AUTODESK UNIVERSITY

DV23698-R

Total Guide to Virtual Reality Visualization: Hardware Edition

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Learning Objectives

- Gain an overview of the virtual-reality uses in the AEC industry
- Learn about tethered versus mobile—implementing VR for Oculus Rift, HTC Vive, Gear VR, Google Cardboard, and others
- Discover pros and cons of all major currently available hardware solutions
- Learn how to get started with VR visualization on any budget

Description

This roundtable will focus on different available virtual-reality (VR) hardware options, with the purpose of implementing VR into architecture, engineering, and construction (AEC) workflows. We will have an in-depth discussion both about the tethered VR options like the Oculus Rift and HTC Vive, as well as about more-affordable mobile options like the Samsung Gear VR, Google Cardboard, and others. Every VR platform has strengths and weaknesses. We will discuss which VR platforms perform best paired with specific workflows for optimal end results. We will discuss everything from setting up and optimizing the VR hardware and available accessories to desktop/laptop/mobile requirements and hardware specifications needed to ensure an optimal AEC-VR experience. We will showcase different ways we use VR in the AEC industry, paired with appropriate hardware. VR can realize major savings in various VR workflows that include 360 renderings, VR walk-throughs, existing conditions exploration, virtual mockups, and many others. This session features Revit, 3ds Max, and Autodesk Stingray.

Your AU Experts

Marin Pastar graduated from Drury University in 2005 and got licensed as an Architect in 2011. From the beginning of his career, Marin was deeply involved in 3D modeling and visualization with AutoCAD and 3DS Max, which evolved into a career defining turn to Revit and BIM.

Fascinated by BIM compared to traditional project delivery methods, Marin was the driving force in evolving the 11-person CAD firm into a growing, multi-office 80+ person VDC firm that Bates is today. As Director of Innovation, Marin is involved in all aspects of Projects from Design and VR, to streamlining AEC Workflows from Planning and Construction, into Facility Management and Operation.

Marin has been a regular AU attendee and a Revit Certified Professional since 2012. He has been invited to speak about VDC at several CSI and AGC conferences as well as AU 2015. Autodesk recognized Bates as “Early Technology Adopters” and produced a customer success story published at https://www.youtube.com/watch?v=meJ2t3BSeR4

Ian McGaw has a dual degree in computer science and international business, focusing on the management and research and development of emerging technologies in the AEC/O sector. He is an executive business leader with broad domestic and international experience in identifying strategic and innovative technology solutions to complex business challenges. Ian’s interests, along with years of industry-related experience, have allowed him to understand complex technology process has become an influential factor in the way buildings are delivered all over the world. Ian has experience in full value chain of project development process, starting from early strategic planning, project planning, business IT innovation strategy and business portfolio management for long term clients all the way to project execution on healthcare, mega-sized mixed use development, aviation, hospitality, simulation training, and complex industrial projects.

Rich Conyers, Design Professional & Associate Architect, is a Revit Certified Professional currently pursuing licensure while co-designing and production modeling. His experience with a variety of typologies from a 108 bed lodge resort, a $160 mil. hospital expansion, a 120 bed skilled nursing facility, to Missouri’s only natural science museum has allowed Rich to experience the processes and workflows unique to many building types as well as the consistencies between them. Rich is currently a member of multiple boards and committees targeting education in the office and throughout the region: bates BIM committee, Missouri Institute of Natural Science Board, OTC’s Drafting and Design Technology Advisory Committee, OTC Steam Days, and GOCAPS (a program for exceptional students seeking careers in engineering, entrepreneurship, and medical fields). He strives to reevaluate processes of the past and mold more accurate and efficient workflows of tomorrow.

Key Concepts

Below are some key terms that will be discussed and utilized during the roundtable. In order to be able to easily follow along and take part in deeper discussions, we recommend reading up a bit about the VR concepts ahead of AU.

What is VR? AR? MR?

Key Terms: *Virtual Reality*
Augmented Reality
Mixed Reality

There are a lot of resources discussing the differences between all of the alternate realities. The following short explanation is what helps me sleep at night:

VR – any form of fully immersive alternate reality. It does not integrate any form of reality you are physically surrounded by. (IE roller coaster simulation, while you are seated in your living room)

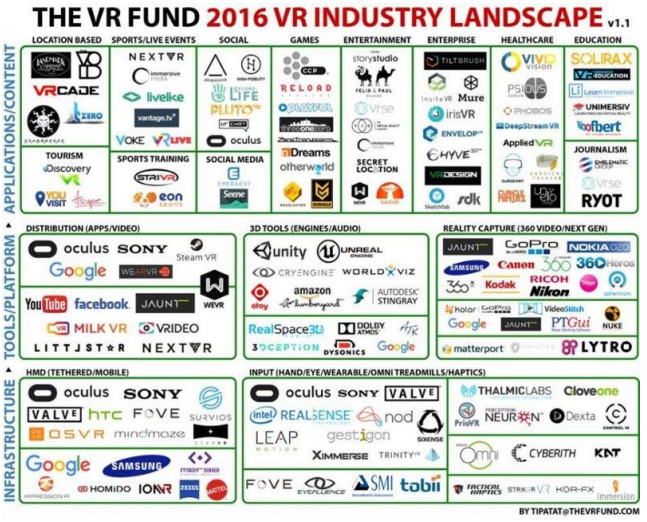
AR – form of reality that incorporates your physical surroundings, augmented with an overlay of Virtual Reality. You are aware of both of the realities. For example – Pokémon GO. Key point is that the two realities do not interact with each other.

MR – this is where it gets tricky. It is an evolution of AR. Imagine if your virtual Pokémon could turn off the lights in your actual living room and hide behind the window shades. Key point is that the two realities react and interact with each other.

Additional Information:
https://www.thefoundry.co.uk/solutions/virtual-reality/vr-ar-mr-sorry-im-confused/

VR Software Tools / Distribution Platforms:

Key Terms: *Unity*
Autodesk Stingray
Unreal Engine
Oculus Home
Steam VR



Additional Information:
https://trello.com/b/srhdQF14/virtual-reality-industry-2016

VR Panorama:

Key Terms: *Monoscopic*
Stereoscopic
Equirectangular
Cubic

Much of what we do within the realm of "static" VR within the AEC industry starts by 3D modeling (there are many 3D modeling platforms like Revit, Rhino, SketchUp etc.) and rendering high quality 360 degree "Panoramic" Images, creating a sense of virtual immersion when using a VR device of some sort (like Oculus Rift or Google Cardboard).

There are many ways to develop 360 degree panoramas, and many different formats. We will touch on the most important concepts and workflows at the roundtable.

Additional Information:
http://wiki.panotools.org/Panorama_formats

VR Performance:

Key Terms: *Frame Rate*
Positional Tracking
Seated/Standing VR
Room-Scale VR

When putting together a VR presentation, we are faced with many decisions. What is the scale of the VR Showcase? There is a huge difference in approaching a single room VR vs a whole building experience. Will it be static (Panoramic image) or VR Walk-through? Indoor or outdoor? What resources do we have (Laptop, Desktop, Cell phone)? How much room do we have for the presentation?

VR performance depends on many factors. Every VR presentation needs to be tailored to suit the need and the client. VR pre-planning is the crucial step to a successful VR presentation and experience. First step is understanding how VR works and how to work around the limitations.

Additional Information:
http://whatis.techtarget.com/definition/room-scale-VR-room-scale-virtual-reality
http://www.techrepublic.com/article/mini-glossary-virtual-reality-terms-you-should-know/
https://unimersiv.com/vr-sickness-what-is-it-and-why-do-we-get-it-340/

VR Hardware:

Key Terms: *HMD*
Tethered HMD's
Un-Tethered/Mobile HMD's

VR hardware is rapidly evolving. Even though the focus seems to be shifting to the portable, cable-free and mobile platforms, lack of positional tracking and processing power are still the key factors why laptop or desktop powered VR devices are the preferred option for more demanding VR experiences.

Additional Information:
http://www.wareable.com/headgear/the-best-ar-and-vr-headsets
https://www.cnet.com/special-reports/vr101/

Computer Generated (CG) Content Creation

Key Software:

Autodesk Revit
Autodesk Navisworks Manage
Autodesk 3DS Max
Autodesk AutoCAD Fabrication
Autodesk A360 Rendering
Autodesk LIVE
Lumion 3D Pro
InsiteVR
Iris VR
Insta VR
Enscape
KRPano
Revizto

It seems like every couple of days, we find a new way to get your BIM models into VR. We have tested multiple workflows and will discuss some of the best results we achieved, depending on what it is that we are trying to achieve with every given VR presentation.

For some clients, being able to walk the entire building with less detail is much more important than experiencing only a few hyper realistic static Panoramas. For others, they may want to make sure that their Marble countertops are exactly the kind they want, and they will pair nicely with the new floor tiles. Facility Managers want to see EXACTLY how key areas will be fabricated, to make sure they can maintain the assets for years to come. Medical Surgeons and their staff may want to experience their new OR to make sure all equipment is optimally placed.

There are a lot of variables in deciding your appropriate VR path. There is only one thing that is certain - your tools and workflows will constantly keep evolving.

Real-World VR Content Creation

Key Terms: *360 Photos*
360 Videos
360 Drone Aerials
360 Tours
Holobuilder
Matterport

Often times, we forget to acknowledge that Virtual Reality represents ANY alternate reality other than our current physical surroundings. It doesn't necessarily mean Computer-Generated environments. 360 photos and videos, and IR/Laser scanning are all great options for creating VR experiences! We will discuss some implementations of real-world VR for the AEC industry.

Additional Information:
https://en.wikipedia.org/wiki/VR_photography
http://www.wareable.com/cameras/best-360-degree-cameras

Hardware Recommendations:

Platform: *Laptop*
Desktop
Mobile
Other

From high-end gaming laptops to custom-built VR powerhouses, the market for VR-Ready computers is expanding along with the rest of the growing VR industry. We will discuss what we found works well and what doesn't.

Additional Information:
http://www.logicalincrements.com/articles/vrguide#understanding
http://blog.irisvr.com/blog/category/our-favorite-vr-ready-hardware-how-to-get-the-most-out-of-prospect
http://www.theverge.com/circuitbreaker/2016/9/13/12902700/msi-vr-one-backpack-gaming-pc-tgs-2016

Holobuilder

Bates Office

Bates ENG Office

Revit / Lumion / InsiteVR

Mercy Hospital NWA Exterior

Mercy Hospital NWA Aerial

Revit / A360 Cloud Pano Rendering

Mercy Hospital NWA Hybrid Cath Lab

7-11 Convenient Store Prototype