



The Content Creation Process for Creating Interactive 3D Content Using Hypercosm

A White Paper prepared by Hypercosm LLC, November 2005

In order to understand what is involved in setting up an in house operation to produce Hypercosm content creation, it is first necessary to understand the content creation process. This white paper describes the steps that are necessary to create a complete Hypercosm enabled web page from start to finish.

Phase 1: Pre Production

In many ways, the creation of graphical, dynamic Hypercosm content is similar to the production process involved in making a film. The first step, before a line of code is written, a model is built, or a pixel is painted, is to set forth a plan of what the final product is to be.

Step 1: Description of Goals

The first step in the process is to determine what the main points to be communicated are. This sounds like a trivial and self-evident step, yet we have found that to formally document the goals of the project before implementation begins significantly helps to focus the development effort.

Figure 1: Description of Goals



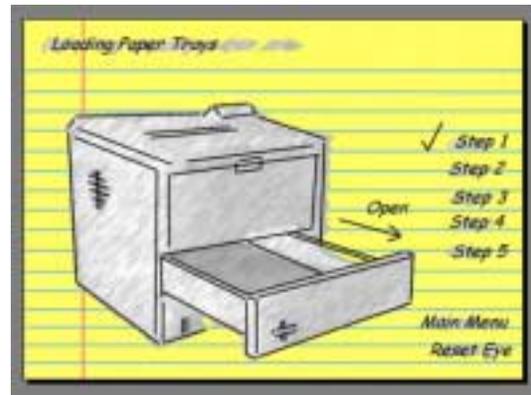
Too often a project is implemented without clear documentation as to what the piece is intended to communicate and the result is often a piece that looks nice, that may have a lot of bells and whistles, but does not really communicate effectively.

Step 2: The Storyboard

One it has been decided what is to be communicated, the next order of business is to figure out how it is to be communicated in graphical form. This is done through a series of drawings or sketches that are collectively known as a storyboard. The storyboard process has been taken directly from the film industry

and in both cases, it has proven to be an absolutely essential step in producing a quality product. No film, whether it has a small or large budget, is created today without the creation of an extensive storyboard. The same should be true for interactive web development.

Figure 2: The Storyboard



Phase 2: Production

Once the course of the project has been narrowed down, first through the description of goals and then through the storyboard, it is finally time for actual production to begin.

Step 3: 3D Model Creation

The 3D graphics process is actual a lot closer to photography than it is to drawing. The actual images that are displayed in a Hypercosm enhanced web page are actually created by the Hypercosm player software, but for this to work, a complete 3D model of the scene must be created, surface textures must be define, and synthetic lights must be set up. The process is much like having a virtual photography studio inside the computer. There are a number of ways that the required 3D models may be obtained.

Method #1: Translation from Existing CAD Files

If a model is already available in a CAD format of some kind, then it is likely that it may be converted into a format which is supported by Hypercosm. If a CAD model is not available, then a 3D model will have



to be created using one of the alternate techniques described below.

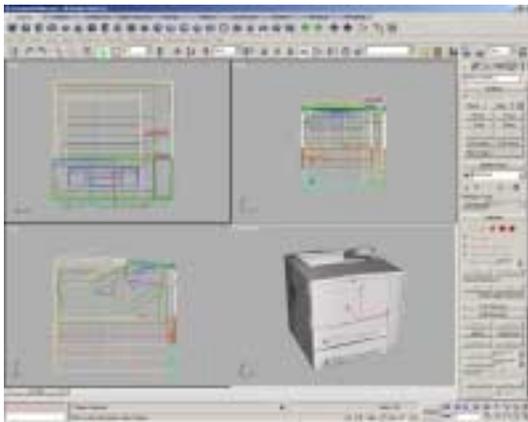
Figure 3: 3D Scanning Hardware



Method #2: 3D Digital Scanning

The fastest and easiest way to create a 3D model from scratch is to use a 3D scanning device to automatically scan the surface geometry of the object directly into a digital format. This technique works best for objects with simple, convex geometry such as a teapot or a vase. For mechanical objects, the surface geometry can usually be more accurately captured by manually creating the 3D model using techniques described below rather than automatically scanning it. In addition, this process is only possible when the physical object is available and if the physical object can fit the dimensions of the scanner. Typically, this means that the object must range between about an inch or so to about a foot in each dimension.

Figure 4: Using GUI 3D Modeling Software



Method #3: GUI 3D Modeling Software

The next approach for obtaining digital 3D models is to use a graphical 3D authoring tool to build the 3D models. These GUI modelers are much like CAD software in nature and allow models to be created

through a point and click type interface. Examples of graphical editing tools supported by Hypercosm include Autodesk's 3D Studio product and Newtek's Lightwave product.

Figure 5: Modeling Software Tools: Hypercosm Studio, 3D Studio Max, and Lightwave



Method #4: Hypercosm Studio Scripting Software

If none of the above tools are available or applicable, then models can be defined by using the Hypercosm Studio product to define the models' geometry in our text based scripting language, OMAR. This approach works well for simple models or for certain types of mathematically defined models, but for most objects, this will be tedious and time consuming compared to the GUI based techniques.

Figure 6: Basic Geometric 3D Model



Step 4: Surface Detailing and Texturing

Once the models have been created, the next step is to add the surface detailing which will make the models look lifelike. This process is known technically as "texture mapping" and is essentially a method for painting colors onto the surface of the model. Texture mapping can be used to depict the coloring of an object, the surface texture, the labels, and many small details about the object such as screws or seams which do not have to be explicitly modeled. Imagine that you are building a model out of clay. The clay



model would need to reflect the large-scale form of the object, but many of the smaller details could be effectively painted on instead of modeling every small detail in the clay model itself.

Figure 7: Toner Cartridge with and without Textures



Figure 8: 3D Model with Surface Detailing and Texturing



Digital Photography

The texture mapping technique is further enhanced through the use of digital photography.

Figure 9: Digital Cameras Used For Surface Detailing



If the actual physical object that is being modeled is available, then rather than manually painting the surface details, we can obtain these images simply by shooting digital pictures of the object. Usually, it is necessary to shoot a picture of the object from each side (top, bottom, left, right, front, and back) and then to use the 3D modeling software to virtually paste these digital photographs onto the computerized 3 dimensional model. These techniques can save a lot of time from the labor-intensive modeling process.

Step 5: Scripting of Behaviors

They key to the effectiveness of interactive forms of communication is not the form, but the function of the models. The point of a graphic is to illustrate a process, for example, how to install, assemble, operate, maintain, or configure a product. For these applications, it is necessary to add behaviors to the models to make them functionally lifelike. This is most often done using Hypercosm Studio and the scripting language, OMAR. These tools allow a programmer to create models that not only move, but also respond to user input.

Figure 10: Scripting Behaviors Using Hypercosm Studio



Step 6: Applet User Interface Creation

Once a model is created and its behaviors are defined, it is necessary to construct a convenient mechanism so that the end user can initiate and control those behaviors. This is most often accomplished by creating a user interface in which buttons, sliders, and other familiar GUI widgets can be used to control the behavior of the simulation. This interface is constructed using Hypercosm Studio and the OMAR scripting language. First, code is written to define the look and arrangement of the user interface elements. Following this, code is added to link the user interface elements to the various behaviors.



Figure 11: 3D Model with Surface Detailing, Behaviors, and a User Interface



Phase 3: Post Production

As in film production, some of the most aesthetically important work is done after the main content is completed. The importance of these final touches can not be overstated.

Step 7: Branding and Aesthetics

Once the applet has been functionally completed, it is time to concentrate on the aesthetics. Often, there are simple steps that can be taken to increase the prominence of the customer's brand such as the addition of a logo in a corner of the applet or as a background element. These are the little touches that separate a functional piece of content from a great piece of content.

Figure 12: Completed Applet with Branding



Step 8: Web Page Integration

The process of creating a Hypercosm enhanced web page is not complete until the Hypercosm 3D simulation has been integrated into the web environment in which it is destined to reside. First, the applet has to be linked into the web page so that it functions from a purely mechanical standpoint. Next, the applet must be blended into the web page so that it functions in harmony with the page from an aesthetic standpoint. This means that the colors which are used should be complementary and also that the layout and composition works well as a unit. Whatever the medium that a web designer uses, consistency is always important.

Figure 13: Complete Web Page with Integrated Applet



Voila! The finished product. This completes the content creation process.