STANLEY'S GAME MODEL WORKFLOW

Throughout this article I will be demonstrating the various methods I make my game models. The reason for this article is in case I want to highlight previous workflow methods or if I want to share my workflow with other game artists. Each method is done separately, but some share similar steps. I also share tips that are not necessarily intended for the audience, but for personal memory. Hopefully in the future I will have many more methods to making game art, but for now this is the information I have gathered throughout my game artist career. Let's get started.

In this article I will list multiple methods for making game art:

I. 3ds Max to zbrush method.
II. Highpoly to lowpoly method
III. Lowpoly to highpoly method
IV. Simplified method
V. zbrush to 3ds max method

The programs I will use:

1. 3ds Max
2. zbrush
3. Adobe Photoshop
4. CrazyBump

METHOD I. 3DS MAX TO ZBRUSH

Pipeline: 3ds Max modeling, unwrap, render to texture, then to zbrush using GoZ, and making maps in Photoshop.

Pre-visualization

When I make models the first things I approach is pre-visualization. I start by drawing concepts and gathering references from sources (via internet, photos, concept art, and doodles). Next I could either design a modeling sheet of the object or go into 3ds max and free-model the object (not always the best option).

Before going into 3ds Max there are things I want to consider about the model, such as poly flow (the flow of polygon in the model to make sure that every polygon on the object has a purpose. A valuable reference is looking at images that show topology), the maps we should use (such as using a single polys for wings or inverted polys for a sky dome), and any other proficient methods of achieving the desirable features for the object. Once you know what you want the object to look like, then the chaos begins.

Setting the stage

These are things I like to do before modeling. I don't use them all the time, but it's good to know.

1. I usually start by selecting the tab on the right of the perspectives tab in the perspective screen's menu. Where it says "smooth + Highlights", I turn on the "Edged Faces" option to see the model's edges.

2. By default the levels of undos is 20. Sometimes this can be a problem. To change it go to the customize menu and select preferences. In the preference settings select general. There you should see the Scene Undo. Change the levels to 500 (this is the max).

3. Sometimes I want to have a representation of what I'm modeling, so I go to the standard primitives tab and draw out two planes. One plane is sideways, the other is in the background. Make sure the planes have no segments. This will allow me to display my model sheet without any interrupting lines. Then I go to the materials editor, there is where I upload the model sheets. I upload the model sheets by selecting an empty material slot and pushing the square on the right of where it says diffuse. Then I upload the model sheet images and drag and drop the images onto the planes. Make sure the planes are at a decent size and in a good position. If the images looked stretched then you can go to the UVW mapping modifier from the modifier list and using the alignment you can push the "fit" button to make it scale correctly. When modeling with modeling sheets hold the "alt x" keys on the keyboard to toggle between x-ray mode (making objects visible and slightly visible).

4. To ensure that the model sheets are crisp, I go to the customize tab, preferences, and viewports, and click on the configure driver option. In the configure driver option set the background texture size to 1024 and the Download texture size to 512.

5. If the model you are using is for the Unreal Engine or UDK, it's best to use their units. You can do this by going to the Customize menu and units setup. In the display unit scale option, select custom. Set the boxes to "uus = 2.54

centimeters". Close out the menu and go to the main interface. On the top bar, left click the Snap Toggle button and select Home Grid. In the Grid dimensions options set the Grid Spacing to 8, Major Lines every Nth Grid Line to 8, and Perspective View Grid Extent to 64. Finally in the Dynamic update option, select All Viewports. The units will allow proper scaling of the object when importing into unreal.

6. Pressing 7 on the keyboard will display the amount of polygons your object has.

Modeling

I first start by modeling in 3ds max by selecting a shape (cube, plane, cylinder, or chmferbox is easy to work with when starting, but it really depends on what you are modeling). Then I left click on Convert to editable poly and start modeling.

- When modeling watch for edge flow, ever line in the model should have a purpose. This is referred as topology. When making a game model, optimization is always good as long as the model keeps its shape.
- The tools I use a lot are connect, bridge, target weld, cap, and bevel, but it all depends on the way you like to model.
- A neat trick to know when modeling organic or any type of character is to select half of the model and delete one side. Only use that one untouched side to focus modeling. Once you get the look you want, use the mirror or symmetry tool to duplicate that one side onto the other side and target weld each vertex of that side.
- There are good modeling references online to look at, especially looking at modeling tutorials and images with models showing edges and wireframe.
- Shortcuts I depend on are holding the scroll wheel of the mouse and moving the mouse around (panning the view), and holding the Alt button while holding the scroll wheel of the mouse and moving the mouse around (orbiting around the object). A very quick and sufficient way to move throughout 3D space.
- A common mistake is when a person presses the x key on the keyboard by itself; it will make your curser go away.
- For UDK or the unreal engine a model might have collision. To make a collision, duplicate the lowpoly model and give it the name "UCX_name". Make sure the collision is optimized as possible (it can lead to terrible frame rate).
- You can make a model with multiple objects. This would mean setting up multiple unwraps, and creating a multi/sub material (we will get into that later). When making a model with multiple parts make sure to attach and detach the objects in the edit poly modifier.

Unwrap

After modeling the object, the next step is to unwrap it.

// this part is copy and pasted from another tutorial I previously made. It's cuz I'm lazy. lol

In the Modifier list menu add an unwrap modifier and click edit. Next choose mapping and press flatten mapping. Keep it at default (face angle thresh hold 45.0, spacing 0.02.)

- • Unwrapping is easy even with hundreds of pieces. The process is making groups of recognizable pieces, so it's easier to texture. Also you need to try and hide the seams (bold light green lines).

- • Right click to stitch and break pieces. With the "edge mode" selected stitch other pieces together to make recognizable groups. The objective is to hide the seams as much as you can while making groups of recognizable data. If you want to change a piece, "break" the piece in "poly mode".

- • Try and hide the seams under or between places on the model so the player can't see it or is unlikely to see it.

- • Only add the pieces that the player will be seeing, into the square area. Pieces that the player can't see can be left out.

- • Make sure you make the unwrap in one direction so you know the direction the texture will apply to the model (facing upwards for example).

- • Scale the pieces together to prevent texture stretches and size issues.

- • For n00bz: "Stitch" puts pieces together and "break" breaks them apart. After flattening the maps into pieces, select the "edge" mode in the menu bellow the work area. Right click on "Stitch" to put pieces together into recognizable groups, and select "poly" mode and right click "break" to separate them.
  - o Work in the "perspective" view port on the main interface, and work inside the unwrap editor to get an idea what you are doing.
  - o Select all the pieces and drag them outside the square. The pieces that are pieced together, place them back inside the square.
  - o You're trying to hide the seams (bold green lines).
  - o If you get an odd connection while stitching, just hit undo and select one edge.
  - o Don't half ass the job, because it could come back to get you. (one mistake can make you redo the process over)
  - o Think about unwrapping as a puzzle game. Stitch and break to get the perfect groups of pieces for texturing later. With practice, it becomes a fun and easy process (depending on how complex the model is).
- • Make sure you unwrap the object well, because you may end up starting all over.

- If you have a model with multiple objects, it's best to unwrap each part separately (they will be combined later on).
- If you want to make a slight editing adjustment to the object, you can left click the model and convert it to an editable poly (like you did when you started modeling), so that the unwrapping information is saved. When you add the unwrap modifier to the object again, you'll notice the information is still saved. Nevertheless, depending on what you edited you might have to start over again.
- Some models require a lightmap (map that helps lighting) in UDK. To do this go to your unwrap and in the parameters settings and save the unwrap (after you unwrap of course). Next go to the Channel option and set it to map channel 2. Then load the UV you just saved.

Next, you need go to "tools" and click "Render UVW Template" set the object 1024x1024; or 1024 x2048 if it's a rectangle (or powers of two: 512, 1024, 2048, 8192). Leave the rest as default (this step is critical). Next "Render UV template"; save to a desired location, and choose Bitmap as the file format with RGB 24 bit (we are going to take this into Photoshop later).

Next you might want to add a smooth group. You can do this by going back to your object's editable poly modifier and select the element tab. Next scroll down to the polygon: smoothing groups and select 1 (You can add as many smooth groups as you want. You can also select multiple surfaces by using the smooth groups in the polygon tab instead of the element tab).

Using zBrush

Now we will be going into zBrush. I'm not an expert when it comes to zBrush; however, I know enough to get by. We will be bringing in our model into zbrush and sculpting it to create a normal map. There are two ways of doing this. The One way is using GoZ and the other is exporting the object as a .obj file and importing it into zBrush. I've never done the .obj method because I believe it's outdated in my opinion, so I I'll use GoZ.

1. If you haven't installed GoZ, then it is wise to do so. If you already have it, select the object then click on the GoZ option in 3ds max (it should be on the top next to the help option). It should automatically open into zBrush.

   // I realize sometimes zBrush doesn't open it directly (if your program is bootlegged or stuck with a bug). For those in this situation, open up zbrush manually, go to preferences, GoZ (path to 3ds max), double click on browse and find the 3ds max (.exe) launch icon. When you get back into 3ds max, use the GoZ button and it should work (if it doesn't, use GoZ in 3ds max while zbrush is open).

2. When zBrush opens, you should see the object inside the tool menu (if nothing shows, it's because you didn't select the object in 3ds max before pressing GoZ). Use your mouse or graphics tablet to drag out your object into the zbrush screen.
   // Using a mouse in zbrush is very daunting and near to impossible to work with. I recommend using a graphics tablet.

3. Now that the object is in zBrush, we are going to sculpt details into the model and make a normal map.
   To do this we are going to make our model into a 3D object by selecting Edit in the top bar (the default is 2D/3D, meaning it's more like a 3D painting) .
   Now comes the fun part. Go to your Tools menu and open up the Geometry panel.
   There you will see Divide. By pressing the divide button you can choose how smooth or how much polys you want to work with to sculpt and detail the object. Keep in mind to keep the basic shape of the object.
   - Shortcut keys are great when it comes to zBrush, because it saves you time.
     These are a few of the most useful shortcut keys:
     - Free Rotate - **Click & drag Background**
     - Move - **Alt+Click & drag Background**
     - Constrain to 90-degree rotation - **Click+drag, press Shift**
     - Scale – **Alt+Click, Release Alt, drag Background**
     - Rotate around Z-axis - **Shift, Click, release Shift, drag**

   - You can toggle between zBrush and 3ds max by using GoZ.
   - When you want to zoom to a certain area, scale the model.
   - the unwrap data is saved with the model inside zBrush.
   - When working with multiple pieces you can add them by separating them in the layers menu.

4. When you are finished sculpting, the next thing to do is export the details into a normal map. To do this we must first set the division to the lowest level. We can do this by going into the tools menu, selecting geometry, and lowering the sDiv (subdivision levels) to 1.
   Next go to the UV map panel and select a texture size in the UV Map Size option. Next go to Normal Map and select FlipG. Then render the normal map by pressing the Create NormalMap button. To save the normal map, go to the Normal map panel and select CloneNM. This should bring the normal map to the Current texture box. In the current texture box, save the normal map by pressing the export button. Once the normal map has been saved, we can exit zBrush and move on to texturing (if you know how, you can also texture in zBrush).

Texturing in Photoshop

Now we are going to use Photoshop to texture and make additional maps for our object (such as spec, alpha, and illumination).

Before we begin we have to make our ambient occlusion for our diffuse texture, which means we have to go back into 3ds max. Load your object into 3ds max and go to the material editor. Go to a blank material and set the diffuse to white in the Blinn Basic Parameters menu. After that go to the create tab and select the light icon. Change where it says Photometic to standard. In the standart settings choose the Skylight button and click anywhere inside a viewport. Next go to the render menu and to the Light Tracer option. Here you can preview the ambient occlusion of the model. Select the object inside the view port and go to the render to texture menu. Go to the Selected element common settings and choose the size (where it says width and Height). Then go to the Output and press Add. Select the DiffuseMap in the Available Element list. Finally hit render. When you are done you can exit 3ds max and open Photoshop.

In photoshop, open the unwrap (Bitmap) you saved from your render UVW template. Before you start texturing, Double click to unlock your layer. Next press "ctrl I" on your keyboard to invert the image. Then go to File, and Place. Find the ambient occlusion you rendered in 3ds max and press place. This should drop the occlusion directly on top of your unwrap template.

Now open a new layer and you can begin texturing.

- I usually start by coloring in the layer above the ambient occlusion. Then use the drop down menu to try different layer effects.
- Be sure to save the texture sizes that are powers of two (256, 512, 1024, 2048, 4096, and 8192).
- A nice trick to sharpen textures is to duplicate the layer (ctrl J), go to filter, other, and high pass. Use the slider to try how far you can sharpen the image (usually 1.0 or 2.0 is just fine). After that you should be left with a greyish layer. Set the layer drop down list to soft light or hard light to see the results.
- I usually go back and forth between 3ds max and Photoshop to see what the model looks like.
- When the model has multiple objects, all the unwraps should be textured separately.
- A great way to have control while texturing it to duplicate the layer you inverted and move it to the top. Then use the opacity slider to make it transparent.
- If you want you can tweak and polish the normal map by using the smudge tool. You can also add additional details by using the NVidia's Normal Map Filter plug-in (this plug-in is for free; you can download it off their website).

Once you are finished, save the diffuse map. If you are using UDK, save the map as a Targa (.tga) 32 bits/pixel. If you are using another engine like Unity 3D, you can simply save it as a Jpeg.

After the diffuse is complete it's time to make other maps. A spec map , commonly referred as a specular map, makes the model reflectivity. It's the values between white and black that determines how shiny the object is. White means ultra-reflective and black has no reflection at all. Specular maps are mostly seen greyish black. Creating a custom specular map is easy, to start out, go to the Image, adjustments, and desaturate. You can tweak the levels by playing with the intensity and brightness tool. You can view the map in 3ds max (I will show you how to load up the map in the material editor later) and come back to Photoshop to re-adjust and tweak it (another option is to use crazybump). You can also make a simple spec map by just coloring the areas on a different layer.

Let's move on to the alpha map. The alpha (or opacity) map is a white to black map that show the transparency of an object (like see through glass or a barely visible object). White meaning visible and black invisible. The alpha map is pretty much made the same way as a specular map. However, depending on the game engine you are using, you might need either a diffuse (main texture) and an opacity (alpha) map. It's usually a white shape on a black background.

Finally, moving on to an illumination map. The illumination map, or emissive map, is a map that can consist of color yet be of a white to black value. Depending how light it is will depend how much it will glow. A good example is a light bulb in a dark room.

Exporting

Now we're getting to the end of this lesson. It's time to open up 3ds max and load your object. Now we will combine all the maps we have made and see them on the object.

Open up the material editor. Scroll down to the Maps panel. Here is where you will load up your maps. Simply click on the button where it says none and open your desired map.

- if you are stuck in the maps coordinates, noise, and bitmap parameters, click the icon that has the sphere with the arrow going upwards. This will take you back to the previous menu.
- For alpha (opacity) maps, load your map and in the bitmap parameters and make sure Filtering is on Pyramidal, Mono channel output is on RGB Intensity, RGB channel output is on RGB, and Alpha Source is on Image Alpha.

- Load your normal map into the bump option.
- If your model has multiple maps, we will combine them to make a multi/sub material. To do this select a blank pallet in the material editor. At the very top where it says "Standard", select it and open the material/ map Browser. Open the Multi/Sub-Object option and load all the maps. They should appear in their correct place on the model.
- A nice trick after you have all the textures on the model is to view it with a real time shader. You can do this by left clicking Smooth + Highlights in the perspective view port and hover over Lighting and shadows and selecting Enable hardware shading. In the same menu you can turn on exposure control in viewport, enable shadows, and enable ambient occlusion. At the top of the same menu there are two options: illuminate with scene lights and illuminate with default lights. If you add lights in the scene, you can get some really nice results (Be sure to get rid of the lights when it comes to exporting).

Hopefully the model should be textured and ready. Before exporting, it's wise to look and give the object a self-critique. What could be improved on? What can be optimized (reduce polys)? What needs more polish? Does it look realistic? What doesn't look professional about the object? What is most appealing? Are you and others satisfied with the model? It's great to ask questions, because they can only make the model better. If you are satisfied with your final product, then it's time to export.

To export, go to file (or the 3ds max icon at the top of the screen) and select export. If you are using UDK, set the export as ASCII (.ase) with the option Mesh definition, Materials, Mesh normal, mapping coordinates, vertex colors, Geometric and shapes turned on. If you are using Unity 3D, then simply save the file as a .FBX with default settings.

Now that the models are exported, you are finally done. This concludes Method I. 3ds Max to zBrush.

METHOD II. HIGHPOLY TO LOWPOLY

This method is from one of my oldest tutorials. It was specifically made for UDK and the Unreal Engine. However, making the highpoly model is universal and can be applied for any game engine.

There are multiple ways of making a high to lowpoly; however, I find making it this way easiest. I will be creating a high poly model for the object's details, then the low poly that will be used in-game. Next, I will unwrap the lowpoly and make a normal map for it using render to texture. After that I will texture in Photoshop, and bring it into unreal.

Process:
1. High poly
2. Low poly
3. Unwrap
4. Projection
5. Render to texture
6. Photoshop (texturing)
7. Unreal

1.Make a highpoly model.

- Unreal works best with polygons of fours vertices, but this can be ignored.

- It's all about edge flow; hold the ctrl key down to get rid of vertexes when removing them.

- The highpoly is only for details, it doesn't matter how many polys it has.

2. Make a lowpoly model around the high poly.

- add chamfer to the sides of the object to make it have smooth edges

- Make it slightly bigger than the highpoly. The projection modifier will project outwards from the high poly onto the lowpoly's unwrap.

- You can model individual pieces with the low poly. You need to "attach" the

pieces together and make it a single group.

- To check for object stats press 7. It depends on the object over how many polygons it can be. Complex models have more polygons than easy objects. It's all about edge flow, if there's no purpose for a segment than remove it.
- Make sure it's not touching the highpoly model.
- If a model is done by primitives (shapes) then it's concluded as a lowpoly.
- ALT X for x-ray mode
- Next you might want to add a smooth group. You can do this by going back to your object's editable poly modifier and select the element tab. Next scroll down to the polygon: smoothing groups and select 1 (You can add as many smooth groups as you want. You can also select multiple surfaces by using the smooth groups in the polygon tab instead of the element tab).

3. Using the lowpoly model around it, duplicate it and call it "UCX_name". Unreal registers this as collision (don't do this if you are using another game engine). Then you want to hide it.

- You can use multiple collisions as long as they are "attached" to each other.
- Not all objects need collision, only the ones that will be affecting game play. If it's in the background and the player isn't going to interact with it, leave it without collision. Collision affects frame rate.

4. Once you are done creating the lowpoly, you need to unwrap it. Add an unwrap modifier and click edit. Next chose choose mapping and press flatten mapping. Keep it at default (face angle thresh hold 45.0, spacing 0.02.)

- Unwrapping is easy even with hundreds of pieces. The process is making groups of recognizable pieces, so it's easier to texture. Also you need to try and hide the seams (bold light green lines).
- Right click to stitch and break pieces. With the "edge mode" selected stitch other pieces together to make recognizable groups. The objective is to hide the seams as much as you can while making groups of recognizable data. If you want to change a piece, "break" the piece in "poly mode".
- Try and hide the seams under or between places on the model so the player can't see it. However, if you can't hide it, it doesn't matter, unless if the seam is visible.
- Only add the pieces that the player will be seeing, into the square area. Pieces that the player can't see can be left out.
- Make sure you make the unwrap in one direction so you know the direction the texture will apply to the model.
- Scale the pieces together to prevent texture stretches and size issues.

• For n00bz o "Stitch" puts pieces together and "break" breaks them apart. After flattening the maps into pieces, select the "edge" mode in the tab bellow the work area. Right click on "Stitch" to put together pieces into recognizable groups, and select "poly" mode and right click "break" to separate them.

> o Work in the "perspective" view port on the main interface, and work inside the unwrap editor to get an idea what you are doing.
> o Select all the pieces and drag them outside the square. The pieces that are pieced together, place them back inside the square.
> o You're trying to hide the seams (bold green lines).
> o If you get an odd connection while stitching, just hit undo and select one edge.
> o Don't half ass the job, because it could come back to get you. (one mistake can make you redo the process over)
> o Think about unwrapping as a puzzle game. Stitch and break to get the perfect groups of pieces for texturing later. With practice, it becomes a fun and easy process (depending on how complex the model is).

5. Next, you need go to "tools" and click "Render UVW Template" set the object 1024x1024; or 1024 x2048 if it's a rectangle. Leave the rest as default. (this step is critical) All textures must be made in powers of two. Next "Render UV template"; save to a desired location, and chose Bitmap as the file format. (we are going to take this into Photoshop later). Next you might want to add a smooth group. You can do this by going back to your object's editable poly modifier and select you element tab. Next scroll down to the polygon: smoothing groups and select 1 (You can add as many smooth groups as you want. You can also select multiple surfaces by using the smooth groups in the polygon tab instead of the element tab).

6. Add a "projection" modifier. Go to "Reference Geometry" chose pick or pick list and add the high poly model. Next go to "Cage" and check "shaded". Then "push" the "amount" out a little.

7. Now the fun crap. Press 0 for "Render to Texture" (Rendering tab, and select Render to Texture). Go to "Render Setting" under General Settings, and click on "Setup". Go to the bottom in the "Common" tab and "Assign Renderer". In Production chose "Mental Ray" (make sure you are not using any materials; all materials must be at default) Next go to the "Render" tab, in "sampling quality" change the "Samples Per Pixel" to Min 4 (or ¼), and Max to 16. Then close out of the window.

8. Back to the Render to Texture window. Go to "Selected object settings" and check "enable" Next go to "Projection Mapping" check "enable". Make sure it says "projection" in the tab next to enable. In the "Options" menu (if you want), you can check Ray miss check to see if you have any errors (all errors or holes will appear in red, and make sure you turn it off in your final render). Go to "Mapping coordinates" in the

Render to Texture window. Select "Use Existing Channel" for both Object and sub object. After that go to "Output" and "Add" any maps you need. Preferably Normal map and ambient occlusion (you can use ambient occlusion for test). In Selected Element Common Settings use 1024 x 1024 for sample and 2048 x 2048 for final. Next go to "Select element unique settings" and select "output into normal map". Then close the render tab and re-open it. Go back to "Select element unique settings", set the samples to 32, but for final set it to 64.

9. NOW RENDER!!! What you see in the final render window isn't the map you're looking for. The maps you are looking for is where ever it was saved. You can preview the occlusion map, or bump map by adding them in the material editor under maps. (Put occlusion into diffuse and make sure when adding your normal to set bump to 100%). It's ok if it looks bad; as long as you get the desired maps you're in the right path) Now that the hard part is done, it's off to Photoshop!

10. Open Photoshop and bring in the Unwrap from step 5. It's supposed to have black with green and white lines. Many people use different methods of texturing; however, mine is the easiest. Double click the layer to unlock it. Then simply go to Image, Adjustments, and Invert (or ctrl I). Add a new layer and start texturing! (keep in mind how you did your unwrap) Also you can tweak your normal map. Not every render is perfect even if it's done correctly; usually the final results are edited in Photoshop.

11. When you are done save it as a Targa file with 32 bits/pixel. This will be your Diffuse map (since the size of the unwrap is in powers of two it'll be easy getting it into unreal) Usually an object has 3 properties when bringing it into unreal a diffuse map, specular map, and a normal map. The diffuse acts as the main texture, the specular is a grey to black texture for reflections.

12. Go back into 3ds Max and place your new texture in the diffuse map in the material editor. See what the object looks like. If you're not satisfied you can always go back and tweak the texture.

13. Now remove the material from the object (and projection modifier) and save the model. Go to "Export" and export it as an ASCII scene export (.ASC). Make sure the first 3 options are checked, but I would check them all just to be safe. (it's a common mistake when Unreal refuses an object or the material references to the object)

14. Now Open Unreal or UDK and create a new package (or open one that you already have). Left click on the package and click import (or select the import button) Import the ASC file and then import the textures. To apply the materials to the object you have to create a material. You can do this by right clicking the empty space inside the editor and selected new material. Open the material editor and select a texture you want to open in the generic browser. After it highlights, go back into the material editor and scroll down the list to texture sample. Drag out the texture sample and the texture from the

generic browser will appear inside the square. Link that with the channel you want with the material. Do the same with all the other textures. After you are done save using the green check mark, and open the object in the generic browser. In the objects menu, go to the objects properties and click the LOD properties. Click down from all the settings to where it says material. Select the material you have created in the generic browser and go back into the object properties and add the material. If everything is done correctly the model should have the textures applied correctly. And Done!

METHOD III. LOWPOLY TO HIGHPOLY

This method introduces an alternative way to baking a highpoly model. Some of the steps will be taken from previous tutorials. This method is pretty much the same as the highpoly to lowpoly tutorial; nevertheless, the steps are slightly rotated.

Pipeline: Modeling lowpoly, unwrap, modeling highpoly, projection, render to texture, and texture in Photoshop.

Lowpoly Model

I first start by modeling in 3ds max by selecting a shape (cube, plane, cylinder, or chmferbox is easy to work with when starting, but it really depends on what you are modeling). Then I left click on Convert to editable poly and start modeling.

- When modeling watch for edge flow, ever line in the model should have a purpose. This is referred as topology. When making a game model, optimization is always good as long as the model keeps its shape.
- The tools I use a lot are connect, bridge, target weld, cap, and bevel, but it all depends on the way you like to model.
- A neat trick to know when modeling organic or any type of character is to select half of the model and delete one side. Only use that one untouched side to focus modeling. Once you get the look you want, use the mirror or symmetry tool to duplicate that one side onto the other side and target weld each vertex of that side.
- There are good modeling references online to look at, especially looking at modeling tutorials and images with models showing edges and wireframe.
- Shortcuts I depend on are holding the scroll wheel of the mouse and moving the mouse around (panning the view), and holding the Alt button while holding the scroll wheel of the mouse and moving the mouse around (orbiting around the object). A very quick and sufficient way to move throughout 3D space.
- A common mistake is when a person presses the x key on the keyboard by itself; it will make your curser go away.

- For UDK or the unreal engine a model might have collision. To make a collision, duplicate the lowpoly model and give it the name "UCX_name". Make sure the collision is optimized as possible (it can lead to terrible frame rate).

- You can make a model with multiple objects. This would mean setting up multiple unwraps, and creating a multi/sub material (we will get into that later). When making a model with multiple parts make sure to attach and detach the objects in the edit poly modifier.

Before moving on to the unwrap, we need to duplicate the lowpoly model. We can do this by selecting the object and going to edit and clone. In the clone options, be sure to set it to copy instead of instance in the object menu (copy makes a new clone and instance will modify the clone according to the original).The duplicated model will be used to make the highpoly model.

Unwrap

After making the lowpoly model, the next step is to unwrap it.

In the Modifier list menu add an unwrap modifier and click edit. Next choose mapping and press flatten mapping. Keep it at default (face angle thresh hold 45.0, spacing 0.02.)

• Unwrapping is easy even with hundreds of pieces. The process is making groups of recognizable pieces, so it's easier to texture. Also you need to try and hide the seams (bold light green lines).

• Right click to stitch and break pieces. With the "edge mode" selected stitch other pieces together to make recognizable groups. The objective is to hide the seams as much as you can while making groups of recognizable data. If you want to change a piece, "break" the piece in "poly mode".

• Try and hide the seams under or between places on the model so the player can't see it or is unlikely to see it.

• Only add the pieces that the player will be seeing, into the square area. Pieces that the player can't see can be left out.

• Make sure you make the unwrap in one direction so you know the direction the texture will apply to the model (facing upwards for example).

• Scale the pieces together to prevent texture stretches and size issues.

• For n00bz: "Stitch" puts pieces together and "break" breaks them apart. After flattening the maps into pieces, select the "edge" mode in the menu bellow the work area. Right click on "Stitch" to put pieces together into recognizable groups, and select "poly" mode and right click "break" to separate them.

o Work in the "perspective" view port on the main interface, and work inside the unwrap editor to get an idea what you are doing.

o Select all the pieces and drag them outside the square. The pieces that are pieced together, place them back inside the square.

o You're trying to hide the seams (bold green lines).

o If you get an odd connection while stitching, just hit undo and select one edge.

o Don't half ass the job, because it could come back to get you. (one mistake can make you redo the process over)

o Think about unwrapping as a puzzle game. Stitch and break to get the perfect groups of pieces for texturing later. With practice, it becomes a fun and easy process (depending on how complex the model is).

• Make sure you unwrap the object well, because you may end up starting all over.

• If you have a model with multiple objects, it's best to unwrap each part separately (they will be combined later on).

• If you want to make a slight editing adjustment to the object, you can left click the model and convert it to an editable poly (like you did when you started modeling), so that the unwrapping information is saved. When you add the unwrap modifier to the object again, you'll notice the information is still saved. Nevertheless, depending on what you edited you might have to start over again.

Next, you need go to "tools" and click "Render UVW Template" set the object 1024x1024; or 1024 x2048 if it's a rectangle (or powers of two: 512, 1024, 2048, 8192). Leave the rest as default (this step is critical). Next "Render UV template"; save to a desired location, and choose Bitmap as the file format with RGB 24 bit (we are going to take this into Photoshop later).

Next you might want to add a smooth group. You can do this by going back to your object's editable poly modifier and select the element tab. Next scroll down to the polygon: smoothing groups and select 1 (You can add as many smooth groups as you want. You can also select multiple surfaces by using the smooth groups in the polygon tab instead of the element tab).

Highpoly model

The next step is to make a highpoly model. To start, we need to get the cloned lowpoly model we made earlier. Hide the original lowpoly so it doesn't get in the way. This can be done by left clicking and selecting hide selection (To unhide it, left click and select unhide all). Now we can start modeling the highpoly and add all the details.

• It's all about edge flow; hold the ctrl key down to get rid of vertexes when removing them.

• The highpoly is only for details, it doesn't matter how many polys it has.

• A simple way to model highpoly is by adding a turbo smooth. Then left click it and turning it into an editable poly. Now you can add even more detail.

After you are done modeling the highpoly, unhide the lowpoly (left click, unhide all). Now you have to size the highpoly to fit within the lowpoly. We will use a projection, then use render to texture to bake the normal map for our lowpoly model.

Projection

Using the highpoly model, add a "projection" modifier. Go to "Reference Geometry" chose pick or pick list and add the high poly model. Next go to "Cage" and check "shaded". Then "push" the "amount" out a little.
//To be technical, this projection is going to render the normal map outwards onto the lowpoly model.

Render to texture

Press 0 for "Render to Texture" (Rendering tab, and select Render to Texture). Go to "Render Setting" under General Settings, and click on "Setup". Go to the bottom in the "Common" tab and "Assign Renderer". In Production chose "Mental Ray" (make sure you are not using any materials; all materials must be at default) Next go to the "Render" tab, in "sampling quality" change the "Samples Per Pixel" to Min 4 (or ¼), and Max to 16. Then close out of the window.

Go back to the Render to Texture window. Go to "Selected object settings" and check "enable" Next go to "Projection Mapping" check "enable". Make sure it says "projection" in the tab next to enable. In the "Options" menu (if you want), you can check Ray miss check to see if you have any errors (all errors or holes will appear in red, and make sure you turn it off in your final render). Go to "Mapping coordinates" in the Render to Texture window. Select "Use Existing Channel" for both Object and sub object. After that go to "Output" and "Add" any maps you need. Preferably Normal map and ambient occlusion (you can use ambient occlusion for test). In Selected Element Common Settings use 1024 x 1024 for sample and 2048 x 2048 for final. Next go to "Select element unique settings" and select "output into normal map". Then close the render tab and re-open it. Go back to "Select element unique settings", set the samples to 32, but for final set it to 64.

NOW RENDER!!! What you see in the final render window isn't the map you're looking for. The maps you are looking for is where ever it was saved. You can preview the occlusion map, or bump map by adding them in the material editor under maps. Now that you have the normal map, it's time to move into Photoshop to make some texture maps.

Texturing in Photoshop

Now we are going to use Photoshop to texture and make additional maps for our object (such as spec, alpha, and illumination).

Before we begin we have to make our ambient occlusion for our diffuse texture, which means we have to go back into 3ds max. Load your object into 3ds max and go to the material editor. Go to a blank material and set the diffuse to white in the Blinn Basic Parameters menu. After that go to the create tab and select the light icon. Change where it says Photometic to standard. In the standart settings choose the Skylight button and click anywhere inside a viewport. Next go to the render menu and to the Light Tracer option. Here you can preview the ambient occlusion of the model. Select the object inside the view port and go to the render to texture menu. Go to the Selected element common settings and choose the size (where it says width and Height). Then go to the Output and press Add. Select the DiffuseMap in the Available Element list. Finally hit render. When you are done you can exit 3ds max and open Photoshop.

In photoshop, open the unwrap (Bitmap) you saved from your render UVW template. Before you start texturing, Double click to unlock your layer. Next press "ctrl I" on your keyboard to invert the image. Then go to File, and Place. Find the ambient occlusion you rendered in 3ds max and press place. This should drop the occlusion directly on top of your unwrap template.

Now open a new layer and you can begin texturing.

- I usually start by coloring in the layer above the ambient occlusion. Then use the drop down menu to try different layer effects.

- Be sure to save the texture sizes that are powers of two (256, 512, 1024, 2048, 4096, and 8192).

- A nice trick to sharpen textures is to duplicate the layer (ctrl J), go to filter, other, and high pass. Use the slider to try how far you can sharpen the image (usually 1.0 or 2.0 is just fine). After that you should be left with a greyish layer. Set the layer drop down list to soft light or hard light to see the results.

- I usually go back and forth between 3ds max and Photoshop to see what the model looks like.

- When the model has multiple objects, all the unwraps should be textured separately.
- A great way to have control while texturing it to duplicate the layer you inverted and move it to the top. Then use the opacity slider to make it transparent.

Once you are finished, save the diffuse map. If you are using UDK, save the map as a Targa (.tga) 32 bits/pixel. If you are using another engine like Unity 3D, you can simply save it as a Jpeg.

After the diffuse is complete it's time to make other maps. A spec map , commonly referred as a specular map, makes the model reflectivity. It's the values between white and black that determines how shiny the object is. White means ultra-reflective and black has no reflection at all. Specular maps are mostly seen greyish black. Creating a custom specular map is easy, to start out, go to the Image, adjustments, and desaturate. You can tweak the levels by playing with the intensity and brightness tool. You can view the map in 3ds max (I will show you how to load up the map in the material editor later) and come back to Photoshop to re-adjust and tweak it (another option is to use crazybump). You can also make a simple spec map by just coloring the areas on a different layer.

Let's move on to the alpha map. The alpha (or opacity) map is a white to black map that show the transparency of an object (like see through glass or a barely visible object). White meaning visible and black invisible. The alpha map is pretty much made the same way as a specular map. However, depending on the game engine you are using, you might need either a diffuse (main texture) and an opacity (alpha) map. It's usually a white shape on a black background.

Finally, moving on to an illumination map. The illumination map, or emissive map, is a map that can consist of color yet be of a white to black value. Depending how light it is will depend how much it will glow. A good example is a light bulb in a dark room.

Exporting

Now we're getting to the end of this lesson. It's time to open up 3ds max and load your object. Now we will combine all the maps we have made and see them on the object.

Open up the material editor. Scroll down to the Maps panel. Here is where you will load up your maps. Simply click on the button where it says none and open your desired map.

•   if you are stuck in the maps coordinates, noise, and bitmap parameters, click the icon that has the sphere with the arrow going upwards. This will take you back to the previous menu.

•   For alpha (opacity) maps, load your map and in the bitmap parameters and make sure Filtering is on Pyramidal, Mono channel output is on RGB Intensity, RGB channel output is on RGB, and Alpha Source is on Image Alpha.

•   Load your normal map into the bump option.

•   If your model has multiple maps, we will combine them to make a multi/sub material. To do this select a blank pallet in the material editor. At the very top where it says "Standard", select it and open the material/ map Browser. Open the Multi/Sub-Object option and load all the maps. They should appear in their correct place on the model.

•   A nice trick after you have all the textures on the model is to view it with a real time shader. You can do this by left clicking Smooth + Highlights in the perspective view port and hover over Lighting and shadows and selecting Enable hardware shading. In the same menu you can turn on exposure control in viewport, enable shadows, and enable ambient occlusion. At the top of the same menu there are two options: illuminate with scene lights and illuminate with default lights. If you add lights in the scene, you can get some really nice results (Be sure to get rid of the lights when it comes to exporting).

Hopefully the model should be textured and ready. Before exporting, it's wise to look and give the object a self-critique. What could be improved on? What needs more polish? What doesn't look professional about the object? What is most appealing? It's great to ask questions, because they can only make the model better. If you are satisfied with your final product, then it's time to export.

To export, go to file (or the 3ds max icon at the top of the screen) and select export. If you are using UDK, set the export as ASCII (.ase) with the option Mesh definition, Materials, Mesh normal, mapping coordinates, vertex colors, Geometric and shapes turned on. If you are using Unity 3D, then simply save the file as a .FBX with default settings.

Now that the models are exported, you are finally done. This concludes Method III. Lowpoly to Highpoly.

METHOD IV. SIMPLIFIED METHOD

This method is very simple and can be made for almost any beginning game engine. This method can be used for making test/ placeholder models (models used as placeholders in a Work in progress (WIP) level). These models can be popped out fairly fast saving time or if met with short deadline. Most commonly referred as PS2 graphics. Some of this method's information is taken from previous methods.

Pipeline: Modeling lowpoly, unwrap, and making maps in Photoshop and Crazybump.

Lowpoly Model

I first start by modeling in 3ds max by selecting a shape (cube, plane, cylinder, or chmferbox is easy to work with when starting, but it really depends on what you are modeling). Then I left click on Convert to editable poly and start modeling.

- When modeling watch for edge flow, ever line in the model should have a purpose. This is referred as topology. When making a game model, optimization is always good as long as the model keeps its shape.
- The tools I use a lot are connect, bridge, target weld, cap, and bevel, but it all depends on the way you like to model.
- A neat trick to know when modeling organic or any type of character is to select half of the model and delete one side. Only use that one untouched side to focus modeling. Once you get the look you want, use the mirror or symmetry tool to duplicate that one side onto the other side and target weld each vertex of that side.
- There are good modeling references online to look at, especially looking at modeling tutorials and images with models showing edges and wireframe.
- Shortcuts I depend on are holding the scroll wheel of the mouse and moving the mouse around (panning the view), and holding the Alt button while holding the scroll wheel of the mouse and moving the mouse around (orbiting around the object). A very quick and sufficient way to move throughout 3D space.
- A common mistake is when a person presses the x key on the keyboard by itself; it will make your curser go away.
- For UDK or the unreal engine a model might have collision. To make a collision, duplicate the lowpoly model and give it the name "UCX_name". Make sure the collision is optimized as possible (it can lead to terrible frame rate).

Unwrap

Now that the lowpoly object is modeled, the next step is to unwrap.

In the Modifier list menu add an unwrap modifier and click edit. Next choose mapping and press flatten mapping. Keep it at default (face angle thresh hold 45.0, spacing 0.02.)

• Unwrapping is easy even with hundreds of pieces. The process is making groups of recognizable pieces, so it's easier to texture. Also you need to try and hide the seams (bold light green lines).

• Right click to stitch and break pieces. With the "edge mode" selected stitch other pieces together to make recognizable groups. The objective is to hide the seams as much as you can while making groups of recognizable data. If you want to change a piece, "break" the piece in "poly mode".

• Try and hide the seams under or between places on the model so the player can't see it or is unlikely to see it.

• Only add the pieces that the player will be seeing, into the square area. Pieces that the player can't see can be left out.

• Make sure you make the unwrap in one direction so you know the direction the texture will apply to the model (facing upwards for example).

• Scale the pieces together to prevent texture stretches and size issues.

• For n00bz: "Stitch" puts pieces together and "break" breaks them apart. After flattening the maps into pieces, select the "edge" mode in the menu bellow the work area. Right click on "Stitch" to put pieces together into recognizable groups, and select "poly" mode and right click "break" to separate them.

    o Work in the "perspective" view port on the main interface, and work inside the unwrap editor to get an idea what you are doing.

    o Select all the pieces and drag them outside the square. The pieces that are pieced together, place them back inside the square.

    o You're trying to hide the seams (bold green lines).

    o If you get an odd connection while stitching, just hit undo and select one edge.

    o Don't half ass the job, because it could come back to get you. (one mistake can make you redo the process over)

    o Think about unwrapping as a puzzle game. Stitch and break to get the perfect groups of pieces for texturing later. With practice, it becomes a fun and easy process (depending on how complex the model is).

- Make sure you unwrap the object well, because you may end up starting all over.
- If you have a model with multiple objects, it's best to unwrap each part separately (they will be combined later on).
- If you want to make a slight editing adjustment to the object, you can left click the model and convert it to an editable poly (like you did when you started modeling), so that the unwrapping information is saved. When you add the unwrap modifier to the object again, you'll notice the information is still saved. Nevertheless, depending on what you edited you might have to start over again.

Next, you need go to "tools" and click "Render UVW Template" set the object 1024x1024; or 1024 x2048 if it's a rectangle (or powers of two: 512, 1024, 2048, 8192). Leave the rest as default (this step is critical). Next "Render UV template"; save to a desired location, and choose Bitmap as the file format with RGB 24 bit (we are going to take this into Photoshop later).

Next you might want to add a smooth group. You can do this by going back to your object's editable poly modifier and select the element tab. Next scroll down to the polygon: smoothing groups and select 1 (You can add as many smooth groups as you want. You can also select multiple surfaces by using the smooth groups in the polygon tab instead of the element tab).

Now that the lowpoly is unwrapped, we can jump right into Photoshop.

Making textures in Photoshop and Crazybump

Unlike previous tutorials, this part will have some copied material from previous methods and additional material.

Now we are going to use Photoshop to texture and make additional maps for our object (such as spec, alpha, and illumination).
Before we begin it is optional to make our ambient occlusion for our diffuse texture. Do this by going back into 3ds max. Load your object into 3ds max and go to the material editor. Go to a blank material and set the diffuse to white in the Blinn Basic Parameters menu. After that go to the create tab and select the light icon. Change where it says Photometic to standard. In the standart settings choose the Skylight button and click anywhere inside a viewport. Next go to the render menu and to the Light Tracer option. Here you can preview the ambient occlusion of the model. Select the object inside the view port and go to the render to texture menu. Go to the Selected element common settings and

choose the size (where it says width and Height). Then go to the Output and press Add. Select the DiffuseMap in the Available Element list. Finally hit render. When you are done you can exit 3ds max and open Photoshop.

In photoshop, open the unwrap (Bitmap) you saved from your render UVW template. Before you start texturing, Double click to unlock your layer. Next press "ctrl I" on your keyboard to invert the image. Then go to File, and Place. Find the ambient occlusion you rendered in 3ds max and press place. This should drop the occlusion directly on top of your unwrap template.
Now open a new layer and you can begin texturing.

- I usually start by coloring in the layer above the ambient occlusion. Then use the drop down menu to try different layer effects.

- Be sure to save the texture sizes that are powers of two (256, 512, 1024, 2048, 4096, and 8192).

- A nice trick to sharpen textures is to duplicate the layer (ctrl J), go to filter, other, and high pass. Use the slider to try how far you can sharpen the image (usually 1.0 or 2.0 is just fine). After that you should be left with a greyish layer. Set the layer drop down list to soft light or hard light to see the results.

- I usually go back and forth between 3ds max and Photoshop to see what the model looks like.

- When the model has multiple objects, all the unwraps should be textured separately.

- A great way to have control while texturing it to duplicate the layer you inverted and move it to the top. Then use the opacity slider to make it transparent.

Once you are finished, save the diffuse map. If you are using UDK, save the map as a Targa (.tga) 32 bits/pixel. If you are using another engine like Unity 3D, you can simply save it as a Jpeg.

After the diffuse is complete it's time to make other maps. A spec map , commonly referred as a specular map, makes the model reflectivity. It's the values between white and black that determines how shiny the object is. White means ultra-reflective and black has no reflection at all. Specular maps are mostly seen greyish black. Creating a custom specular map is easy, to start out, go to the Image, adjustments, and desaturate. You can tweak the levels by playing with the intensity and brightness tool. You can view the map in 3ds max (I will show you how to load up the map in the material editor later) and come

back to Photoshop to re-adjust and tweak it. You can also make a simple spec map by just coloring the areas on a different layer.

Let's move on to the alpha map. The alpha (or opacity) map is a white to black map that show the transparency of an object (like see through glass or a barely visible object). White meaning visible and black invisible. The alpha map is pretty much made the same way as a specular map. However, depending on the game engine you are using, you might need either a diffuse (main texture) and an opacity (alpha) map. It's usually a white shape on a black background.

Finally, moving on to an illumination map. The illumination map, or emissive map, is a map that can consist of color yet be of a white to black value. Depending how light it is will depend how much it will glow. A good example is a light bulb in a dark room.

Now we are going to use Photoshop to texture and make additional maps for our object (such as spec, alpha, and illumination).
Before we begin we have to make our ambient occlusion for our diffuse texture, which means we have to go back into 3ds max. Load your object into 3ds max and go to the material editor. Go to a blank material and set the diffuse to white in the Blinn Basic Parameters menu. After that go to the create tab and select the light icon. Change where it says Photometic to standard. In the standart settings choose the Skylight button and click anywhere inside a viewport. Next go to the render menu and to the Light Tracer option. Here you can preview the ambient occlusion of the model. Select the object inside the view port and go to the render to texture menu. Go to the Selected element common settings and choose the size (where it says width and Height). Then go to the Output and press Add. Select the DiffuseMap in the Available Element list. Finally hit render. When you are done you can exit 3ds max and open Photoshop.

In photoshop, open the unwrap (Bitmap) you saved from your render UVW template. Before you start texturing, Double click to unlock your layer. Next press "ctrl I" on your keyboard to invert the image. Then go to File, and Place. Find the ambient occlusion you rendered in 3ds max and press place. This should drop the occlusion directly on top of your unwrap template.
Now open a new layer and you can begin texturing.

- I usually start by coloring in the layer above the ambient occlusion. Then use the drop down menu to try different layer effects.

- Be sure to save the texture sizes that are powers of two (256, 512, 1024, 2048, 4096, and 8192).
- A nice trick to sharpen textures is to duplicate the layer (ctrl J), go to filter, other, and high pass. Use the slider to try how far you can sharpen the image (usually 1.0 or 2.0 is just fine). After that you should be left with a greyish layer. Set the layer drop down list to soft light or hard light to see the results.
- I usually go back and forth between 3ds max and Photoshop to see what the model looks like.
- When the model has multiple objects, all the unwraps should be textured separately.
- A great way to have control while texturing it to duplicate the layer you inverted and move it to the top. Then use the opacity slider to make it transparent.

Once you are finished, save the diffuse map. If you are using UDK, save the map as a Targa (.tga) 32 bits/pixel. If you are using another engine like Unity 3D, you can simply save it as a Jpeg.

After the diffuse is complete it's time to make other maps. A spec map , commonly referred as a specular map, makes the model reflectivity. It's the values between white and black that determines how shiny the object is. White means ultra-reflective and black has no reflection at all. Specular maps are mostly seen greyish black. Creating a custom specular map is easy, to start out, go to the Image, adjustments, and desaturate. You can tweak the levels by playing with the intensity and brightness tool. You can view the map in 3ds max (I will show you how to load up the map in the material editor later) and come back to Photoshop to re-adjust and tweak it (another option is to use crazybump). You can also make a simple spec map by just coloring the areas on a different layer.

Let's move on to the alpha map. The alpha (or opacity) map is a white to black map that show the transparency of an object (like see through glass or a barely visible object). White meaning visible and black invisible. The alpha map is pretty much made the same way as a specular map. However, depending on the game engine you are using, you might need either a diffuse (main texture) and an opacity (alpha) map. It's usually a white shape on a black background.

Finally, moving on to an illumination map. The illumination map, or emissive map, is a map that can consist of color yet be of a white to black value.

Depending how light it is will depend how much it will glow. A good example is a light bulb in a dark room.

Now that the maps are described and out of the way, let's open Crazybump (Crazybump's older version can be found and downloaded for free; nevertheless, the updated version you have to pay). Crazybump allows you to make normals, displacement, occlusion, specularity, and diffuse maps. It's extremely easy to use and is a great tool to make the mapping process simple and quick. We can do this by launching Crazybump and select the open button to begin. There you will choose an image. For this example you will choose the Open photograph from file icon and open the diffuse texture you made for your model. Next it should give you two options (one concave the other convex; meaning one inward the other outward), choose the shape you prefer more. Then you should be in the interface that shows you all the maps. Here you will play with the settings and use the preview box to make it the way you like (right click drag to rotate object in preview or left click drag to move the light). Usually a game model always has a diffuse, normal, and a specular map (alpha or illumination map if needed), so this is what we are going to need. Once you have selected the amount of detail and the specularity we will export the maps. For this example we will export a normal and specular map. We can do this by going to save at the bottom for the screen and selecting save_to file (ex: save normal to file). Here we can save the file and set the file format. If you are using Unreal or UDK, use the Targa format, but if it's for Unity 3D you can save it as a Jpeg. Once the files are saved you can open them in 3ds max.

Exporting

Now we're getting to the end of this lesson. It's time to open up 3ds max and load your object. Now we will combine all the maps we have made and see them on the object.

Open up the material editor. Scroll down to the Maps panel. Here is where you will load up your maps. Simply click on the button where it says none and open your desired map.

- if you are stuck in the maps coordinates, noise, and bitmap parameters, click the icon that has the sphere with the arrow going upwards. This will take you back to the previous menu.

- For alpha (opacity) maps, load your map and in the bitmap parameters and make sure Filtering is on Pyramidal, Mono channel output is on RGB Intensity, RGB channel output is on RGB, and Alpha Source is on Image Alpha.

- Load your normal map into the bump option.

- If your model has multiple maps, we will combine them to make a multi/sub material. To do this select a blank pallet in the material editor. At the very top where it says "Standard", select it and open the material/ map Browser. Open the Multi/Sub-Object option and load all the maps. They should appear in their correct place on the model.

- A nice trick after you have all the textures on the model is to view it with a real time shader. You can do this by left clicking Smooth + Highlights in the perspective view port and hover over Lighting and shadows and selecting Enable hardware shading. In the same menu you can turn on exposure control in viewport, enable shadows, and enable ambient occlusion. At the top of the same menu there are two options: illuminate with scene lights and illuminate with default lights. If you add lights in the scene, you can get some really nice results (Be sure to get rid of the lights when it comes to exporting).

Hopefully the model should be textured and ready. Before exporting, it's wise to look and give the object a self-critique. What could be improved on? What needs more polish? What doesn't look professional about the object? What is most appealing? It's great to ask questions, because they can only make the model better. If you are satisfied with your final product, then it's time to export.

To export, go to file (or the 3ds max icon at the top of the screen) and select export. If you are using UDK, set the export as ASCII (.ase) with the option Mesh definition, Materials, Mesh normal, mapping coordinates, vertex colors, Geometric and shapes turned on. If you are using Unity 3D, then simply save the file as a .FBX with default settings.

Now that the models are exported, you are finally done. This concludes Method IV. Simplified method.

METHOD V. ZBRUSH TO 3DS MAX METHOD

This method is something I have been working on for a while. Most of everything will be done using zBrush. There might be more to learn than the

information in this method. I will do my best to cover everything that I have learned with my experience using zbrush.

Pipeline: modeling, unwrap, texturing, baking, and exporting to 3ds Max.

Modeling

Let's get started by finding some reference material. We will be doing the lowpoly as well as the highpoly in zBrush, so be sure to gather images with useful details. Now without any delay let's get started.

We are first going to start by using zSpheres. But first let's set up the stage by having a backdrop for modeling our reference. This is optional, but you can also start by immediately modeling with zSpheres. To set up a backdrop, open zBrush and go to the tool menu. Go to the tool box (in the load and import menu under clone and above zshere). Open the menu and go to the load tool option. There you should see Image plane (if not open the image plane folder), then select ImagePlaneX.Z.TL. It should now be in your Tool box. Now add the texture by going to your current texture box and selecting import. Locate and select the reference image (or model sheet). Then go to the current material box and select a white material in the material menu. Now click and drag the tool (model) out onto the screen. There should be an X and Z plane with your reference images. You can also import the reference image and in the Current texture menu and choose Add to spotlight. There is also a plug-in called ImagePlane that works really well. ImagePlane is a plug-in that uses a plane to help model the object. You can find ImagePlane in the texture menu at the top of the screen. In the ImagePlane pallet, click load image, and select an image. Now you can edit your model and use the ImagePlane as a reference for a side or front view. You can go back to the ImagePlane pallet to size, shape, and even use opacity to make your model see through. When you are finished, press ctrl N while in edit mode to remove the ImagePlane. If you used opacity on your object, go back to the ImagePlane pallet and set the scroll bar to 100% make it visible again. These are alternative ways of displaying your image separately. Now that we have our references we can start modeling with zSpheres.

In the tool settings, select the zSphere tool. Click and drag it on the screen. Then press edit on the top bar. Now shift and click on the screen to align the sphere. It's good to model both sides of the object, so we will need the symmetry tool. To activate symmetry, go to the Transform menu and activate symmetry (or use the x key). Now it's down to business, start by dragging out the

zSpheres to get the objects features (such as the head, body, legs, arms…ect). Once you have all the features press A to preview the model. You can go to adaptive skins in the tool menu and play around with some of the settings to get the look you want for your model. The next step is to create the outline you want for your object. Save a version of your zsphere object before proceeding (just in case). Now go to adaptive skin and selecting make adaptive skin. Now we can start outlining the object.

- A great way to help out line the object is by using the move brush (to move single polys) and the DM_standard brush (moves wide range of polys; might have to download).
- The zsphere mode is not like the edit mode, the shortcuts are different (in case the shortcuts for the mode you are working with doesn't work).
- Drawing zspheres is referred to as "sketch mode".
- Think of zspheres as the base before molding a clay model.
- You can model different pieces to the object in different layers using the layers tool.
- Sculpting is best used with a graphics tablet because of its sensitivity. It would impossible to get the same results with a mouse.
- Use the shift button to smooth your object
- Use the frames buttom to watch how close your geometry is to each other (for texturing purposes).
- Press Alt and click to remove the zsphere.
- Use the mask button (ctrl drag) to work in specific areas without disturbing another area of the model. To deselect it, ctrl click on the shaded area of the model and ctrl click off the model.
- You can go back to zsphere mode and click move to move them around; this is great when you have a multi zsphere model.
- For outlining purposes, you take the object into 3ds max using GoZ for more control over modeling details, hard to reach places, difficult features, or specific areas.
- You can hold and drag control and use rotate or scale specific places.
- A way to make easy selections or hiding polys on the model is by using polygroups. Polygroups are selections saved for future use. To set up a polygroups you have to know how to select geometry.

Press F for frame, this will display groups. To hide geometry press "ctrl shift drag", whatever is in the area will be isolated. You can display inside the model by going to display properties and clicking on "double". To invert the selection, press ctrl shift and drag. To make everything visible, press ctrl shift and click outside the model. You can also press crtl shift M for the lasso selection. Now that we have our selection, let's get to how to use polygroups. In the polygroup properties, there are three options: Auto groups (groups anything without connecting faces), UV groups (groups UV according to seams), and Group visible (groups what is visible). To make polygroups, separate the model by selecting and hiding pieces (ctrl shift drag), then in the polygroup properties use the Group Visible button to group them. You can also make selections by using polypaint (Color an area and press convert polypaint to polygroup button).

- Shadow box can be a useful tool for hard surface models. Let's look at how this works. In the bottom of the subtool pallet, click the shadow box button. If you load the shadow box with an object already on the screen it will make a mask on a three part plane. You can clear the object by pressing the ctrl key and dragging off screen. Go to the mask tool in the current brush tool box. Use the mask to form shapes in the shadow box. Depending what side of the shadow box you make, will determine the angle your masked object will be facing. Use ctrl and alt to cut away from the mask (It's similar to Unreals add and subtract brushes). It helps to use a texture for reference. Turn off the shadow box by deselecting the button.

- Another way to start modeling is by sketching your object in quicksketch and use zspheres to bring out the outline.

- You can make clean cuts using the PlanerCutDeep brush and going to the option that has lazy mouse and select the plane button. This will make clean straight cuts on an object depending on the angle of the object. You can also select the line button (right beside the plane button) to make slanted cuts.

- Planer cut brush is good to cut into the surface. The planer brush is good for flattening out (doesn't clearn carved areas). The planerflatten brush flattens out the surface and flattens deep areas.

- There is a difference using zspheres and zsketch spheres. Zsphere are like the base of the object, while zsketch spheres are more of the added details on the object (like skin). Make your zsphere base then press shift A to go into zsketch mode. Select a material and you can start drawing

details on your model. You can use the move brush and smooth brush (hold shift) to make the outline of the object. Then you can use a planer brush to flatten some detail and add details using a noisy alpha brush (alpha brush with dots). This is good for making rocks and cement objects.

- To make bevels on an object stretch it out sideways and use the clip rectangle brush down the middle. If there are circle cut outs in your model use the clip circle center brush and ctrl shift to click and drag (use space key to reposition) then hold the alt key to make a perfect circle on the circular cutouts in the object. Go to the deformation panel and set relax to 100%. This will smooth everything out. Then go to the side of the object and use the clip rectangle brush and select the front face of the object. Invert the mask with ctrl click and in the deformation panel scroll the inflate option inwards a little. Now go back to your model and use the side view. Now use the move tool to bring the face out. You should have a nice bevel now. To even out the edges hold the shift key down on the objects face. Now the object should have a nice beveled look.

- For mesh extraction (used for clothes), mask off a part of the model. Hold ctrl and draw to mask, Use alt with ctrl then drag to unmask as area; you can hold L to use lazy mouse, it will draw you a straight line (ctrl click on the model will soften the mask). In the subtool pallet select the extracted layer and go to the thick option and pull the thickness down, then press extract. To get rid of any organic parts you don't want, use the clay brush and smooth the surface. We can use the inflate brush or the clay brush to add or refine detail.

- These are a few of the most useful shortcut keys:
    - Free Rotate - **Click & drag Background**
    - Move - **Alt+Click & drag Background**
    - Constrain to 90-degree rotation - **Click+drag, press Shift**
    - Scale – **Alt+Click, Release Alt, drag Background**
    - Rotate around Z-axis - **Shift, Click, release Shift, drag**

Now that the outline is complete. Let's move onto making the highpoly object. To do this we go to our tools menu and Make polymesh3D. Now we can go to the tools menu, geometry, and use the divide button(if it doesn't show up, select the model in different tool box). To sculpt even more details we can add subdivision by pressing the higher res button or using "ctrl + D". Once the object is subdivided you can begin sculpting details.

- Before pressing divide there are some option, by default it's on smooth (smt), but you can also use Suv (smooth uv), or crisp (makes hard edges). Turn on the button you wish to apply to your model.

- One of the best ways for easy complex highpoly details is by using projection mater. You can find projection master in zplugin or press G. In the projection master window turn off fade and turn on double sided. Draw on the model and press g to go back to the projection master button. Then push pickup now (this turns it into a 3D state). If you push drop now you can edit your object; you can also press shift s to duplicate geometry. You can also use an alpha to make unbelievable sculpts.

- A lot of high detail comes from alpha brushes. Let's see how to make one. Open up Photoshop and make a new document 512 x 512. Get a texture image and set it into the document. Go to Image, adjustments, and desaturate to remove the color. You can use the Levels in the same menu to get the look you want. Now use the brush tool and change the primary color box to black. Color black around the canvas. Then go to file and save as and save the document in a desired location and Jpeg as it's file format. Now open zbrush and open up the alpha box. Then use the import button to load your alpha texture.

- We can use the meshinsert (dot) brush to load another object onto you current object Go to Brush, modifiers, and meshinsert preview. Then drag out the external object.

- We can sculpt using the spotlight feature in zbrush (we can texture also, but I will go through that later. To sculpt using spotlight, go to the texture box and import an image. Inside the texture box menu click on the "add to spotlight" icon. This will bring up the image and a scroll wheel of buttons. Turn Zadd on and turn off mrgb or rgb. You can turn on spotlight with shift z or hide the scroll wheel by pressing z. Changing the opacity helps to see what's going on (move scroll wheel). Go to the polypaint pallet in the tools menu and turn on colorize. Now click and paint the image onto the model. You can use symmetry to paint the image on both sides. If you use the spotlight radius option in the spotlight scroll wheel you can make your texture easier to see.

- Using Decimation master. Decimation master help you optimize and lower your poly count while not affecting the way your model looks. Usually you would lead this step for last, because it's hard to re edit. For decimation master, you can use the mask tool for areas you don't want affected. To find decimation master, go to the zplugin menu. In the decimation options there is a button called freeze borders (this preserves the seams; as if it continues to another object). The next button called Keep UVs (keeps UVs of the object). Then there is the preprocess current and preprocess all button (preprocess

current is the only visible object on the screen and preprocess all is all objects including sub objects). We can select the preprocess current to allow zbrush to calculate our optimization. Next we have some sliders, we can change the slider to set how much we want to optimize. To start decimating we can select the decimate current button or decimate all button (for all sub objects). Now if you look at the amount of polygons, you'll see the amount of optimization. To see the details you can turn on the frame button.

Unwrap

Once the highpoly object is done and filled with detail, the next step is to unwrap. There are a few options to use to unwrap the model. I will list multiple ways of unwrapping the model, but you only need to choose one.

1. Using 3ds max to unwrap. In zbrush, set the object to the lowest subdivision. You can do this by going to the tool menu, Geometry, and setting the SDiv to 1. Then use the GoZ button send the object to 3ds Max. In 3ds max, go to the modify tab and choose Unwrap UVW from the modifier list. Now you can unwrap the object. For information on unwrapping, check out my unwrap in one of my previous methods.

2. Using UV Master. UV Master must be downloaded before using. In the tool menu go to UV Master and click on Work on clone. This will make a clone with a low subdivision. Now click unwrap. To see how the UVs are laid out select the flatten button. To go back click the unflatten button. To see our seams, press the check seams button. To edit the seams, turn on the enable control painting button. In the enable control seams option, there are three buttons. Protect, (red color) will protect the object from seams showing up. Attract, (blue color) will attack seams. Erase, gets rid of lines. Now press unwrap again and the flatten button to view the unwrap. Now that the unwrap is done, let's put the unwrap on the original object. Use the Copy UVs button and select the original object in the tool box. Now go back to UV Master pallet and select the Paste UVs button. Now the object should be unwrapped.

3. Using Unfold 3D. This is a software package that unwraps objects from zBrush. This program must be installed before using. To use this, go to the tool menu and press export and save your object. Now open

unfold 3D and go to file, load, and get your zBrush object. Use alt ctrl and drag a line for your seams on the object. Once done, use the Cut Mesh button in the center of the screen. Next click on the automatic unfolding button at the top of the screen. Now save the object.

Texture

Now that the object is unwrapped, we need to make our texture maps. There are many ways of texturing in zBrush. Here is a list of what we can do to texture our model.

1. Using Polypaint. To use polypaint you must first convert your object into a polymesh3D (tool menu , makePolymesh 3D). We can start by selecting a decent material, something that won't show too much shadows (MatCap White01 works well). Next go to polypaint pallet in the tool menu and press the colorize button. Before coloring, turn off the Zadd (or zSub) and turn on rgb (make sure Mrgb is off). Now choose a color and you can begin painting. Depending on the subdivision (SDiv) will allow you to add as much detail as you want. Use symmetry to paint the other side of the model (X key). Turn off colorize (in the polypaint pallet) when you are done. After you are done texturing go to the tool menu and open the UV Map pallet. In the pallet choose the UV Map size. Next go to the Texture Map pallet, turn texture on, and choose New From Polypaint. After the Texture is loaded, click the clone txtr button. Now go to your Current texture box, open its menu, and export your texture (Targa for UDK and Jpeg for Unity; plus don't forget to flip the UV for 3ds max, "Flip G").

2. Using Spotlight. Spotlight is used for taking images and using them to texture or carve into the model. To texture using spotlight, go to the texture box and import an image. Inside the texture box menu click on the "add to spotlight" icon. This will bring up the image and a scroll wheel of buttons. Turn Rgb on and make sure Zadd and Zsub is turned off (at the top of the menu bar). You can turn on spotlight with shift z or hide the scroll wheel by pressing z. Changing the opacity helps to see what's going on (move scroll wheel). Go to the polypaint pallet in the tools menu and turn on colorize. Now click and paint the image onto the model. You can use symmetry to paint the image on both sides. If you use the spotlight radius option in the spotlight scroll wheel you can make your texture easier to see. After you are done texturing go to the tool menu and open the UV Map pallet. In the pallet choose the UV Map size. Next go to the Texture Map pallet, turn texture on,

and choose New From Polypaint. After the Texture is loaded, click the clone txtr button. Now go to your Current texture box, open its menu, and export your texture (Targa for UDK and Jpeg for Unity; plus don't forget to flip the UV for 3ds max).

3. Using zAppLink. Before proceeding change the material of your model (like FastShader or MatCap White01) and depending on the amount of geometry will show your texture quality. Now we can start. To use the zAppLink you must be in edit mode. You can find zAppLink in the document tab in the very top of the screen. Open zAppLink and click the Enable Polygon Colorize button. In the next menu, click the set target app button and select Photoshop. Once the application is selected to back to the previous menu and click the drop now button. It should automatically open up Photoshop with the screenshot of the image of your object from zbrush. Now we can draw and texture on the image. In Photoshop there should be three layers. Put your texture in a different layer and when you are finished merge it with Layer 1(do not use or merge zshading or Fill Zshading). After the merge, rename the layer to Layer1 and save the file (not save as). When you are done in Photoshop minimize the browser and go back into zBrush. Click the Re-enter ZBrush button (return to external editor will bring back into zBrush). Then press the pick up now button. Your photoshop texture should be dropped onto the model. You can rotate your object and go back to zAppLink. In Zapplink you can click the Drop Now button and re-enter photoshop. When you re-enter photoshop a message will appear, click the update button, and you can start texturing on a different side. After you are done texturing go to the tool menu and open the UV Map pallet. In the pallet choose the UV Map size. Next go to the Texture Map pallet, turn texture on, and choose New From Polypaint. After the Texture is loaded, click the clone txtr button. Now go to your Current texture box, open its menu, and export your texture (Targa for UDK and Jpeg for Unity; plus don't forget to flip the UV for 3ds max).

4. Using PhotoShop. To use Photoshop you must first have an unwrap of the object (such as the unwrap from 3ds max or Unfold 3D). In Photoshop, double click to unlock your layer. Then press "ctrl I" on your keyboard to invert the image. Now you can start texturing on the unwrap.
Now open a new layer and you can begin texturing.

- I usually start by coloring in the layer above the ambient occlusion. Then use the drop down menu to try different layer effects.
- Be sure to save the texture sizes that are powers of two (256, 512, 1024, 2048, 4096, and 8192).
- A nice trick to sharpen textures is to duplicate the layer (ctrl J), go to filter, other, and high pass. Use the slider to try how far you can sharpen the image (usually 1.0 or 2.0 is just fine). After that you should be left with a greyish layer. Set the layer drop down list to soft light or hard light to see the results.
- I usually go back and forth between 3ds max and Photoshop to see what the model looks like.
- When the model has multiple objects, all the unwraps should be textured separately.
- A great way to have control while texturing it to duplicate the layer you inverted and move it to the top. Then use the opacity slider to make it transparent.
- If you want you can tweak and polish the normal map by using the smudge tool. You can also add additional details by using the NVidia's Normal Map Filter plug-in (this plug-in is for free; you can download it off their website).

Once you are finished, save the diffuse map. If you are using UDK, save the map as a Targa (.tga) 32 bits/pixel. If you are using another engine like Unity 3D, you can simply save it as a Jpeg.

Now that we have our textures, the next thing to do is to make the rest of our maps.

Baking

Before we get the rest of the maps done lets bake out our normal maps. There are two ways of baking out our normal maps. One way is using zbrush and the other using Xnormals. I will explain both ways; however, you can choose to do it either way.

1. Using zBrush. First set the division to the lowest level. We can do this by going into the tools menu, selecting geometry, and lowering the sDiv (subdivision levels) to 1. Next go to the UV map panel and select a texture size in the UV Map Size option. Next go to Normal Map and select FlipG. Then render the normal map by pressing the Create NormalMap button. To save the normal map, go to the Normal map

panel and select CloneNM. This should bring the normal map to the Current texture box. In the current texture box, save the normal map by pressing the export button. Once the normal map has been saved, we can exit zBrush and move on to texturing (if you know how, you can also texture in zBrush).

2. Using Xnormals. Using Xnormals. Inside of xnormals, select a highpoly object (you can left click to add the object). Uncheck ignore per vertex color. In the smooth normal, use average normal. Now move on to the low Definition meshes tab. Inside this option set the smooth normal to average normal. You can select cage if you are using the cage feature in 3ds max (such as my highpoly to lowpoly method). Now go to the tools tab, click on Ray distance calculator, and press Go (I'm not sure, but if it gives you numbers, I believe you're supposed to get those numbers and go back to the low definitions mesh tab and plug those numbers into the Maximum frontal ray distance and the maximum rear ray distance column). Let's move on and get to the fun part which is baking the map. Go to baking operation and in the output file setting, set a desired location to save the file. You can set the size of the file you want using the Size options (keep in mind to use the powers of two).Edge padding is the amount of stretch the edge pixels can make (keep it 16). Keep all the other potions the same and go to the maps to render option. Select the normal map and go to its settings. In the map settings, change the Y swizzle coordinates to Y-. UDK and 3ds max uses a different Y axis (if you are not using these programs then keep it the same). Close out the menu and in the maps to render menu select the maps you want and check bake highpoly's vertex colors. Now click the generate maps. Now your maps should be rendered. This small tutorial is advice I have noted from a colleague.

Now that we have our Normal map, let's bake out the other maps. We can do this by using Photoshop or multi map exporter.

1. Using Multi map exporter. Set the object to the lowest subdivision (SDiv). You can find the multi map exporter in the Zplugin menu. In the mult map exporter pallet you can select what maps you would like, and select the resolution size (cavity map will be used for specular map). Then turn on the Flip V button (for 3ds max). Now let's open up export options. Here we have all the setting we can change. We are going to make some slight changes to our setting. We are going to change two settings, the normal map settings and the mesh export settings (they all should be at default). In our normal map settings make sure tangent and flipG is turned on. In Mesh exporter, make sure quad and Grp is turned on. When all the options are ready, click the create all maps button. If you look at your maps in your file be sure to change the Photoshop file (displacement map) to a Tiff or Targa. Otherwise it could cause 3ds max to crash (for some unknown reason). Also in photoshop you can change the levels of the cavity map to be used as your specular map. Now open 3ds max. I believe the multi map exporter exported the zbrush object as a obj file and when you import it into 3ds max it will be upside down. If this happens go to the mirror option inside the tool menu. In the mirror axis, change it to YZ. Now it

should be flipped, but the pivots is off. To fix this go to hiearachy tab (next to the modifier tab), affect pivot only, center to object, and turn off the affect pivot only button. Now your object is ready for the next part of the lesson.

2. Using photoshop. This will be the same method as texturing using photoshop. To use Photoshop you must first have an unwrap of the object (such as the unwrap from 3ds max or Unfold 3D). In Photoshop, double click to unlock your layer. Then press "ctrl I" on your keyboard to invert the image. Now you can start texturing on the unwrap.

Now open a new layer and you can begin texturing.

- I usually start by coloring in the layer above the ambient occlusion. Then use the drop down menu to try different layer effects.
- Be sure to save the texture sizes that are powers of two (256, 512, 1024, 2048, 4096, and 8192).
- A nice trick to sharpen textures is to duplicate the layer (ctrl J), go to filter, other, and high pass. Use the slider to try how far you can sharpen the image (usually 1.0 or 2.0 is just fine). After that you should be left with a greyish layer. Set the layer drop down list to soft light or hard light to see the results.
- I usually go back and forth between 3ds max and Photoshop to see what the model looks like.
- When the model has multiple objects, all the unwraps should be textured separately.
- A great way to have control while texturing it to duplicate the layer you inverted and move it to the top. Then use the opacity slider to make it transparent.
- If you want you can tweak and polish the normal map by using the smudge tool. You can also add additional details by using the NVidia's Normal Map Filter plug-in (this plug-in is for free; you can download it off their website).

Once you are finished, save the diffuse map. If you are using UDK, save the map as a Targa (.tga) 32 bits/pixel. If you are using another engine like Unity 3D, you can simply save it as a Jpeg.

This is pretty much the only way I have discovered to making the maps I want so far. Here are other ways that can come in handy to make other desirable maps or polish to the maps.

- Here is another way of making a spec map (this paragraph is not specific but illustrates the idea). In making a specular map use polypaint in zbrsuh

with greyscale colors then export it out. You can then take it into photoshop and change the level values to make it look the way you want for your model.Another way to get a specular map is to get the diffuse texture map from zbrush and take it into Photoshop and converting that into a greyscale and use the level in Photoshop to get the specularity you want. I'm pretty sure there are other ways of getting a specular map; nevertheless, all you really need for a game model are diffuse, specular, and normal maps.

- For diffuse or specular maps you can bake a zbrush material onto your zbrush object using zApplink(this paragraph is not detailed, but you can use it with the previous zAppLink step). You can do this by opening zapplink, open the image up inside Photoshop. Saving the reference in Photoshop and reopening zbrush and projecting the image with the material onto your zbrush object. You will have to do this for all sides of your objects.

Export

Finally we can load all our textures onto the model and get it ready for export. It's time to use GoZ to load our object into 3ds max. Now we will combine all the maps we have made and see them on the object.

Open up the material editor. Scroll down to the Maps panel. Here is where you will load up your maps. Simply click on the button where it says none and open your desired map (load the normal map as a bump map).

Hopefully the model should be textured and ready. Before exporting, it's wise to look and give the object a self-critique. What could be improved on? What can be optimized (reduce polys)? What needs more polish? Does it look realistic? What doesn't look professional about the object? What is most appealing? Are you and others satisfied with the model? It's great to ask questions, because they can only make the model better. If you are satisfied with your final product, then it's time to export.

To export, go to file (or the 3ds max icon at the top of the screen) and select export. If you are using UDK, set the export as ASCII (.ase) with the option Mesh definition, Materials, Mesh normal, mapping coordinates, vertex colors, Geometric and shapes turned on. If you are using Unity 3D, then simply save the file as a .FBX with default settings.

Now that the model is exported, you are finally done. But before we wrap it up, you can take the object you made in zbrush and create a 3D print.

A 3D print is sending your object you created in zbrush to be made into an actual figurine. To make a 3D print it's best to have you object using double sided. To do this go to the display properties pallet and turn on double sided. Now we have to look at our object and try and find anything that will give us print errors. We cannot allow open gaps in the mode, the model cannot be too thin, and parts of the object must touch the object. When you are confident about the object, open the 3D printing exporter plug in (downloaded for free). This will update the size ratios button. Type in your figurine size (12 is decent for most figurines; the other two dimensions will auto configure with the auto stl button). Go to stl binary and save your model. Now you have to contact a 3D printing company and send them your model and the cost will depend on your file sizes. It's best to have your stl file under 250 megabytes. You can use the decimation master plug in to optimize the amount of polys if you want to lower your file size. Once you get a quote and pay for the model, you will receive a box in the mail with your figure inside.

Now that the method is over, we can sculpt and create many wonderful objects using zbrush to 3ds max and bring our visions to life in games and real life figurines. This concludes Method V. zBrush to 3ds max method.

I hope for everyone who reads this that they might have found it useful. By doing all these methods, I have learned by documenting each article, it has given me the encouragement to learn more. Even though there is a lot of information in these methods, I encourage everyone to go further, learn more, and share their methods with others.