Image as the Background, so it is not gone into detail here.

13) The Sky is actually an infinite sphere that holds the objects. In the Sky panel there is:

Colours- you can choose 1, 2 or 3 colours. Click on the colour patch to modify it to your colour choice with the 3DSMax Material Editor.
Angle- colour 1 is the base colour and the 2nd and the 3rd colours merge at the base of an angle off the North Pole (straight up from the browser). Try playing around with multiple colours to see a blending effect, but 1 colour still does the trick.

14) The parameter's for the Ground are the same as with the Sky. Except that the angle of the 2nd and 3rd colours merge off at an angle coming from the opposite end, at the South pole. Therefore if you want more than one colour, you must specify the angle for these.

15) In the Images box you can define a set of images with .gifs or .jpegs by specifying the URLs. --panorama style for the Background.

16) In the Icon Size box, you can designate a larger or smaller icon size for the Background node---but this is only for the 3ds max file and has no bearing on the VRML file.

17) Now you have entered all possible information for the 'Background' node. If you need to go back, after leaving the Creation panel, and alter any of the parameters, then go to the 'Modify' panel and adjust.

18) Now you have completed implementing a Background into your file!

19) To check, go to the 'Selection' menu and look for it! NOTE: You can name your Background node in 3ds max in the 'Name' field.

How to Export 3ds max files to VRML:

20) Now move on over to 'File' and choose 'Export'. The Exporter knows that you are referring to the file that is open and requests that you name your file.

21) So first choose '.wrl' file type Then name your file, i.e. 'SuchAndSuch.wrl'

22) Suggestion: Because you might need to go back to the 3ds max file and adjust part of your world, it is a good idea to keep the filename between to two files the same.

23) Check out a more elaborate sample file that demonstrates the Background node.

Here are the official Fields and Events, for the Background node in the VRML text, according to the VRML2 Spec:

```
Background {
  eventIn      SFBool    set_bind
  exposedField MFFloat   groundAngle  []
  exposedField MFColor   groundColor  []
  exposedField MFString  backUrl       []
  exposedField MFString  bottomUrl     []
  exposedField MFString  frontUrl      []
  exposedField MFString  leftUrl       []
  exposedField MFString  rightUrl      []
  exposedField MFString  topUrl        []
  exposedField MFFloat   skyAngle      []
  exposedField MFColor   skyColor      [ 0 0 0 ]
  eventOut     SFBool    isBound
}
```

ProximitySensor

What is it?

The ProximitySensor node is a trigger event activated by the user getting within certain distance from an object. Once the user is within specified box parameters an event will generate as determined by you, the author. For example, if the user gets close to the object it may animate, other objects may animate, a sound file may be launched, etc. For more details about this node, check out the VRML 2.0 Spec

Create the scene and add Cameras

1) First create a scene with all the objects, materials, NavigationInfo and animation that are needed.

2) Next it is a good idea to add at least one 'Camera' which will be a 'Viewpoint' in the VRML file, but the file will still work without Viewpoints. NOTE:

The more Viewpoints the better in VRML files. The different browsers have various navigation abilities and restraints, therefore the Viewpoints are the one consistent way the user can view the file.

3) To add a Camera, go to the Creation panel/press the 'Camera' button and Choose 'Target' as the Object Type.

4) With your mouse, drag the Camera in the 'Top' viewport and stretch it out.

5) To view what the Camera is seeing, go to the Perspective viewport and press 'c' on the keyboard. And there you are from the Cameras point of view.

6) The Camera is easy to adjust with the Move and Rotate buttons, so test them out.

7) Also it is good to name your Cameras. The Camera name is what the user sees in the VRML browser as the name of the Viewpoint. Otherwise it will default to Camera01, Camera02 etc. Which is pretty boring, if you have a great viewpoint to show off.

8) Viewpoints help tell a story in the VRML file, because you can lead the viewer to ideal viewing points of the model which they might not otherwise explore.

How to implement a ProximitySensor into a 3ds max file:

9) Now move on to the ProximitySensor. Go to the 'Creation' panel and choose 'Helpers'. Under 'Helpers' use the pull down the menu and choose VRML 2.0. Then choose the Object Type 'ProxSensor'.

10) Then go to your scene and drag the mouse anywhere. You will see an icon of a hand that signals to you that you have placed the ProximitySensor.

11) Select the Pick Action Objects button. The action objects are the objects that have an event that will occur due to the user coming within the proximity you designate. The events can be animation, cameras, anchors or sounds.

12) You can either select the objects with your mouse OR press the keyboard letter 'H' and the 'Selection' menu pops up. From the 'Selection' menu select your animated objects and these will appear in the Pick Action Objects box. Now don't forget to turn off the 'Pick Action Objects' button by pressing it again.

13) Make sure that the Enabled box is checked.

14) To alter the parameters of the ProximitySensor, adjust the width, length, and height of the bounding box. Also the box easily moves around to surround the objects that are the focus of the trigger. NOTE: the bigger the box, the further out the user will be when the ProximitySensor is set off. If you are out of the creation panel, you will need to go to the 'Modify' panel. The same panel for the node will appear as before.

15) Next choose the object linked to the event that will occur as the user gets within the distance parameters. This will either be the animated object or any of the VRML helpers (i.e. sound, anchor).

16) In the Icon Size box, you can designate a larger or smaller icon size for the ProximitySensor node---but this is only for the 3ds max file and has no bearing on the VRML file.

17) Now you have successfully implemented a ProximitySensor into your file.

18) To check, go to the 'Selection' menu! NOTE: You can name your ProximitySensor in 3ds max in the 'Name' field.

How to Export 3ds max files to VRML:

19) Now choose 'File' and choose 'Export'. The Exporter knows that you are referring to the file that is open and requests that you name your file.

3ds max to VRML

<http://www.dform.com/inquiry/tutorials/3dsmax/>

20) So first choose '.wrl' file type Then name your file, i.e. 'SuchAndSuch.wrl'

21) Suggestion: Because you might need to go back to the 3ds max file and adjust part of your world, it is a good idea to keep the filename between to two files the same.

22) Check out a more elaborate sample file that demonstrates the ProximitySensor.

Here are the official Fields and Events, for the ProximitySensor node in the VRML text, according to the VRML2 Spec:

```
ProximitySensor {
  exposedField SFVec3f    center      0 0 0
  exposedField SFVec3f    size        0 0 0
  exposedField SFBool     enabled     TRUE
  eventOut      SFBool    isActive
  eventOut      SFVec3f   position_changed
  eventOut      SFRotation orientation_changed
  eventOut      SFTime    enterTime
  eventOut      SFTime    exitTime
}
```

Anchor

What is it?

The Anchor node creates a link in a VRML file. The link is embedded in an object . The Anchor will take the user to another file, be it a wrl, text or graphics or to another Viewpoint. This node is activated by the user setting off an event, such as clicking on a particular object or getting within a ProximitySensor in the scene. For more details about this node, check out the VRML 2.0 Spec

Create the scene and add Cameras

1) First create a scene with all the objects, materials and NavigationInfo that are needed.

2) Next it is a good idea to add at least one 'Camera' which will be a 'Viewpoint' in the VRML file, but the file will still work without Viewpoints. NOTE:

The more Viewpoints the better in VRML files. The different browsers have various navigation abilities and restraints, therefore the Viewpoints are the one consistent way the user can view the file.

3) To add a Camera, go to the Creation panel/press the 'Camera' button and Choose 'Target' as the Object Type.

4) With your mouse, drag the Camera in the 'Top' viewport and stretch it out.

5) To view what the Camera is seeing, go to the Perspective viewport and press 'c' on the keyboard. And there you are from the Cameras point of view.

- 6) The Camera is easy to adjust with the Move and Rotate buttons, so test them out.
 - 7) Also it is good to name your Cameras. The Camera name is what the user sees in the VRML browser as the name of the Viewpoint. Otherwise it will default to Camera01, Camera02 etc. Which is pretty boring, if you have a great viewpoint to show off.
 - 8) Viewpoints help tell a story in the VRML file, because you can lead the viewer to ideal viewing points of the model which they might not otherwise explore.
- How to implement an Anchor into a 3ds max file:
- 9) Now go to the 'Creation' panel and press the 'Helpers' button and select Anchor.
 - 10) With your mouse drag in any Viewport and the 'Anchor' icon will appear.
 - 11) Select the Pick Trigger Objects button and choose the geometry that will trigger an anchor jump. Either select the objects with the mouse OR press the keyboard letter 'H'. The selected objects will appear in the 'Pick Trigger Objects' box. And turn off the 'Pick Trigger Objects' button by pressing it again.
 - 12) In the Description box you can put in a text description of the anchor. The description will appear at the bottom of the browser in the status bar telling the user that Anchor is established. Currently the CosmoPlayer browser does not support the Description.
 - 13) To jump to another URL, check the Hyperlink Jump box, and then fill in the URL box with the URL to which the anchor will be linked.
 - 14) In the Parameter box, enter any additional information to be read by the browser. All information should be in the form of 'keyword=value'. For example, if you wanted a new browser to open with the linked file then the parameter would be 'target=_blank'. NOTE: The parameter must be written in lower case for it to work successfully. For more information see the VRML 2.0 Spec.
 - 15) You can also fetch a .wrl file or put a .wrl in the Bookmarks folder. This folder refers to .wrl's you have placed in there, otherwise it fetches HTML documents.
 - 16) If you decide link to another world, not only can you link to this world, you can also link to particular viewpoints within that world by adding '#viewpointname' to the end of the URL.
 - 17) In the Camera you can 'Set Camera', and can create an Anchor that jumps to a viewpoint--this is optional.
 - 18) In the Icon Size box, you can designate a larger or smaller icon size for the Anchor node---but this is only for the 3ds max file and has no bearing on the VRML file. It is basically to adjust how well you can see the icon in the 3ds max interface.

19) Now you have entered all information for the 'Anchor' node. If you need to go back, after leaving the Creation panel, and alter any of the parameters, then go to the 'Modify' panel and adjust.

How to Export 3ds max files to VRML:

20) Now go on over to 'File' and choose 'Export'. The Exporter knows that you are referring to the file that is open and requests that you name your file.

21) So first choose '.wrl' file type Then name your file, i.e. 'SuchAndSuch.wrl'

22) Suggestion: Because you might need to go back to the 3ds max file and adjust part of your world, it is a good idea to keep the filename between to two files the same.

23) Check out a more elaborate sample file that demonstrates the Anchor node.

Here are the official Fields and Events, for the Anchor node in the VRML text, according to the VRML2 Spec:

```
Anchor {
  eventIn      MFNode    addChildren
  eventIn      MFNode    removeChildren
  exposedField MFNode    children      []
  exposedField SFString  description   ""
  exposedField MFString  parameter    []
  exposedField MFString  url           []
  field        SFVec3f   bboxCenter    0 0 0
  field        SFVec3f   bboxSize      -1 -1 -1
}
```

Inline

What is it?

The Inline node groups other VRML objects or scenes by calling URLs from the World Wide Web to create one composed world. There are several benefits when using this node. An Inlined file loads quickly and the user can see the world loading almost immediately. This occurs because there are separate files for VRML objects. Therefore those files can be used repeatedly as they are not constrained to one world. For more details about this node, check out the VRML 2.0 Spec.

Create the scene and add Cameras

1) First create one scene with all the objects, materials and NavigationInfo that are needed for a basic VRML file and export it to a .wrl file. To the right, we have created a simple world for you to use as an example.

2) Next it is a good idea to add at least one 'Camera' which will be a 'Viewpoint' in the VRML file, but the file will still work without Viewpoints. NOTE:

The more Viewpoints the better in VRML files. The different browsers have various navigation abilities and restraints, therefore the Viewpoints are the one consistent way the user can view the file.

3) To add a Camera, go to the Creation panel/press the 'Camera' button and Choose 'Target' as the Object Type.

4) With your mouse, drag the Camera in the 'Top' viewport and stretch it out.

5) To view what the Camera is seeing, go to the Perspective viewport and press 'c' on the keyboard. And there you are from the Cameras point of view.

6) The Camera is easy to adjust with the Move and Rotate buttons, so test them out.

7) Also it is good to name your Cameras. The Camera name is what the user sees in the VRML browser as the name of the Viewpoint. Otherwise it will default to Camera01, Camera02 etc. Which is pretty boring, if you have a great viewpoint to show off.

8) Viewpoints help tell a story in the VRML file, because you can lead the viewer to ideal viewing points of the model which they might not otherwise explore.

9) Now you must also create another scene which will include only objects. Note: the objects between the two scenes are going to be combined and therefore need coordinate systems that match so that the geometry fits together appropriately.

How to implement a Inline into a 3ds max file:

10) With the first file go to the 'Creation' panel and choose 'Helpers'. Under 'Helpers', at the pull down arrow, choose 'VRML 1.0/2.0/VRBL' and then choose the Object Type 'Inline'.

11) Now go to your scene and drag the mouse anywhere. You will see an icon that signals to you that you have placed the Inline node.

12) In the URL field enter the URL of the second file you created. The inlined file must be a .wrl file.

13) You can also add wrl files or pull wrl files to inline from the 'Bookmark' directory.

14) In the Icon Size box, you can designate a larger or smaller icon size for the Inline node.

NOTE: The inlined scene replaces the icon and assumes its location, rotation and scale. And the icon can be moved, rotated and scaled like any other piece of geometry.

15) Now you have entered all possible information for the 'Inline' node. If you need to go back, after leaving the Creation panel, and alter any of the parameters, then go to the 'Modify' panel and adjust.

16) Now you have successfully implemented an Inline node into your file.

17) To check, go to the 'Selection' menu! and NOTE: You can name your particular Inline in 3ds max in the 'Name' field.

How to Export 3ds max files to VRML:

18) Now Skinny on over to 'File' and choose 'Export'. The Exporter knows that you are referring to the file that is open and requests that you name your file.

19) So first choose '.wrl' file type Then name your file, i.e. 'SuchAndSuch.wrl'

20) Suggestion: Because you might need to go back to the 3ds max file and adjust part of your world, it is a good idea to keep the filename between to two files the same.

Here are the official Fields and Events, for the Inline node in the VRML text, according to the VRML2 Spec:

```
Inline {
  exposedField MFString url          []
  field          SFVec3f  bboxCenter  0 0 0
  field          SFVec3f  bboxSize    -1 -1 -1
}
```

Sound and AudioClip

What are they?

The Sound node specifies locational and spatial coordinates for sound in a VRML 2.0 world which calls an AudioClip (audio data). The AudioClip node calls specific audio data that is referenced by other nodes such as the Sound node. For more details about this node, check out the VRML Audio Tutorial and VRML 2.0 Spec.

Create the scene and add Cameras

1) First create a scene with all the objects, materials and NavigationInfo that are needed. AND have a sound file (ex. .wav file) ready to be implemented.

2) Next it is a good idea to add at least one 'Camera' which will be a 'Viewpoint' in the VRML file, but the file will still work without Viewpoints. NOTE:

The more Viewpoints the better in VRML files. The different browsers have various navigation abilities and restraints, therefore the Viewpoints are the one consistent way the user can view the file.

3) To add a Camera, go to the Creation panel/press the 'Camera' button and Choose 'Target' as the Object Type.

4) With your mouse, drag the Camera in the 'Top' viewport and stretch it out.

5) To view what the Camera is seeing, go to the Perspective viewport and press 'c' on the keyboard. And there you are from the Cameras point of view.

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6) The Camera is easy to adjust with the Move and Rotate buttons, so test them out.

7) Also it is good to name your Cameras. The Camera name is what the user sees in the VRML browser as the name of the Viewpoint. Otherwise it will default to Camera01, Camera02 etc. Which is pretty boring, if you have a great viewpoint to show off.

8) Viewpoints help tell a story in the VRML file, because you can lead the viewer to ideal viewing points of the model which they might not otherwise explore.

How to implement a Sound file into a 3ds max file:

9) You need to implement an AudioClip into your file in addition to the Sound node. The order of implementation does not matter.

10) For the AudioClip, go to the 'Creation' panel and choose 'Helpers' Under 'Helpers' use the pull down the menu and choose VRML 2.0. Then choose the Object Type 'AudioClip'.

11) Now go to your scene and drag the mouse anywhere. You will see an icon that signals to you that you have placed an AudioClip node.

12) Then in the URL box fill in the URL for the sound file you had prepared/recorded earlier.

13) Other parameters to fill in are: Description, Pitch, Loop--which means that the sound file will play continuously, and Start on Load--so that when the

VRML file loads the sound file will start immediately.

14) Instead of starting on load, you can implement a TouchSensor to be a trigger that will start the sound.

15) To check that the AudioClip is actually there, go to the 'Selection' menu! NOTE: You can name your AudioClip in 3ds max in the 'Name' field. Now you are finished implementing the AudioClip and need to move on the Sound node.

16) So go back to the 'Creation' panel and choose 'Helpers'. Under 'Helpers' use the pull down the menu and choose VRML 2.0. Then choose the Object Type

Sound.

17) Then go to your scene and drag the mouse anywhere. You will see an icon that signals to you that you have placed a Sound node.

18) In the Sound node parameters roll-out you can specify the Intensity, Priority, Spatialize: min front, min back, max front, max back.

Intensity-This sets how loud the sound will be and 1.0 is full volume.

Priority-This is specific for a scene with multiple sound files. Relative importance is given to each of the files. The value of 1 is most important and 0 is least important.

Spatialize-Without this box checked the sound will be ambient. Spatialized sound makes the audio 3D coming from a source with a specific location within the scene.

Min Front, Min Back, Max Front, Max Back-With these parameters, you can specify the area for the sound. The area is demonstrated by two ellipsoids, a larger red and smaller blue. Outside the red ellipsoid the sound is inaudible, between the two is a fall-off point where the volume varies and inside the blue ellipsoid the sound is at full volume.

19) Select the Pick AudioClip button and select the AudioClip with your mouse OR press the keyboard letter 'H' and the 'Selection' menu pops up. From the

'Selection' menu select the AudioClip.

20) Now you have implemented a Sound node into your file.

21) To check that the Sound node is actually there, go to the 'Selection' menu! NOTE: You can name your Sound node in 3ds max in the 'Name' field.

How to Export 3ds max files to VRML:

22) Now Skinny on over to 'File' and choose 'Export'. The Exporter knows that you are referring to the file that is open and requests that you name your file.

23) So first choose '.wrl' file type Then name your file, i.e. 'SuchAndSuch.wrl'

24) Suggestion: Because you might need to go back to the 3ds max file and adjust part of your world, it is a good idea to keep the filename between to two files the same.

25) Check out a more elaborate sample file that demonstrates the Sound node.

Here are the official Fields and Events, for the Sound node in the VRML text, according to the VRML2 Spec:

```
Sound {
  exposedField SFVec3f   direction      0 0 1
  exposedField SFFloat   intensity     1
  exposedField SFVec3f   location       0 0 0
  exposedField SFFloat   maxBack       10
  exposedField SFFloat   maxFront      10
  exposedField SFFloat   minBack       1
  exposedField SFFloat   minFront      1
  exposedField SFFloat   priority      0
  exposedField SFNode    source        NULL
  field            SFBool   spatialize  TRUE
}
```

LOD

What is it?

The LOD (Level of Detail) node allows for different levels of detail and complexity in an object which is directly related to the user's distance from the object. At closer distances, an object with greater detail is loaded. The purpose of the LOD node is to lower loading time with files by working with human eyesight. We can't see details well

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at further distances, so detail at that distance is unnecessary, and by eliminating unnecessary detail the file will be smaller and load quicker. For more details about this node, check out the VRML 2.0 Spec.

Create the scene and add Cameras

1) First create a scene with all the objects, materials and NavigationInfo in the greatest of detail. To the right, we have created a simple world for you to use as an example.

2) Next it is a good idea to add at least one 'Camera' which will be a 'Viewpoint' in the VRML file, but the file will still work without Viewpoints. NOTE:

The more Viewpoints the better in VRML files. The different browsers have various navigation abilities and restraints, therefore the Viewpoints are the one consistent way the user can view the file.

3) To add a Camera, go to the Creation panel/press the 'Camera' button and Choose 'Target' as the Object Type.

4) With your mouse, drag the Camera in the 'Top' viewport and stretch it out.

5) To view what the Camera is seeing, go to the Perspective viewport and press 'c' on the keyboard. And there you are from the Cameras point of view.

6) The Camera is easy to adjust with the Move and Rotate buttons, so test them out.

7) Also it is good to name your Cameras. The Camera name is what the user sees in the VRML browser as the name of the Viewpoint. Otherwise it will default to Camera01, Camera02 etc. Which is pretty boring, if you have a great viewpoint to show off.

8) Viewpoints help tell a story in the VRML file, because you can lead the viewer to ideal viewing points of the model which they might not otherwise explore.

How to implement a LOD into a 3ds max file:

9) Decide how many levels of detail (LOD) you want for a particular object. There will be one more 'level' than specified Range (distance).

10) In this case create 2 modified versions of the original object in the same location. The two other versions can either be the same model with less face counts (less detail) or an entirely different object that will appear in the same place, but at a further distance. With a different object you can create a type of morphing.

11) Then go to the 'Creation' panel and choose 'Helpers' Under 'Helpers' in the pull down choose 'VRML 1.0/2.0/VRBL' and then choose the Object Type LOD.

12) Then go to your scene and drag the mouse anywhere. You will see an icon that signals to you that you have placed the LOD node.

13) Next select the Pick Objects button and choose all of the geometry that will be part of the LOD sequence. Either select the objects with the mouse OR press the keyboard

letter 'H'. The selected objects will appear in the 'Pick Objects' box. To turn off the 'Pick Objects' button, press it again.

14) Once the objects are picked, a default Distance of zero is given to them. Therefore you will need to change them. Highlight the object and the Distance in the scroll panel can be changed. Highlight each object and assign increasing distances. For example,

```
detailed_model 100 (loads first)
less_detailed_model 150
even_less_detailed_model 200
```

15) 3ds max automatically determines Range and Levels from this information. Levels are how many objects are involved in the LOD sequence. Range is the number of different distances not counting the initial range that loads with the file.

16) In the Icon Size box, you can designate a larger or smaller icon size for the LOD node---but this is only for the 3ds max file and has no bearing on the VRML file.

17) All possible information for the 'LOD' node has been entered now. If you need to go back, after leaving the Creation panel, and alter any of the parameters, then go to the 'Modify' panel and adjust.

18) Now you have successively implemented the LOD node into your file.

19) To check, go to the 'Selection' menu! NOTE: You can name your LOD in the same way as every other object in 3ds max in the 'Name' field.

How to Export 3ds max files to VRML:

20) Now Skinny on over to 'File' and choose 'Export'. The Exporter knows that you are referring to the file that is open and requests that you name your file.

21) So first choose '.wrl' file type Then name your file, i.e. 'SuchAndSuch.wrl'

22) Suggestion: Because you might need to go back to the 3ds max file and adjust part of your world, it is a good idea to keep the filename between to two files the same.

Here are the official Fields and Events, for the LOD node in the VRML text, according to the VRML2 Spec:

```
LOD {
  exposedField MFNode level []
  field SFVec3f center 0 0 0
  field MFFloat range []
}
```

Billboard

What is it?

The Billboard node allows you to modify the coordinate system of selected objects so that they constantly rotate around the local z-axis to face the viewer.

This is good when you want the user to always face a particular piece of geometry. For more details about this node, check out the VRML 2.0 Spec.

Create the scene and add Cameras

1) First create a scene with all the objects, materials and NavigationInfo that are needed.

2) Next it is a good idea to add at least one 'Camera' which will be a 'Viewpoint' in the VRML file, but the file will still work without Viewpoints. NOTE:

The more Viewpoints the better in VRML files. The different browsers have various navigation abilities and restraints, therefore the Viewpoints are the one consistent way the user can view the file.

3) To add a Camera, go to the Creation panel/press the 'Camera' button and Choose 'Target' as the Object Type.

4) With your mouse, drag the Camera in the 'Top' viewport and stretch it out.

5) To view what the Camera is seeing, go to the Perspective viewport and press 'c' on the keyboard. And there you are from the Cameras point of view.

6) The Camera is easy to adjust with the Move and Rotate buttons, so test them out.

7) Also it is good to name your Cameras. The Camera name is what the user sees in the VRML browser as the name of the Viewpoint. Otherwise it will default to Camera01, Camera02 etc. Which is pretty boring, if you have a great viewpoint to show off.

8) Viewpoints help tell a story in the VRML file, because you can lead the viewer to ideal viewing points of the model which they might not otherwise explore.

How to implement the Billboard into a 3ds max file:

9) For the Billboard node go to the 'Creation' panel and choose 'Helpers'. Under 'Helpers' use the pull down the menu and choose VRML 2.0. Then choose the

Object Type 'Billboard'.

10) Then go to your scene and drag the mouse anywhere. You will see an icon that signals to you that you have placed the Billboard node.

11) The Screen Alignment option in the parameter rollout, keeps the Billboard-linked geometry aligned when the viewer changes navigation position.

12) NOTE: this linking step is different than all others!--Go to Select and link in the toolbar, then select the object you want linked to the Billboard node. You can do this with either with mouse or press the keyboard letter 'H' and the 'Selection' menu pops up. From the 'Selection' menu select the objects. There is no 'Pick Objects' bar as in all the other node panels.

13) The object rotates around the center of the Billboard icon. This way the geometry is camera-aligned in the browser.

14) In the Icon Size box, you can designate a larger or smaller icon size for the billboard node.

15) It is necessary to rotate the icon to the position wanted in the file. The default setting is facing upside down, and so the geometry linked to it will be perpendicular to how it looks in 3ds max. Therefore it is necessary to change the rotation of the icon.

Now you have entered all possible information for the 'Billboard' node. If you need to go back, after leaving the Creation panel, and alter any of the parameters, then go to the 'Modify' panel and adjust.

16) Now you have successfully implemented a Billboard into your file.

17) To check, go to the 'Selection' menu! NOTE: You can name your Billboard node in 3ds max in the 'Name' field.

How to Export 3ds max files to VRML:

18) Now slide on over to 'File' and choose 'Export'. The Exporter knows that you are referring to the file that is open and requests that you name your file.

19) So first choose '.wrl' file type Then name your file, i.e. 'SuchAndSuch.wrl'

20) Suggestion: Because you might need to go back to the 3ds max file and adjust part of your world, it is a good idea to keep the filename between to two files the same.

21) Check out a more elaborate sample file that demonstrates the Billboard node.

Here are the official Fields and Events, for the Billboard node in the VRML text, according to the VRML2 Spec:

```
Billboard {
  eventIn      MFNode    addChildren
  eventIn      MFNode    removeChildren
  exposedField SFVec3f   axisOfRotation  0 1 0
  exposedField MFNode    children        []
  field        SFVec3f   bboxCenter      0 0 0
  field        SFVec3f   bboxSize        -1 -1 -1
}
```

Useful Tools in 3ds max for Making VRML

3ds max will export many of its animation and modeling capabilities to VRML so it is full of useful tools. Some are particularly useful:

The Polygon Counter:

Under the "Utilities" command panel, select "Polygon Counter". It will tell you the total polygons in the scene and in your selection. You can set a limit of polygons for your scene which it will keep track of.

Optimize Modifier:

Good for reducing the poly count.

Normal Modifier:

Reversing the normals of objects can create interesting effects in VRML. Try reversing the normals of a sphere and spinning it around in your browser.

EditMesh Modifier:

Used constantly for detailed polygon work. Detaching faces as separate objects and optimizing them separately can give you a lot of control of complexity.

Boolean:

Booleans can create massive numbers of polygons in files and should be used very carefully. If you're finding a huge polycount and you've used a Boolean, it's probably the culprit.

The Track View:

Essential for keeping track of objects, grouping and animation just as in 3ds max.

Hiding Objects:

The VRML exporter gives you the choice to export hidden objects. This is useful if you want to isolate geometry or animations in a larger file and test them out separately.

Animation:

Generally, VRML has a non-linear narrative. Whereas in 3ds max you're usually making a scene where one thing happens after the other for output to film or video, a VRML file might have multiple animations happening at once that you link sensors to. They will play in whatever order the user triggers them in the VRML file. This can get confusing in a 3ds max scene. The trackview is particularly useful here to see what's going on.

Wire materials:

Applying a "wire" material to an object will make the geometry export as a wireframe. Wireframes render much faster than faces in VRML - less pixels per frame. This can mean much smaller file size for models and animations.