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MEMORANDUM

To: George M. Janes, AICP
CC:
From: Brian Heagney
Date: 2011-04-15

**RE: The Feasibility of using Blender to replace 3ds Max for
          Photosimulations**

Problem
Photosimulations (Verifiable Digital Photomontages) are most often performed using
Autodesk's 3ds Max, a costly, propriety software.   Blender is a free, open source
software that performs many of the same functions of 3ds Max. **Can Blender be used
to replace 3ds Max in the production of photosimulations?** This memo documents our
research into this question.

Findings
**The current version of Blender does not lend itself to creating photosimulations and is
not a reasonable replacement for 3ds Max in a professional planning, architecture or
landscape architecture office.** While it can be used to produce photosimulations, it
shows itself to be both very difficult and cumbersome when compared to 3ds Max.

Background
Blender was created as animation software, developed by and for professional 3D
Modelers and Animators. At the time of this writing Blender is in a transitional stage.
The software is going through a fairly significant change, from version 2.4 to 2.6 (beta-
testing in 2.5). Thus, not only are some of the features not enabled in the beta-version
yet, but it also uses a newer python scripting, thus older scripts written for previous
versions of Blender will not work with the newer version of Blender.

Therefore, this analysis may soon be outdated. While at first I thought it would be fairly
easy to use Blender to create a photosimulation, I eventually ran into so many issues
that I had to stop and conclude that it is not advisable.

Set-up
Unfortunately, Blender doesn't use units like Inches or Feet very well. It was developed
to mainly use "blender units" (which is basically, well, unitless). So working in feet and
inches is tricky, kind of annoying, and weird. Luckily, there is a work-around. It may
seem contrary to what I just stated, but there actually is an option to use Imperial units
instead of Blender Units. (When importing objects or scenes into Blender from
Autodesk, make sure you use or ask for Collada files (.dae) - using .3ds does not provide
the correct units.)

The Imperial units option turns out to be very disappointing however, because Blender automatically uses "yards" as a major unit. So, you have a box that is 10' x 10' x 10', then Blender will show the units as: 1yd 1ft x 1yd 1ft x 1yd 1ft. So far, I have not found a way to change this and only use feet and inches.

One solution to this annoyance is to use blender's regular units, and in your head know that 1 blender unit = 1 foot. But the problem may occur when importing objects created by architectural or planning firms, since the majority of firms in those fields use Autodesk software. It wouldn't be impossible, but it will add one more layer of annoyance to your project.

Terrain
There is no terrain tool in Blender. In 3ds Max, turning contour lines from an engineering drawing is very easy to do, and is really just a push of a button. In a photosimulation one will often need to model either the terrain, or a re-grading of the terrain, and the data will more than likely be sent to you as contour lines as a .dxf or .dwg file. In Blender, there are supposedly a few workarounds, but they all failed when I tried to model a terrain from contours. The only options so far are to build them in professional version of SketchUp (not free version), or 3D Max. If you have 3ds Max, then the issue of using Blender is moot, so perhaps the only solution for the terrain aspect is to turn the contours into a terrain within SketchUp, and import that terrain into Blender.

Modeling the Action
Modeling and adding materials shouldn't be an issue in Blender, since this is what it was designed to do. 3ds Max was designed from the start to work with architectural data, so it is easier to model in 3ds Max, but Blender is a strong modeling tool, so modeling would just be a bit different.

For instance, 3ds Max creates windows, walls, and doors that can be altered and updated in real-time. The windows and doors are also integrated with "walls" such that by simply dragging and dropping windows and doors onto a "wall", the doors and windows will "go through" the wall. This is not built into Blender, so the ease of adding a window to a wall is lost when using Blender.

Sun
3ds Max has a wonderful sunlight system built into it. It is easy to use, and self-explanatory. Blender, on the other hand, does not. At this point, there may be two methods: importing a rig from SketchUp, or there might be a script. The rig from SketchUp seemed fairly cumbersome, and I was not too thrilled to think of that as a solution. I was still looking into the script to create a light to simulate the sun, when I realized that using Blender for photosimulation was just too troublesome, so I stopped looking.

Camera-matching
Once again, 3ds max contains a built-in set of tools to perform a camera-match. Blender does not. I did, however, find a camera-matching script written by Jonathan Merritt.

Unfortunately, I had only limited success. There are two problems: 1. while I used the tool to successfully match one camera to a scene, it was a very simple scene (a 2D checker board) and utilized the 2D algorithm. When I tried matching a camera for a more complicated scene of a housing development in the background of a rural landscape, the 3D algorithm consistently failed by either suggesting that no correct answer existed, or by producing a camera that was way off.

Additionally, this camera-matching tool only works in previous versions of Blender (so far). So it was at this point that I had to install a second Blender on my machine: Blender 2.45, in order to complete a camera-match.

It should be noted that a camera in Blender is exactly the same as a camera in 3ds Max (provided they have the same parameters). So if a camera was successfully created using the script, I would trust that camera to be comparable to 3ds Max cameras. To test this, I imported a .3ds model (created in and exported from 3ds Max) into Blender. I then created a camera directly within Blender, and gave it the same lens, x, y, z, pitch, roll and yaw as the 3ds Max camera. I then rendered images from both softwares and compared the two images: they were exactly the same.

Conclusion

Blender cannot be recommended for photosimulation at this time. In fact, I would not recommend it for most planning, architecture or landscape architecture applications because of its difficulty with units, modeling and developing an accurate terrain. Perhaps as the tools necessary for this particular process (terrain building and camera-matching) become integrated into Blender, and as units become more user-friendly, then using Blender for photosimulation and other applications will become a more viable solution. Until then, Autodesk's 3ds Max is by far the most practical and most reliable solution.