ROOMSCALE IN VR

WHAT DOES ROOMSCALE MEAN?

Room scale is a design paradigm for virtual reality experiences which allows users to freely walk around a play area with their real-life motion reflected in the VR environment.

HTC and VIVE led the way with using room scale as a paradigm and thus defined it. They decided room scale would cover 15x15 (or larger), but would be built to scale down from that size as needed. The minimum space required for room scale VR is 2 X 1.5.

WHAT DOES ROOMSCALE REALLY MEAN?

As additional platforms enter the marketplace, room scale has become more a marketing term that a design paradigm. Both oculus, and PS VR claim some room scale functionality, albeit limited in comparison to Valve and HTC's original goals. What users really expect from room scale is full 360-degree tracking of a volume. Tracking is the major difference between the platforms when considering room scale experiences. Space is limited by users more so than the hardware itself. Valve has done multiple room scale surveys which help developers see how much space most users have.

Posted By Valve Feb 2017:

And here's the most common exact Play Area settings and their changes since June 2016:

25.3% (+6.8) - 1 x 1 (Standing Only)

13.9% (-0.2) - 2.5 x 2

13.8% (+1.4) - 2 x 2

8.2% (+0.2) - 2.5 x 2.5

7.4% (+0.1) - 2 x 1.5

6.2% (-0.3) - 2.5 x 1.5

5.7% (-1.3) - 3 x 2.5

"the number of Rifts playing VR games through Steam doubled in December with the addition of optional motion controls."

WHAT DOES ROOMSCALE REALLY MEAN FROM A UX POV?

Many experiences claim to support room scale. However, many are not room scale experiences by default, and are simply scaling experiences. Room scale experiences are experiences built from the ground up without a need for locomotion. Locomotion may be added later for accessibility but the experience should not be reliant on it if the space

is available and the user is able. In many games, physical movement is an option, in pure room scale games, physical movement is required by design. If we use this definition, there are not many true room scale experiences available to date. Developers would rather design to reach as many users and platforms as possible.

HOW IS ROOM SCALE DIFFERENT? (Google, The Void, Independent, Owlchemy Labs, WEVR)

- Deep emotional connection using your body to facilitate the experience, so you lose the abstraction of using a controller or staring at a monitor.
- Anxiety can be increased, giving users cues to what is about to happen using audio, etc. is key. More responsibility to cue users.
- Responsive systems that are meeting people's expectations become more important (physics,etc.)
- Concept of world having audio by default is not a thing (music is odd, unless contextualized like JobSim radio)

WHAT ARE DESIGN PRINCIPLES TO KEEP IN MIND WHEN DESIGNING FOR ROOM SCALE VR?

- **TRACKING:** As mentioned before Room scale VR comes with the perception of immaculate 360-degree tracking. If the platform you are designing for does not have true 360-degree tracking ensure your design does not expose this or finds clever ways to handle it without breaking immersion. [see Job Sim PS VR solution]
- **USER HEIGHT:** When creating room scale VR spaces, you cannot assume the head height of your user. Since the user interacts in a room scale VR space with a realistic approximation of their body, the physical dimensions of both the space and user matter.
- **ENCOURAGE MOVEMENT:** Try to design without locomotion in mind, at least initially. If you must have a travel mechanic, built into the world's fiction.
- **IMMERSION LEVELS:** Be aware that room scale allows for greater immersion, so experiences need to be finely calibrated. In the case of horror, scares can quickly become "not a fun scare but a survival scare".
- **PERMISSIONING THE PLAYER:** Have things that are moving, calling to users, directing them around the space. Curtain openers, its ok you can touch things. Give users a reason to use all angles.
- **ADAPTIBILITY:** Unless you are designing for a very specific environment, your room scale design will have to be able to adapt to various play space sizes.
- **ACESSIBILITY:** Room scale VR can be magical but also means developers must consider accessibility as a separate design track.

WHAT TECHNIQUES DO DEVELOPERS CURRENTLY USE TO GET AS CLOSE TO ROOM SCALE PERCEPTION AS POSSIBLE GIVEN RESTRAINED PLAY AREAS?

- Scale to Play space
- Redirected Walking
- Flipping room scale orientation
- Building locomotion into the fiction of the game (platforms, elevators, warp bubbles, etc.)

WHAT TECHNIQUES DO DEVELOPERS CURRENTLY USE TO DEAL WITH EDGE CASES IN ROOM SCALE VR?

- **Walking Through Walls**
    - **The Gallery** blurs the camera if a player walks through a wall
- **Walking Off Ledges**
    - **The Gallery** blurs the camera and teleports the player to the ground
- **Stairs**
    - **Vanishing Realms**, you just walk into them (i.e. your vertical position stays constant)
- **Uneven terrain**
    - **Vanishing Realms,** doesn't change your vertical position unless you teleport
- **Player View Clipping Thru Walls**
    - Ensure levels are laid out in such a way that if the player's view clips through a wall slightly there's nowhere they can instantly pass through to. No old-school doors/walls composted of 2 polygons. Everything should have at least a small amount of depth geometry.
    - When a player's view comes close enough to a wall that they are at risk of clipping through, the game should respond by dimming the screen and pausing the game simulation as if the player had opened a game menu. This would prevent "noclip" movement in the game world.

WHAT TRUE "ROOM SCALE EXPERIENCES" ARE AVAILABLE?

- **Unseen Diplomacy**

they use fancy math to create these twisting hallways that move around your play space so it feels like you're in a much bigger space. It was specifically built for big play spaces in mind as the 'gimmick' of the game is a non-Euclidean room where you go from one room to the next completely in room scale in a circle while encountering random obstacles.) "procedurally generated levels like this that adapt to your room is the future on room scale vr."

- **Budget Cuts**

Does a great job giving users a reason to use all angles (laying on floor, shooting thru vent) Developers refused to modify their design to fit other platforms stating, "It's not that we don't want to support PSVR and Touch, but that the Touch, and especially PSVR, doesn't currently seem to support 360° tracking with near-occlusion free interaction, from head to toe, purely from a technical standpoint."

WHAT TYPE OF ROOM SCALE EXPERIENCES DO USERS WANT?

- Exploration, Exploration, Exploration (Myst,Riven,Gabriel Knight, Monkey Island, Maniac Mansion)
- "…want an underwater submarine game, set in a "Waterworld" kind of setting, within a huge vast ocean. In your ship, you have different rooms, which are accessed through elevators, or turning doorways. You have a command room where you "pilot" the sub, and you can access all the other rooms through turning doorways or elevators."
- Detective Game that requires examining crime scene, all the way to court room appearance i.e. Phoenix Wright Detective
- Kung Fu , Martial Arts
- Defending a Room (COD Zombies), Room Escape
- Interactive educational Simulators
- Roomscale RTS like starcraft (carmen sandiego tv show, map on the floor)
- Tiny World/Sim Management games (Civ, Sim City,Theme Park, Settlers, etc)

WHAT DOES TETHERLESS ROOMSCALE VR REALLY AFFORD US?

Sadly, not much. Here is why:

- **No More Cord Is Good Right?**
  - As many experiments have shown, users adapt to the cord location in VR, and it causes minimal issues
  - The cord acts as a grounding element for many, helping them understand the restrictions of their play space without guardian/chaperone
  - In the end, it will be make movement much easier, ensuring users get immersed easier. However, you don't want to encourage continuous 360 rotations.
- **It's mobile**
  - It is still highly unlikely this will change the available play space users have as documented by Valve
  - It will encourage users to possibly have multiple play spaces, thru travel but won't excuse designers from meeting minimum play space requirements.
- **Tracking**
  - With comfort and mobility, we lose some tracking precision while encouraging users to move around even more freely than before.
- **Graphic Fidelity**
  - With mobility, we lose some power to push graphics, etc.