Virtual Reality at Grimm + Parker Architects

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Since the beginning of recorded design, the search for a method of conveying an idea of a three-dimensional space or environment that didn't yet exist in physical form, encouraged the creation of perspective views, the perfection of hand painted renderings, sketches and even scaled down physical models throughout history. The practical necessity to "see" and even "feel" a three-dimensional space to test for proportion, light, materiality, context and a multitude of other elements, has been at the core of architecture practice since its inception. This need has been there to fulfill two basic requirements of the design process: to help the designer transform abstract ideas into form, by allowing for study through the iterative design process, and second, to offer others (colleagues, clients and the community) a means for the visualization of the designer's intent and the client's vision. With the advent of computer aided design and advance in technology, the profession has seen a rapid evolution towards ever more realistic renderings and visualization in ways that were almost inconceivable in the past, such as full immersive virtual reality.

From a client's perspective, this evolution in technology couldn't be better news! Instead of relying on imagination by trying to understand traditional 2D floor plans and elevations, which can be notoriously difficult, even if these were paired with illustrations of interior and exterior spaces, virtual reality and full 3D design offer a much easier way to process architectural information than ever before - for everyone. Through full immersive virtual reality, the client can literally "fly" as well as "walk" around and through spaces rendered with an incredible amount of realism, in an unparalleled experience, letting the client see and feel their vision like never before. This process helps increase the effective collab-

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oration and decision making among the entire team; and leads to an eventual greater thoughtfulness, accuracy and overall design quality. After all, there's no better way to understand design than experiencing it in 3D!

Another advantage of full 3D design and virtual reality is the quick integration of the client's feedback. A wall, a window or a door can be moved in real time while the client is "in" the unbuilt space for example, allowing him or her to see the result of their feedback instantly, and quickly approve or not the changes. This translates into a greater integration of the client's input during the design process leading to a built outcome that closely matches the client's vision like never before. Besides of quicker and better-informed decisions, other practical benefits from this process - for the client- are potential less changes during construction which translates into cost savings. Because of these reasons, clients are more likely to select design firms that utilize the latest technology that allow them to realize their vision sooner.

As part of Grimm + Parker's commitment to the Building Information Management process (BIM) through the adoption of the Autodesk Revit software, practically since its introduction to the world in the early 2000's, as the main design and production tool for the firm, facilitated its staff to gain a wealth of experience on that platform that is unrivaled among many other architecture firms that chose to remain designing in 3-D with one software and translating it into another 2-D production software platform for construction drawings. Because Revit requires the creation of one single 3-D virtual model that is shared and worked on by an entire design team, including architects and a variety of engineering consultants, there is no lag between the conceptual design intent and what is being produced in 3-D by the entire team. Even though the creative process often still requires the tried and true pencil sketch on paper at the initial moment of creation, the simple fact that an idea can be modeled quickly in 3-D for quick visualization has helped evolve design through technology. So, as always, at the center of design is visualization! However, this hasn't always been an easy process.

Even though Autodesk Revit has been a terrific platform for the creation of a single 3-D virtual model of a building or project that an entire team collaborates through, its "out of the box" 3D visualization capabilities are not the most straight forward and have been one of the main disadvantages of this software for the designer. However, the opportunity for clash detection, energy modeling, and its overall robust interdisciplinary coordination capability outweighs its shortcomings. Then, Grimm + Parker acquired a visualization plug-in for Revit called Enscape, which is actually a real-time rendering engine for Revit. Enscape was chosen because of its tight integration with Revit. There are many other programs that work similarly. Iris VR, Autodesk Live, Insite VR are a few. However, Enscape allows the user to be immersed using the fewest clicks. And the quality is great.

Thanks to "Enscape" we are finally able to truly visualize – in a very friendly and photo-realistic way - what we are creating with Revit at our desks. This terrific plug-in allows for the quick generation of exciting renderings, animations and real-time walk-throughs and fly-bys of our virtual models. In essence: virtual reality, both through mobile phone and (desktop) hardware. With this plug in we are now able to quickly provide full immersive virtual reality through the use of headset hardware.

Currently, the two major V.R. hardware companies are HTC and Oculus. HTC has the Vive and Oculus has the Rift. They are very similar - the Vive had hand controllers first, Oculus added those a few months later. Grimm + Parker adopted the HTC Vive. Why the Vive? Initially it worked better with Enscape due to the controller support. Even though Enscape supported the Oculus first, we waited for the dust to settle and picked the best technology. These head gear hardware solutions are more robust and offer a much better experience over the mobile phone solutions - those are the ones where you take your phone and stick in a viewer. Google Cardboard (now called Google Daydream) and Samsung Gear VR are the most well know. A major, but necessary, drawback for both systems are the cables. This is currently one of the biggest hurdles and something that is very difficult to solve. Transmitting the necessary amount of data wireless for a smooth experience is currently difficult. Any slight delay and the user will get headaches. Intel is working on a Vive add-on solution that uses Wi-Gig technology (gigabit wi-fi, essentially).

Some next steps we're exploring are modifications in the VR world (changing materials), manipulating objects, eventually getting rid of the controllers and using hands to navigate via LeapMotion. One current drawback of the HTC Vive system – only one person can be immersed at a time. For this reason, we tend to also connect the viewer to an LCD panel during a virtual reality session so others in the room can see what the person with the head gear is seeing and be able to participate in the session in real time. The mobile phone solutions (Iris VR, for example), allow multiple people to experience the immersion at once, from any location. That's the advantage of mobile – you can be anywhere. But the quality is not even close to the HTC Vive or Oculus Rift.

At Grimm + Parker, virtual reality is used for more than client presentations. The instant feedback allows it to act as a great design tool, and the intuitive walk-through controls also make it easier to explore spaces and identify coordination issues. This can be extremely useful for design studies, coordinating between different disciplines or simply just taking a stroll through the unbuilt environment. Its introduction has been a tremendous success with clients and staff. What's next? Augmented Reality (AR) is in the horizon. Microsoft Hololens allows you to see holograms overlaid on top of the real world. Pokemon Go was a great example using a smart-phone. Recently, Apple introduced an AR Kit as part of the latest iOS update which will certainly kickstart the AR revolution. This can become extremely powerful for renovation projects. It could also be a great way to have "x-ray" vision into a space and see behind walls or locate utilities underground. This could potentially be a deliverable to clients for facilities management, for example!

Remember people's expressions when they saw an I-phone or I-Pad in operation for the first time? This is the expression you get to see when people experience VR for the first time. However, no one gives a second thought about seeing or operating a smart phone or tablet today. I believe in brief time, it will be the norm that most architectural firms will be using these capabilities with their staff and clients. Clients will be expecting Virtual Reality and it will no longer be a matter of if, but when will it be necessary to invest. But the investment cannot be solely on equipment. The investment must start with becoming proficient in Revit in order to be able to produce virtual environments that are modeled correctly and exciting to visit. At Grimm + Parker we are proud to have made that investment many years ago, and now we are able to fully use this new technology to the fullest extent of its capabilities!