The Next Level

1.5 years have passed since the release of our last generation of 3D buildings. In this time we've covered a lot of ground to allow our clients to create 3D cities faster and more beautiful than ever. Let's dive in!

by Matthias Buehler

Our vision is to enable studios of all sizes and industries to create 3D cities faster and in higher quality. With each generation of our content, we try to raise the bar and push hard on the engineering side, to make using the content easier and more intuitive.

Our team has grown quite a bit, which allows solid R&D. This is necessary to navigate the vast field of technical challenges (and of course bugs) each single 3D tool brings hidden in its backpack. We're doing the technical heavy lifting so our clients can concentrate on their own respective core expertise.

It's a fine line, but we're specifically crafting our content for both offline and real-time rendering at the same time (these worlds have started to merge), with the right balance between photorealism, optimization for performance and file size on disk. I think we're now at a point where we can say our buildings look better than most AAA game titles and can be used directly 2nd row be-

hind hero quality buildings in Hollywood movies and TV shows!

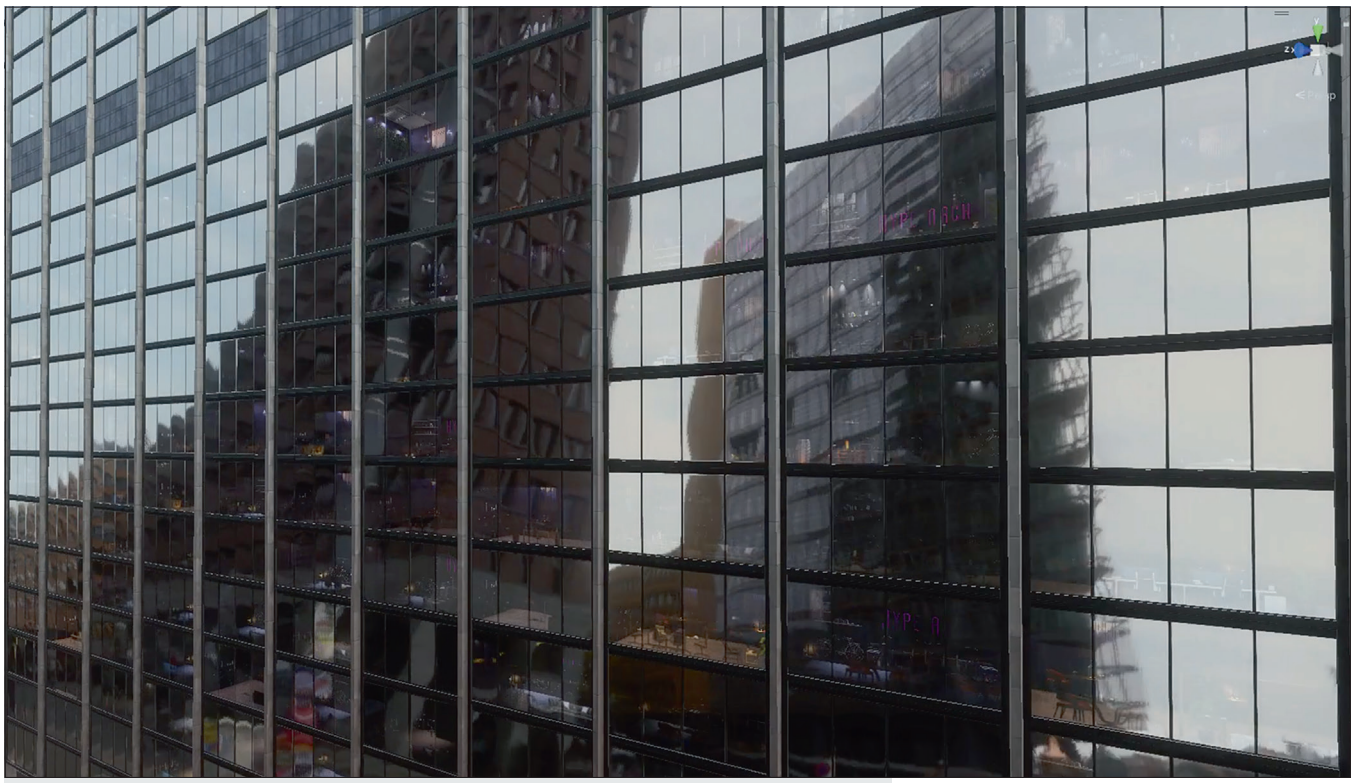
We also keep pushing our environment creation workflows in ArcGIS CityEngine, a tool developed by our friends at Esri (**www.esri.com**).

Applications

In wihich fields and industries are we used? The common ones are: Games, VFX, virtual production, advertisement, simulation (autonomous driving, pedestrian and bicycle safety), architectural and automotive visualization and XR. Well, in all projects that can use fictional contemporary architecture.

Challenges (we set ourselves)

▷ • Consistency in all aspects is one of the main goals: In the architecture itself (realism), but also in the data structure and optimizations for real-time use. This is a huge undertaking, but it makes sure all our assets and buildings can be placed right next to each other.



All our windows and doors now feature bent glass, like in reality. This bends the reflections of the surroundings much more realistically, especially in a raytracing setup.

We created a system that creates maps with which additional dirt and weathering can be added via a slider. Want cleaner or dirtier buildings? No problem!

- We want to deliver 'tool agnostic' content, as a true cross-platform solution.
- Delivered in either native file formats or hopefully soon USD, which can transport all our production features in full quality, for a painless drag-and-drop experience.
- We focus on large scale, full CG environments, for a realistic, contemporary look. This is also why we specifically chose to deliver full 3D buildings (one object each) and not modular sets. Time is money!

Main Features

Il know, I know, if you're not a very technical person, you only care about the value which saves you time. So if you're not a tekkie, skip these next few points For the others, let's dive in. Tech talk:

- Drag-and-drop content – easy to use!
- Full PBR materials
- Animatable emission (day/night cycle)
- Geometric and texture optimizations in detail density, mesh structure, draw calls, texture atlases, texture resolutions, mipmaps, compression

- LODs: We have created our own LOD creation system – we don't just poly-reduce. Assets have 3 LODs, buildings have 5 (1 for offline rendering, 4 for real-time use). For the platforms which need a LOD system setup

(typically game engines such as Unity or Unreal), we provide the content directly in the native format, with the LODs already set up and ready to be used.

Parallax Occlusion Interiors

This feature is the 'big boy' of the production and took on average 8 people a massive 1.5 years to develop. Parallax occlusion itself is a technique that has been around for many years, but it's just been in recent years that it got more traction, mainly in AAA games. It's basically a mathematical effect that unwraps a cubic room into flat textures, which then – based on the camera position and orientation – gets the correct pixels onto the screen for the room's 3D perspective.

We have developed many detailed rooms and developed a true cross-platform solution that works efficiently in all 3D tools which support this via HLSL or OSL.

The major benefit is that we get a full 3D interior look, which is lightweight (no delivery of 3D assets for all interiors) and fully real-time capable. Of course, we made it work for both day and night, too.

As a last note: The dirt and parallax occlusion features, as also access to the texture variations for the buildings, are available as optional upgrades, with a small fee.

Almost all buildings now feature three handy texture variants. The exceptions are skyscrapers, which have almost pure glass facades.

New Shop!

We're super excited to announce our new shop on **www.vrbn.io/shop**. Come have a look! We already have many categories of content available. More to come! This is the first time we're also offering 3D assets for use in open space and street space. They all ship with 3 consistent LODs (for the game engines)

We're licensing our content under the following license types:

- Sub-Licensing for licensing in other commercial software (e.g. simulators)
- Small Studio (1-3 staff)
- Medium Studio (4-15 staff)
- Large Studio (16-20 staff)
- Enterprise (20+ staff)
- Student
- Academia

A subset of those license types can directly order and pay; the other inquiries will be processed individually per client via a so-called 'requests for proposal'. This approach allows us to have a balanced pricing system ranging from students to global enterprises.
We strongly believe in a transparent sales process, thus we specifically decided against a subscription-based shop model and go for clean one-off sales. We don't believe our clients have the time to manage collecting individual products via spare monthly credits over months and months (or lose the subscription value). If you need to create a city, you need all the content at a specific point in time in the project. This is the first iteration of our shop – constructive feedback for improvement is most welcome!

Next Steps

So what's next? Well, the future is bright and we have a lot of ideas going forward. One of the big topics is always importers and file formats. We'll focus on the requested platforms, but Pixar's USD is up next, as it should help us getting our content easily into multiple tools. Next to the off-the-shelf content, it's also getting really exciting what we're developing in CityEngine, related to the creation of procedural urban environments and pushing them toward tools like Houdini and Unreal, as our clients might not need 3D buildings and assets but also methods to distribute them in realistic 3D worlds. Other than that, there are more exciting things cooking – and yes, we're aware of all the fancy buzzwords that are currently in the news. ;-)

Conclusions & Take Aways

We think our community will like this new generation of 3D content, as it allows artists to create realistic city views already with few buildings. If you need entire city shots with detailed skylines: We got you covered; whether it is for realistic games, VFX or hybrid pipelines, as used for example in Virtual Production.

We're curious to hear from you: What are your projects? What are features or types of content you'd wish we could provide? Reach out or look out for one of our upcoming webinar series! **› ei**

Matthias Buehler is the founder and CTO of Switzerland based vrbn. His background is in architecture. Over the last 15 years, he's become a specialist in procedural city modeling: For real world architectural and urban planning uses, but also for entertainment. vrbn specializes in creating large scale 3D urban environments and supports clients with consulting and custom 3D content production. Further, vrbn offers off-the-shelf 3D buildings and assets. For general info or questions, please contact info@vrbn.io.