ADAPTIVE SPACES IN VR

WHAT DOES ADAPTIVE VR MEAN?

VR Designed from the ground up to consider various play space areas ranging from seated to 15x15, and tracking scenarios, ranging from front facing to full 360-degree tracking. Adaptive VR solutions allow developers to reach more users, across various platforms. Adaptive VR solutions are often confused with accessibility VR solutions. They should be looked at as two different paths. At times, an accessibility feature is added, which enables the VR experience to be more adaptable but this means the experience itself was not designed with adaptive measures in mind.

WHAT ARE DEVELOPERS THINKING MAY POSSIBLY WORK?

Many developers recognize the more adaptive their design, the more people they can reach. Here are a few possible solutions discussed:

- "…have the game sense what playarea you have set up and distribute the game assets dynamically over that area."
- "You can either put the gameplay in the center of the room, so it doesn't matter how close or far the walls are, as long as it's enough to walk around the thing in the center. Or you can model the gameplay into a corner of the room or a single wall in the room, so that it doesn't matter how close or far away the other walls are."
- "Procedural geometry and asset placement. Devs get your play area from your Steam settings and build the levels and areas based on those requirements."
- "In UE4 i think you can "request" the size the vive user has configured their vive for. This can be used to create a procedural "adapted" model (or cluster of them) to fit the size of the players room, also it can be used to move objects closer or further away from the player."

IT COMES DOWN TO WHAT?

Adapative VR development comes down to the following main categories:

- **Dynamic:** "…rules are specified what object needs to be placed where in the scene (table A at wall A, window B in wall A, door C in wall B, ...). On startup, the game can automatically scale the virtual room to the real dimensions and place everything according to the rules."

- **Static:** "…the game ships with each environment in e.g. three different sizes and uses the largest one that still fits into the player's room." This works well when you cannot scale content as you are mimicking real world, 1:1 scale.
- **Scale:** Some experiences simple use scale in various ways to make their experiences adaptable. This works well when your experience is NOT mimicking real world.
- **Hybrid:** Some combination of the above solutions.

It's important to note when dynamic is mentioned it is all pre-user interaction.

WHAT ABOUT GAME MECHANICS?

Most of the time scaling is focused on environmental issues.

However; the more complex the experience, the more likely scaling environmental aspects affect core mechanics.

Examples:

Hover Junkers:

Adaptive Approach: Creating different size ships that correlated with roomscale data.

Mechanics Issue:

Different size ships offered different advantages and disadvantages during gameplay.

This became an issue as the player's available space forced them into having to play a certain way based on ships available to them.

Space Pirate Trainer/Holopoint:

Adaptive Approach: Creating different size ships that correlated with roomscale data.

Mechanics Issue:

Larger room sizes offered players more space to dodge, while smaller room sizes meant players had to master the shield mechanic.

This became an issue as there is a leaderboard and players noticed it was harder to achieve higher scores in smaller room sizes.

Solutions Developers Have Considered:

Since it would take a lot of work to design a scaling algorithm based on room scale that made certain game mechanics "fair", most developers do not touch their core mechanics and instead do much more simple things instead:

- Separate leaderboards broken down by applicable play space sizes
- Not allowing ranked cross play across VR platforms (due to the variation of tracking solutions)

WHAT HAVE DEVELOPERS SHIPPED?

PRODUCT: JOB SIMULATOR

MOTIVATION: To be compatible with more platforms, especially PS VR

SOLUTION: STATIC

Job Simulator automatically re-configures the size of each job in the game to fit the available space that you have in your room.

HOW IT WORKS:

SteamVR gives us the data about the "room size" that was detected during your room calibration. From that we sort you into three categories:

- Small (2m x 1.5m or larger)
- Medium (2.5m x 1.875m or larger)
- Large (3m x 2.25m or larger)

Based on your room size, you'll fall into one of these 3 categories. For example if you have a 2.3m wide and 1.9m deep room, you'll be categorized as small, since your width doesn't meet the medium size specifications of 2.5m.

"There is no functional difference between the 3 spaces. We just placed all equipment in a way that makes it more accessible when playing in small or medium spaces. That way you won't have to bump into a wall, and you can still do all the awesome things the job provides!"

Tldr: The kitchen has the same functionality at all sizes, but the layout might be a bit different

LESSONS LEARNED:

PRODUCT: HOVER JUNKERS

MOTIVATION: To be compatible with more platforms, users

SOLUTION: DYNAMIC

HOW IT WORKS:

In the beginning, they measure your height and each ship had different sizes for your room scale. "Hover Junkers" designs around the locomotion problem by having the player standing on a moving platform, and the moving platform is the size of their playable area.

LESSONS LEARNED:

- **Different size ships ended up being advantages or disadvantages during gameplay (was not appropriately balanced)**

PRODUCT: FANTASTIC CONTRAPTION

MOTIVATION: To be compatible with more platforms, users

SOLUTION: SCALE

"…four different scales in which to play the game, depending on what's comfortable for you and how much space you have in which to play."

HOW IT WORKS:

- **Standing Scale:** "... we simply scale you a bit bigger than you normally are, and set your play area to a minimal size. As long are you can bend over and reach out with a small step, you should be able to experience the game as intended."
- **Floor Scale (Lego analogy):** "…we scale you up to be quite large… we aimed to make your butt about 5 meters wide in game units which fills about half the island on which you normally stand. At this size, you are towering over levels – everything is super teensy and it feels a lot more like building a model airplane than a big contraption…"
- **Desk Scale (Lego on desk):** "we simply take the floor scale setup and raise the floor up to be at about the tabletop height for this version of the game." This mode has the most issues.

"In these alternate scale modes, we try to encourage you to stay facing in the same direction by placing your starting point further back, and orienting you to "normally" face the goal area."

LESSONS LEARNED:

- Originally, we gave the player a slider to control their exact scale but, as with all sliders, players only ever used the extremes.

http://fantasticcontraption.com/ **(PS VR media)**

PRODUCT: FINAL APPROACH

MOTIVATION: To be compatible with more users

SOLUTION: DYNAMIC AND USER DEFINED SCALE AND POSITIONING

HOW IT WORKS:

You will see red arrows around the level that allow you to resize the environment to better accommodate your playspace. You can center the arrow to change the height of the runways and change the position of the entire level. Pressing "reset" will undo your changes and take up as much of the play area as possible, which is default behavior.

When you hit "apply", the room layout you just created gets saved with your profile and will be loaded each time you enter a level so there will be no need to change the room layout every time you start a level.

LESSONS LEARNED:

- **Guardian/Chaperone are not perfect**