Basic UV Mapping
Cubic, Hard-surface Object Mapping for Beginners

If you’re like me, you may be having a hard time getting your head around modo’s UV mapping methodology. My own limited UV mapping experience has been confined to the Maya environment (which I have only recently begun to understand), and I have found modo’s approach to be different enough that it gets confusing at times. I am writing this tutorial as a way of helping me to remember some of the basics of modo’s fine UV mapping engine. Perhaps it might be of some help to you, also.

Fear Not
For many in the CGI community, UV mapping is a phrase that has carried with it a certain amount of negative baggage, since it has traditionally been so difficult to use that it is often referred to in hushed tones with fear and trembling. For the novice, it does seem confusing and difficult to understand. However, I have discovered that once you do begin to understand it, you have within your grasp the key to a degree of control over the texturing of your models that you never had before.

Simply stated, UV mapping is a method by which a 3D program ‘flattens’ out a 3-dimensional object, ‘unfolding’ its surfaces into flat pieces that correspond to a grid. This is like taking a cardboard box and cutting it open along its edges in order to lay it out flat on a table (Fig. 1).

With a 3D model that is composed of flat faces (like a house), this is a relatively straight-forward process. When the object is composed of curves, however, it becomes much more complicated. In this tutorial, we’ll stick with the easy stuff, like hard-surface, geometric forms.

So, What the Heck Is a UV Map?
Every object that is created in a three-d program like modo needs to have a UV map associated with it right from the get-go. This is so your model can display ‘solid’ polygon surfaces in the 3D views and give you something to look at in the Preview window—other than a wireframe version of your model, that is. The real fun comes when textures are applied to the model, and that is only possible when a UV map of some sort is present. Any material that is applied to the model (including the default material) can only be applied because a UV map tells modo where to place it on the surfaces of the model; therefore modo automatically generates a UV map for every object that is created within it. However, as you will see, this default map (called Texture in UV Maps) is often-times somewhat haphazard, or is not very efficient, so is not suitable for applying realistic textures to your model. Therefore, in order to get textures or materials to land correctly and predictably on your model, it will almost certainly be necessary for you to get rid of the default map and create a custom UV map for it.

Okay, so back to what a UV map is: a UV map is a series of points that are arranged in a 2D coordinate system called UV texture space. You can see the texture space coordinates in modo by opening the UV Editor (Layout > Windows > UV Editor), or by clicking on the UV Edit tab above the main modeling window.
The map is basically just a 2-dimensional grid that consists of horizontal (U) and vertical (V) coordinates that tells modo how to wrap a 2-dimensional texture around a 3-dimensional object. UV points are points that correspond to the vertices of a 3D model, but live in the 2D world of the texture. They control which points (pixels) on the texture correspond to which points (vertices) on the mesh so that modo knows where on the model to ‘pin’ the 2D texture. Modo thoughtfully provides a window into the UV texture space (Fig. 2) so you can manipulate maps in order to achieve predictable results with the applied textures.

UV by Default
Although modo creates UV maps by default (Fig. 2), in most cases you will need to remap these UVs because the default arrangement is usually overly-simplified and often-times with overlapping areas that will not allow a texture to wrap properly around a model. In order to ensure that a UV map is properly adjusted to your model, it must be mapped, then manually manipulated into the best possible configuration.

For example, Fig. 3 shows (in the panel on the left) the default UV arrangement for the simple model of a house. It appears logical, but when a texture of wooden planks is assigned using this default UV arrangement, the result is hazardous (Fig. 3, the panel on the right).

Notice in the Perspective view that the texture on the gable end is stretched vertically the height of the entire gable. This is because, while the shape of the gable-end of the house is a five-sided polygon that includes a triangular section, the default UV map of the corresponding area is a regular rectangle that does not take into account this additional data. This is what causes the distortion in the texture map as it sits on the house, stretching the grain of a single plank clear up to the top of the gable.

In this case, then, it would be necessary to re-map the model in order to get the texture to fit on this gable end correctly since the default map clearly does not account for the true shape of the model.

More Than One Way to Skin a Cat
Modo provides a number of UV mapping methods and tools for you to create and edit UV texture coordinates.

To UV map an object, modo offers three basic schemes that are designed to work best for particular types of objects or methods: Create Map, Project from View, and Unwrap (Fig. 4). Further, when working with Create Map, you have
the choice of Planar, Cylindrical, Spherical, Atlas, Barycentric, and Atlas 2 algorithms (see below).

**Note:** Be aware that in modo you are not restricted to the use of a single procedure in creating UV maps. Indeed, in practice it is usual to use several of the above schemes separately or in combination on the same map or for a single model in order to arrive at an acceptable UV map.

Let’s take a brief look at each of these main methods: with **Create Map**, modo looks at the model from whichever of the 3D axes (X, Y, and/or Z) that have been designated by you and creates maps of each of the faces/polygons of the model that are perpendicular to those axes (based upon the type of mapping mode you have chosen—see below), then places these maps all together onto the UV grid (always in its upper, right-hand quadrant—the 0-1 quadrant) (Fig. 5). This usually results in multiple ‘UV pieces’ being placed into the texture space, arranged in the available space in accordance with the rules of the mapping mode you have chosen.

With **Project from View**, you establish a particular camera angle (usually Top, Front, or Side) and modo generates a map of all of the faces/polygons of the model that are perpendicular to that axis (except those that have been hidden—see below). This usually results in multiple faces that are placed on top of each other on the UV grid (as indicated by a red color which indicates areas where maps overlap) (Fig. 6) and will look very much
as the model would appear in one of the orthogonal views of the modeling window.

With Unwrap, you work in a perspective view and define the Edges of the model along which modo will ‘split’ the mesh so it can be flattened out most efficiently (Fig. 7). This mode is usually the one used when mapping organic models, but works beautifully with hard-surface models, as well (albeit with some additional manipulations, as you will see).

**Note: Unwrap** is arguably the most demanding technique from the mapper’s (your) point of view since it usually requires much experimentation, experience, and planning to achieve acceptable results.

**Create Map**
The following is a brief explanation of the various **Create Map** mapping types:

- **Planar Mapping**
  Planar mapping projects UVs through a single plane along a specific axis (X, Y, or Z) which is defined by you. This projection works best for objects that are relatively flat, or at least are completely visible from one camera angle. If two planes are aligned along the axis, one behind the other (for example, as in a box shape), then both planes will be mapped and superimposed on top of each other on the UV grid (Fig. 8) and indicated in red (unless one of the planes has been hidden prior to mapping—see below).

- **Cylindrical Mapping**
  Cylindrical mapping projects UVs through a virtual cylindrical shape that is wrapped around the object, like a bun around a hot dog. This projection scheme works best for shapes which can be completely enclosed and visible within a cylinder, without projecting or hollow parts. If you think of the cylinder as a hot dog bun, setting the Axis to Y results in the bun stand-

![Fig. 6](image1)

![Fig. 7](image2)

![Fig. 8](image3)
ing upright on a table whereas setting it to X or Z will lay it on its side. Cylindrical mapping can be very useful for mapping specific areas of a model such as arms for organic meshes or tubes and pipe segments for hard surface meshes.

**Spherical Mapping**
Spherical mapping projects UVs through a virtual spherical shape that envelopes the object, like the colored shell of an M&M around its chocolate center. This type of projection works best for shapes which can be completely enclosed and visible within a sphere, without projecting or hollow parts. The poles of the sphere are placed based on the Axis setting: the Y axis setting will place the poles up and down where as X or Z puts them side to side or front to back.

**Atlas Mapping**
Atlas mapping attempts to find the best UV placement for an object by simultaneously projecting from multiple planes surrounding the object, like sun lamps around a ski bunny (the number of planes are determined by the 3D axes and are perpendicular to them—so there are six for a cubic object, two each for the X, Y, & Z axes). This is useful for more complex shapes where the basic planar, cylindrical, or spherical projections do not place UVs well, especially around projecting or hollow parts.

While at first glance, Atlas projection might seem to be a good choice for most hard-surface models because it maps all faces automatically, its drawback is that it tends to separate the model into myriad parts and scatter these parts seemingly at random across the UV texture space (Fig. 5) in such a way that a great deal of Moving, Sewing, Rotating, and other manipulation (see below) is likely to be necessary before the map can be used to create seamlessly-textured surfaces on the model.

**Barycentric**
This mode creates individual UV pieces of each face (similar to the Atlas mode), but forces each UV piece to fill the entire 0-1 UV space as much as possible. Quadrangular polys will fit perfectly within the UV grid, while triangles and ngons will be placed within the quadrant as best they can (Fig. 9).

Since each piece is forced to fill the entire UV quadrant, all of the pieces are superimposed within the space and do not maintain their original proportions. This is a useful mode if you have a texture that you want to tile across every polygon in the mesh.

**Atlas 2**
This mode is similar to the Atlas mode. It will create as many UV pieces as there are polygons in the model and will fill the UV space with them in the most efficient way possible without distorting the relative scale of each polygon (Fig. 10).
So, Which One Should I Use?
Only experience will help you decide which of the above schemes (Create Map, Project from View, or Unwrap) is best for your model. However, unless an object is nothing more than a simple primitive, more than likely none of them alone will be the perfect choice for any model; most models will require the use of several mapping schemes together to arrive at the most efficient UV map.

**Note:** If any of the UV pieces overlap in the UV Texture Space, the texture will repeat exactly on the corresponding faces in the model. Modo warns you of this by coloring the overlapping pieces red. In general, you should avoid overlapping UVs, unless you **want** the texture to repeat (for example, you want the two arms of a character to texture identically), or if it doesn’t really matter because both areas won’t be seen at the same time.

Planar mapping typically **does** create overlapping UV pieces. In fact, the UV pieces may be perfectly superimposed and look like a single UV piece. You should use Tear Off and Move to separate overlapping UVs (see below).

**Note:** Typically, you would UV-map a model **after** you have completed your modeling and **before** you assign textures since any modeling changes that you make after mapping an object will necessitate remapping it in order to accommodate the changes (see below).

Ok, So Now I Know What a UV Map Is, How The Heck Do I Make One?
First, create a simple model of a house similar to this one (Fig. 11) with the gable ends aligned along the X axis, so we can experiment with UV mapping techniques.

Take a look at the default map *(Texture)* that modo has created for this model: to do this, click on the **UV 3D Split** tab above the main modeling window. This will open a window that is divided between a **Perspective** view of the model and the **UV Editor** view (Fig. 12).

**Note:** You will find that it is almost essential to be able to see a Perspective view of the model at the same time you are manipulating the UV map.
With the UV 3D Split layout activated, you will see the model of the house on the right-hand side of the window and the UV Editor on the left-hand side. In the UV Editor window you will see the standard four-quadrant UV grid, with the default map for the house in the upper, right-hand (0-1) quadrant. This quadrant is normally the quadrant in which UV maps are manipulated since whatever texture-map you have loaded as a material will be entirely contained within this square texture space.

Note: Even though you can’t see it currently because there is no texture map loaded (other than the default material, that is), any texture/material that is loaded into modo and is selected in the Shader Tree will appear in the 0-1 quadrant and is repeated to infinity in all directions in UV texture space. Thus, should you move the model outside the 0-1 grid—the texture will still appear on the model.

Now, open the Vertex Map List (located among the tabs on the upper, right-hand side of the Default Layout). Unfold UV Maps. You will see an entry named Texture (that’s the default UV map) and below that you will see a greyed-out entry entitled new map (Fig. 13). We will discuss these items in a bit, but first....

Load a Texture Map

The easiest way to see what is happening with UV maps is to load a texture map into the Shader Tree so it can be applied to the model, thereby allowing us to see what happens; so before we do any mapping, let’s do that. For those who need a refresher course in this, here is the way to load a map:

Select the model and hit the M key (for Material) then type a descriptive name into the dialog box that comes up, for example ‘Planks,’ and hit Return. This will add an entry named ‘Planks’ into the Shader Tree (don’t worry about about setting the diffuse color since we are going to be loading a bitmapped texture that will override it anyway, but be sure and set the Specular to zero). Next, open the Shader Tree (if it isn’t already open) by clicking on the Render Settings tab (found on the left-hand side of the Default Layout window). Unfold the Render arrow and select the ‘Planks’ entry that you find there. LMB-click on Add Layer, then select Image Map. This will open the file browser from which you can select an appropriate bitmapped image file. (I would suggest a tileable image of planks....) An Image entry containing the texture file will be added above the Material entry and will be immediately applied to your model. Good.

Now that a map is loaded into the Shader Tree, modo will automatically use the default UV map to wrap the texture around the model. If you have the UV 3D Split layout open, you will see the unfolded house-map laid out in the 0-1 quadrant with the texture you loaded (let’s say it is a wooden plank texture) in the background of the quadrant. You will also see the texture wrapping around the model (Fig. 14).
Note: A texture will only appear in the UV Editor if the image map has been selected in the Shader Tree. If you deselect the image map, then it will disappear in the UV Editor. Selecting it again in the Shader Tree will cause it to reappear in the UV Editor, but—depending on the size of the map—the view may take a few seconds to update.

The Trouble with Defaults
Depending upon the texture map that you loaded, the first thing you will notice is that the texture does, indeed, cover the entire house, but that the scale is probably incorrect (usually too big) and it does not fall correctly upon each surface (Fig. 14). For example, the planks on the roof may be a different size than the ones on the walls, and notice how one row of planks on the gable end of the house stretches vertically up the entire height of the gable (see ‘UV By Default’ above for an explanation of this).

Map & Model Relationship
In addition, take a look at how the texture relates to both the model and the UV grid. This gives you an opportunity to see how the UV map determines the placement of the texture on the model: activate Edge and/or Polygon modes and click on edges or polygons in the UV map; you can see the corresponding elements selected in the Perspective view (and vice versa). In this manner you can see along which edges modo has split the model and how it has laid it open. Observe how the various edges, knots, grain, or whatever of the planks fall on the UV map and how that determines where those same elements fall on the model. That, basically, is how a UV map works. Simple, eh?

Now, activate the Move tool and click in the UV Editor.

Note: Because of the modular way in which modo was designed, the standard Transform tools (activated from either the normal modo Tools palette, or from the Transform section of the floating Palette) work in the UV Editor, just as they do in a normal work-view....very nice.

By the way, when using the Move tool in the UV Editor, you get the normal Transform ‘arrow’ handles that allow you to move along the X and Y axes (no Z since the image is 2-dimensional). A quicker way to move—if you don’t need to constrain the move along the axes—is to use the
small, blue circle that accompanies the ‘arrow’ handles. This is a ‘free move’ handle, and allows you to move the selection in any direction freely—but you probably already knew that....

Now drag the map around in the UV texture space. Note that as you move the map, its coordinates on the model change so that it moves on the model, too. Also, note that if you drag the map off the 0-1 quadrant, the texture still remains on the model, as explained above.

Okay, enough playing around; get back to work....

We will now remap the model in an attempt to get the planks to sit correctly on the surfaces of the house and then we will adjust their scale and placement.

**The Nitty, Gritty: Creating the Map**

In order to get the texture on this house to fit correctly, we will first map it using the **Create Map** node. So, make certain that the house is selected in the **Item List** then open the **Vertex Map List** tab and unfold the **UV Maps** category. First, remove the default map so we can start with a clean slate. To do this, select the map entitled **Texture**. This is the default map and we don’t want it, so RMB-click on it and select **Delete** from the drop-down menu. This will remove the map from the UV texture space and the texture will disappear from the model (even though the texture map remains in the 0-1 quadrant of the UV grid); but don’t worry because we are going to create a new, better one.

To begin the mapping process, LMB-click the greyed-out item entitled (**new map**) beneath **UV Maps** (Fig. 13). A dialog box entitled **Create New Vertex Map** will appear waiting for you to type a descriptive name into the **Vertex Map Name** field. Do so, making certain that the **Vertex Map Type** beneath it says **UV Map**, and hit **OK**. The new UV map name will appear in the **UV Maps** list awaiting your next action.

**Note:** Don’t hesitate at any time to create or delete vertex maps. Nothing you can do to a vertex map will affect the model, itself. And you can always remap a model at any time, even right over the previous map without even selecting ‘new map.’ In fact, you may end up remapping a model several times before finding a satisfactory solution.

Now, you need some tools with which to do the mapping. From the main menu bar at the top of the screen, select **Layout** >
Palettes > Toolbar. This will open a floating toolbar palette that features two tabs: Model and Vertex Maps (Fig. 15). ‘Model’ has the standard modeling toolset; ‘Vertex Maps’ contains the UV mapping tools that we want to use—so click on the Vertex Maps tab. Under the Create heading you will see the main mapping modes: Create Map, Project from View, and Unwrap Tool.

To introduce the basics of vertex mapping, we use only Create Map and Unwrap Tool. We will begin with Create Map, so click on it to activate it.

Once you have activated Create Map, find the button entitled Properties at the bottom of the Palette. With nothing selected this button will contain nothing; but with Create Map activated you can open it to find the different mapping modes that were described earlier (you can also find these under Tool Bar > Tool Properties in the main modeling window). You should eventually try each one, to see what they do; but for the sake of brevity, we will only use Atlas as an example of how the process works.

So, click on the Properties button and a black, pop-up window will appear (Fig. 16).

Note: If you move your mouse off this window, the window will disappear, so don’t move it off yet.

Under Create UV click on Projection Type, select Atlas from the drop-down menu then click either in the Perspective view or the UV Editor. A map will appear in the UV Editor. Drop the tool.

About the map: UV points have interconnecting lines that form a shape, called a UV piece. In this map, you should see five UV pieces appear in the UV Editor (Fig. 17). These pieces represent the various surfaces of the model: one for each gable-end, one for each side (with the roof attached), and one for the bottom. Verify these by activating Polygon Selection and then running your mouse over the various UV pieces to see the corresponding surface in the model (or vice versa). You will note, of course, that each UV piece is separate from its neighbors.
(except for the wall and half of the roof, which are attached to each another). You may also note that no texture has yet appeared on the model. If this is so, it is because modo doesn’t yet know which UV map to use. To rectify this, make sure **Render Settings > Shader Tree** is open and the ‘planks’ material item is unfolded, and the image map is selected. Under **Render Properties**, click on the **Texture Locator**. In this panel there are several parameters that you need to consider: **Projection Type**, **UV Map**, **Projection Axis**, and **Horizontal / Vertical Wrap** (Fig. 18).

The first thing you want to check is **Projection Type**. Make sure that **UV Map** is selected from the drop-down menu (this should be selected by default). Next, make sure that the map you created (and named) is selected in the **UV Map** drop-down menu. Once these two parameters have been set, then the texture map should appear on the model.

If all has been done according to Hoyle, you will see the texture wrapped around the house. However, you should also see that there are several problems that need correcting: one, is that the texture is probably too large; and secondly, the edges between planks are probably not lined up correctly on the different faces of the house (Fig. 19). But note also that the gable end is now mapped correctly: it is no longer stretched into the apex the way it had been with the default map.

Now, let’s see what can be done to correct the mapping problems.

**Adjusting the Texture**

First of all, the scale of the planks is gargantuan compared to the house: there are two ways you can adjust these. The first way to do this is to activate the **Scale** tool and click in the UV Editor; the Scale Manipulator will appear. Simply scaling the...
map larger will force the 0-1 area (which contains the entire extent of bitmapped image, remember) to cover less area of the map, so therefore the image becomes smaller relative to the map and more planks show up. Note that this can make the UV map very large relative to the UV grid (Fig. 20).

**Note:** When using the Scale tool within the UV Editor, you can stretch the UV Map on the Y (blue) or the X (yellow) axes individually, or you can use the blue circle to scale universally.

Notice that the scale of the planks has become much smaller in the Perspective view (Fig. 21); also note that any repeats in the texture map on the model have become *much* more obvious (all the more reason to make *absolutely certain* that your bitmapped image can tile seamlessly with no obvious repeats).

The second way to adjust the scale is by changing the **Horizontal** and **Vertical** **Wrap** in the properties of the image map. To do this, open the Shader Tree, select the image map (if not already selected), and under **Render Properties** open **Texture Locator**. You will see toward the bottom of the properties adjustable fields for **Horizontal Wrap** and **Vertical Wrap** with default value of 1 (Fig. 22). Either type in a higher value, or click and drag on the arrows to change the values and watch the texture change on the model. Continue to adjust these values until you arrive at a reasonable scale for the texture.
Note that using this method does not change the scale of the map within the 0-1 quadrant of the UV texture space, only the number of times that the texture is wrapped vertically or horizontally around the model. Note also that the way the UV map sits on the background texture no longer relates directly to the way it looks on the model.

**Sewing Class 101 is Next....**

Now, let’s resolve the problem of the planks not lining up on the various surfaces of the model (Fig. 19).

The reason they don’t line up is because the Atlas mode creates separate UV pieces that are placed almost at random within the UV space so the texture will not fall on them in a consistent manner (Fig. 17). If you want the textures—say on the front and sides of the building—to align with each other, you must *sew* the edges of these pieces together so there is a continuity relative to the texture.

**Note:** Actually, you don’t *really* need to sew them together, you could just shift them so they sit next to each other, but sewing simplifies the process.

So, activate Edge selection and select one edge of the gable-end of the map in the UV Editor. Note that the selected edge will turn yellow—as expected—but that one of the edges on another of the UV pieces will turn blue; this is its corresponding edge on the model (Fig. 23). Cool, eh? (Note also that in the Perspective view, the selected edge will be highlighted.)

These are the two edges that need to be sewn together; so in the **Vertex Map** tool palette, under **Edit**, select **Move and Sew** (Fig. 24). Voilá! one of the UV pieces will be shifted appropriately, and the two edges will be sewn together (Fig. 25). Notice that in the model, the planks of those two surfaces have now become perfectly aligned (Fig. 26) because the corresponding UV pieces are now contiguous in the UV space relative to the background image.

**Note:** The first edge that is selected (yellow) (and its UV piece) will be the piece that moves.
Notice that in my UV space (Fig. 25), the gable-end UV piece moved over the top of the wall UV piece to which it is joined. This is all right if you want the pieces to share the same portion of texture, but otherwise, not.

In order to correct this, the gable-end UV piece’s UVs need to be reversed; so undo the last action, select the gable-end polygon, and from the Vertex Map palette, click on **Mirror UVs** (Fig. 26). A dialog box will appear. Make sure the Axis is set to U (horizontal), and click **OK**. The UV map will be reversed, although you can’t tell it; however if you select the same wall-edge that was selected before, you will see that the opposite edge on the gable-end polygon has been selected. So, select the appropriate edge (whichever you want moved) and click on **Move and Sew**. The two UV pieces are immediately sewn together (Fig. 27), and the texture in the Perspective view is now contiguous, with no overlaps.

Do the same with the other gable-end.

Your model will now have the gable-end pieces properly attached to the walls, but they now need to be attached to each other, so select the polygons on one of the newly-made UV piece-groups, mirror them, then Move and Sew them to the other group so you get something like Fig. 28. Shift this new ensemble into the 1-0 quadrant and scale everything so it fits within the quadrant.

Your model should now have planks that match on all corners but one (the one that isn’t sewn together). For this non-contiguous corner, you typically would try
to place it so it wouldn’t be seen in a final rendering.

The one UV piece that hasn’t been sewn is, of course, the bottom of the model. You can manipulate this, as necessary, even sewing it to one of the other pieces, if you need continuity there.

So, there you have it. That is basically how a **Create Map** UV map works.

However, let’s say—for the sake of argument—that you wanted the planks on the roof to go in a different direction. What could you do, since each half of the roof is presently attached to one of the walls? Well, let’s look at that next.

**Tear It Off...Tear it All Off...**

What you need to do is to move those roof UV pieces separately; but they’re attached to the walls, so right now if you try to move them, you’ll just end up stretching the wall pieces as you move them. The answer is that you need to *detach* the roof UV pieces from the wall pieces. This is not quite as obvious as it should be, but (as is the case with so much in modo) is simple once you understand how it is done: activate Polygon select mode and select one of the roof polygons either in the Perspective view or the UV Editor. Now, activate the **Move** tool and look in the **Tool Bar > Tool Properties** for the Move tool (located in the main **modo Tools palette**). You will see three checkboxes: **Translate**, **Rotate**, and **Scale**. None of those can help you at this point; but click in the UV Editor while the Move tool is activated, and a new checkbox will appear below the others (Fig. 29): **Tear Off** (if it doesn’t appear, simply repeat this process until it does). This is what you want.

Enable **Tear Off** and the selected polygon is immediately detached from its companion. You can now use the Move tool to shift it to some other place in the UV space (even out of the 0-1 quadrant, if you want). Drop the tool, then do the same thing to the other roof piece. Now, you can sew them together along the ridge-line, if you want, or keep them separate. In any case, if you want the planks on them to go in the opposite direction from the planks on the wall, simply select both polygons in the UV Editor, activate the Rotate tool, and rotate them 90-degrees, and move them wherever within the 0-1 quadrant you wish (Fig. 30).
Done, at Last!
Ok, so that’s about it for that. I would recommend that you play around with this mapping process a bit—and try some of the other Create Map mapping modes to see what they do.

Oh, One More Thing....
Above, I suggested that you finish modeling completely before you UV map an object. Let’s look at the reason for this:
Leave the UV 3D Split window layout open, and add an extension onto the front of the house, like this (Fig. 31).

Note: To do this, you might use Axis Slice, with the Y set to 1 and the X set to 2, adjust the position of the new edges to your liking, then Extrude and addition to the house. Before you finish, select the edges you added on the Y axis and move them to get something like the illustrated shape.

If you are in the Texture-viewing mode in the Perspective window, notice what happened to the planks (Fig. 32). They have become skewed and stretched; notice the planks across the top (and bottom) surfaces of the new extension to your house. They are now stretched across the entire surface; the planks on the sides of the extension are bent, and if you moved the edge at the back of the extension upward, the planks on the house have become compressed. That is the problem with modeling after you have UV mapped: the original map no longer reflects the true shape of the model.

This is as far as we will take this particular example; the point being that if you make modeling changes after you have UV mapped an object, you will have to re-map it to get the textures to fall correctly on the model again (this includes beveling edges, too, of course, although the distortion will be harder to see because it is so small).

Okay, It’s Christmas! Let’s do Some Unwrapping....
Okay, now it’s time to try a more interesting approach to UV mapping: UV Unwrap. This is the approach you would typically use for organic models, but as you will see, it can be used effectively for hard-edged ones, as well.

Let’s keep the house-and-extension model that we just made, but delete the UV map that you have been working with so you can create a new one on a clean slate (go to Vertex Maps > UV Maps > whatever map you created > RMB-click > delete). Keep the planks texture...
map in the Shader Tree, as before, and let’s get started.

In **UV Maps** click on *(new map)*. Name it something descriptive (I named mine **uvMap**). Now, before you can unwrap the model, you have to do a little preliminary work by telling modo where to split it open. You do this by selecting appropriate edges in the Perspective view. Be prepared to be patient with this because it involves experience and practice and (more than likely) re-mapping several times before you can get the most efficient map.

The advantage to unwrapping for hard-edged models is that all the edges that are not identified for the split will be contiguous, although a certain amount of hand manipulation will usually still be necessary to achieve desirable results. So, let’s begin.

**Splitting it Open**

To be successful at this procedure, you should visualize yourself as Pierre LePieu, the French Canadian fur trapper and skinner. How would Monsieur LePieu skin a fox?

Well, maybe you don’t really want to visualize that....but in the Perspective view, you need to select the edges along which modo can best ‘skin’ your model. (It might be easiest to do this with the model in wireframe mode.)

But first, with a shape like this, where a section is projecting outward—it is best to hide that section and map the basic shape first. You can add the map of the projecting part later.

**Note:** Hiding any portion of a model will prevent modo from mapping it. Remember this tip because you will use it a good deal when mapping.

So, in Polygon Select mode, select all of the polygons of the projection and hit **H** (hide) so you have this: (Fig. 33)

Now, with Edge selection active turn on Wireframe and select the edges indicated in Fig. 34.

Note: Remember, you will probably have to try several different versions of these splits before you find the combination that works best.

Next, in the UV Tools palette, click on the **Unwrap** tool, then click in either the UV Editor window or in the Perspective View.
A map more or less like Fig. 35 will appear.

Confusing, huh?

The problem with this map is that modo hasn’t run enough iterations on it. So, open the Tool Bar, and under the Tool Properties for the Unwrap tool you will see a field entitled **Iterations** (Fig. 36). You can type a value into this, but the easiest (and funnest) way to proceed is to simply drag the cursor to the right while holding down the Left Mouse Button. This will increase the number of iterations and the UV map will morph before your very eyes. Keep dragging it until it looks like Fig. 37. That will be about 60 iterations (at least for my map).

Now we’re getting somewhere!

The map now looks recognizable (you can identify the gable-ends and the hole where the extension used to be, etc). You can clearly see that the UV pieces are all attached (unlike the Atlas mode). However, modo has placed it at an angle in the 0-1 quadrant, and if you could see the texture on the model, you would see that it was also lying at an angle on the model. Not good, so we need to straighten it out.

**Note:** By the way, if you were to activate Texture viewing mode in the Perspective view right now, you wouldn’t see any texture yet, but don’t worry, I’ll show you how to get it back....

**Straighten That Map, Soldier!**

There are several methods for reorienting the map within the UV space. One is to deselect everything (so that whatever actions you take affect the entire map, not just the selected edges or polys), then go to the main menu and open Texture > UV Operators > Ori-
tent pieces... (Fig. 38). This will open up a dialog box that offers you three choices in a drop-down menu: Auto, Horizontal, and Perpendicular (Fig. 39). Auto will attempt to orient the UV map to the closest U or V direction; Horizontal will orient it along the U direction, and Perpendicular will orient it along the V direction. Depending upon the map, though, none of these may cause the map to re-orient completely along the U or V, and will require some additional nudging. Notice in Fig. 40, for example, where Perpendicular Orientation was chosen, that the map still isn’t quite vertical (and is upside down besides).

So, to correct this, you must activate the Rotate tool, and rotate the map until it is as close to vertical as possible (and right-side up, would be good, too). This may still leave some edges that are not completely vertical or horizontal, however (Fig. 41).

Since it really is best to get all edges lined up vertically or horizontally, modo has provided some UV tools to help you do that with individual edges. In the Vertex Maps tool palette, there is a section called Align (Fig. 42). To align an edge, select it, and click on the appropriate alignment tool, either horizontal or vertical, working your way, edge by edge, throughout the entire map until everything is nice and straight (Fig. 43).

Now you can scale and move the map into the 0-1 quadrant, if necessary, and we can make the texture show up on the model.
Texture.... Appear!
The reason that the texture has not appeared on the model, is because we had deleted the old map that was being used and modo doesn’t know where the new one is. All we have to do is to point it to the correct map, and everything will be hunky-dory. So, go to Render Settings > Shader Tree > Image map > Texture Locator. Locate the field entitled Projection Type and make certain it says UV Map, then locate the field entitled UV Map (Fig. 44), and open the drop-down menu and select the name of the map that you had created (‘uvMap,’ in my case). Click on it and your map should appear on the model, all nice ‘n neat.

Notice that, unlike the Atlas map, the planks all line up on the surfaces because the map is contiguous, by design.

**Note:** Remember, if you want the roof planks to go the opposite direction, you will need to locate them in the map, Tear them off and rotate them, as we did before.

**Now Map the Extension**
Now its time to bring that extension back and map it, too.

On the keyboard, hit U (unhide), and the extension will reappear, untextured, of course. To map it into the same map we already have, we need to hide the part of the map that has already been mapped so it will not be mapped again. So, select all the polygons of the extension and hit the [ -key (this will reverse the selection, selecting everything that has not already been selected), and hit H to hide it.

Now, with the main house hidden, we can map just the extension (Fig. 45).

*Don’t create a new map for the extension because we want it to be a part of the original map (in this case).*
**Note:** If you wanted this section to have a different texture on it—say, brick—then you would create a new UV map for it and proceed as before.

Select the edges indicated in Fig. 46. Remember, if you were working on your own, you would have to arrive at a correct solution through experimentation (make selections, map, reselect, map, and so on until you got something that worked, but the arrangement here will give you a good map. Notice that, unlike the house, you don’t need to select the back edges because that’s just a hole and it’s already split there (so to speak).

Now, Unwrap it, and you will get a map something like Fig. 47.

Rotate it, as before, until it is oriented the way you want, then straighten up any crooked edges (Fig. 48).

Now, because this map occupies the same UV space as the map we previously created, move it temporarily off to the side (so it won’t overlap), then hit U to unhide the first map (Fig. 49). Now both maps will be together in the same texture space. Of course, the scale of the new map will be incorrect, but you can select all the polygons of the extension map and scale them down to match the original map, then shift everything into the 0-1 quadrant (Fig. 50).
Reactivate the **Texture** viewing mode and you should now see the entire model, fully textured.

**Oh, & One More Thing.... Really....**
One of the techniques that UV mappers use to help arrive at consistent UV maps on a model is to apply a checkered pattern to the model *before* they apply the final texture. The idea is to adjust the checkers so they are uniform; that way the final texture will also be uniform. So, let’s try that.

**A UV Grid**
Let’s create a map that can be switched with our plank texture: select the house mesh and create a material named ‘grid.’ Make sure this Material is above the ‘plank’ texture in the **Shader Tree**. Left-click the **Add Layer** menu and add **Image map** to it. You are going to add a ‘UV grid’ to the material. This type of grid has been carefully designed with colored and numbered squares that correspond to the square units of the 0-1 UV space (Fig. 51).

When applied to a model a grid like this helps you to get a consistent UV map. Once the map has been adjusted for consistency using this grid, whatever textures you subsequently apply to the model will also be nice and uniform.

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**Note:** There are a couple of useful UV patterns that can be obtained from the modo forums (as of the time of this writing they are located at: forums.luxology.com/discussion/topic.aspx?id=12583), or elsewhere. Or you can make your own, or even just use a checkered pattern.

So, load a UV grid; it should now appear in the 0-1 UV space and on the model in the place of the wooden planks (Fig. 52).

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**Note:** Since this material is above the plank material in the Shader Tree, it will override the plank texture.

**Get it Square & Straight**
You should now see your model wrapped with the UV test grid. If the grids are too large to be seen effectively, you can make them smaller by scaling the UV map up, or by adjusting the Horizontal and Verti-
Examine the grid in the Perspective view. First of all, the divisions should be as square as possible. If they are stretched or squashed, then the texture on the model will also be stretched or squashed. If edges in the Perspective view are skewed, then the texture on the model in those places will also be skewed (Fig. 53).

To avoid this, you need to select edges and/or points on the map in the UV Editor and shift them until everything is nice and straight and square.

Using a numbered grid will also allow you to see where your map is upside-down (Fig. 54) allowing you to make adjustments, if necessary.

Once you are done with the UV pattern, you can delete it from the Shader Tree and return to the plank texture.

**Th-th-that’s All, Folks!**

While this tutorial is certainly not the last word in UV mapping, hopefully it has been of some use in helping you get a handle on a useful and important function. If there are errors in the tutorial, it is because I am no expert myself, and I would invite suggestions and corrections, as you see fit.

Have fun.

**Last Note:** When deleting portions of UV maps, don’t select the appropriate polys in the map, then hit the Delete key. That will delete those polys on the model as well. Instead, select what you want to delete, then RMB-click and select ‘Delete’ from the drop-down menu. That way, the selected portion of the UV map will be deleted without affecting the model.