



MOST PEOPLE INVOLVED IN CITY PLANNING COMMISSIONS AREN'T GEOSPATIAL EXPERTS. 3D VISUALISATION PROVIDES A WAY FOR THEM TO SEE WHAT A NEW DEVELOPMENT LOOKS LIKE. **RICK HARRISON** EXPLORES SOME OF THE TECHNICAL CHALLENGES INVOLVED, AS WELL AS HOW TO OVERCOME THE PROBLEMS THAT TECHNOLOGY CAN'T SOLVE

In municipal applications, typically all that is currently required is a simple line drawing of street rights-of-way and lot lines lacking detail on subdivision of land submittals. The council must judge millions of dollars of new construction or redevelopment on vague information.

City planning commissions and councils are comprised of everyday citizens dedicating many evenings a month to sitting through presentations long and short that use submittal requirements that have remained unchanged for centuries. Rarely are these citizens involved in the land development or building industry – they are butchers, bakers, homemakers, retired and so on. Some are computer-savvy, others not so much.

Learning how to communicate with them in a way they understand is paramount in getting their approval for projects. And if a picture paints a thousand words, how many more does a 3D visualisation of a project?

That's why we developed LandMentor for VR, a design tool for advanced land

development planning. We created it as a holistic tool for the land development industry, merging land surveying, land planning, civil engineering and architecture to improve design and change the way growth is communicated. We use VR to place people into proposed homes and look out the windows, to demonstrate the 'feel' of openness we designed into the development by coordinating interior and exterior space. Without VR, it would be difficult to replicate at the initial design stages.

Fortunately, recent advances in technology have made VR an affordable reality for many. Today, a VR laptop with a HP Mixed Reality Headset costs just over \$1,000, making it an inexpensive way to ensure 'our design' meets 'their vision'. We deliver all our land-planning work to our clients with a LandMentor 3D file and a free LandMentor VR viewer and spatial analysis tool. We can also export the entire plan to be imported in SketchUp if that is their desired software. Like LandMentor, Enscape is another

excellent program that serves as a plug-in for SketchUp and others 3D applications that also features 'plug and play' for VR.

Dealing with data overload

3D visualisation has faced many technical challenges that have taken a long time to overcome. While it is easy to create a site plan on a flat surface and display it in 3D, most of the world is anything but flat. A digital terrain model (DTM) forms the natural ground. Precision geospatial intelligence defines every existing and proposed 'surface', which LandMentor presents as a colour or texture and tags for environmental or economic impacts. The desired surfaces, be they streets, walkways, ponds or driveways, are selected and then draped over the DTM to create the foundation for the 3D.

Typically, 3D models (likely created in SketchUp) are quickly dropped onto the 2D plan. LandMentor will show the structures at the correct elevations, even if the buildings are look-out, walk-out



This site in Rosenberg, Texas, gained concept approval and was embraced by the city after people witnessed the site and got the feel of the street by wearing VR headsets during a public meeting. Both bird's eye and street views in a rendering do not reflect the large amount of space accurately replicated wearing VR headsets



When looking at a 2D plan during the public meeting, the head of the planning commission for Buffalo, Minnesota, did not understand the huge yards we were presenting when the drawing was presented at 1:960 scale. When he experienced the actual feel of space using a VR headset, he embraced the design and it was quickly approved

or have a complex relationship with the terrain. On rolling or steep sites, using the natural terrain can create a terrible looking visualisation. By integrating engineering functions, a proposed surface DTM is created. It can then recompute the 3D base and produce a more finished presentation without having to place 3D models again.

Importing a LiDAR topography from CAD can consume millions of points that can render VR useless. VR must calculate every detail in real-time at 100 frames per second, while also computing shadows through leaves of trees, architectural elements, people, cars, and so on. If the contour data to develop the DTM consumes the computing power of the graphics, that's a huge problem. That's why LandMentor filters excessive topographic data – typically, we like to see no more than 20,000 points used for a DTM.

Using existing 3D models can also be a major roadblock. For those that use SketchUp, you already know that downloading a 3D model can be instant or take a long time, and only then will you find it's difficult to move about in it. This is because many 3D models are overly complex. However, when exploring a neighbourhood of 100 homes in a virtual environment, nobody is going to look at the window latch that consists of 200 facets, slowing down movement. For VR to be functional in even a small proposal, it has

to be frugal when it comes to creating 3D structures, people, cars, trees and the like.

Much of this cannot be solved through technology. Instead, proper training is key, which must be included with the technology. We use and teach SketchUp methods that retain a highly detailed representation, yet have a minimum amount of data. For the most part, to replicate how it 'feels' to live in a development, we need to have the interior walls and windows located and replicate the kitchen (where most families hang out) as a focal point.

Converting data

VR needs to be highly detailed, showing every existing and proposed element, accurately depicting the proposed buildings and landscaping – never before required of submittals.

For cities, most data arrives in the form of CAD files or internally from a GIS as a shapefile. LandMentor translates these formats, but most cities do not want to do conversions inhouse. Thus, VR opens up an entirely new avenue for consultants

to service cities, as the industry moves from a line-drawing submittal process to a spatial-based submittal process.

We began affordable conversion services for planning commission and council meetings for those cities that have adopted LandMentor. As more cities adopt this new technology, more consultants will provide conversion services until submittal standards change, eliminating the need for conversions altogether.

If VR is ever to become mainstream for city council and planning commission meetings, it must become as simple and easy to learn as a smartphone is today. It also needs to be affordable, specific to land development application, as well as the city to use as a regulatory tool. But we believe once there is momentum, the move to 3D visualisation in city planning will be quick and will bring a tremendous change to the entire industry serving land development.

Rick Harrison is president of Rick Harrison Site Design Studio and Neighborhood Innovations (www.rhsdplanning.com)