Simulation Learning System with Virtual Reality (SLS with VR): Setting Up VR Hardware and the Play Space

Contents

Portions of this guide are adapted from the SimX Instruction Manual located in the SimX Administrator Portal. This guide also contains several external links to the Oculus Quest Enterprise and Consumer portions of their websites. Elsevier, RELX, and their affiliates are not responsible for the information taken from the SimX Manual or Oculus websites.

Before using VR hardware, consult the **Oculus Health and Safety Warnings** at

www.oculus.com/legal/health-and-safety-warnings ↗. See **Using VR Hardware** for guidance on

headset fit and using the controllers.

NOTE: You can use other brands of VR headsets than the Oculus Quest. See **Computer and VR Hardware Specifications** for a list of supported hardware. The primary VR hardware we recommend is the Oculus Quest due to ease of use and being completely untethered. We will continue to update this list as more hardware becomes available and supported.

System Overview

Simulation Learning System with Virtual Reality (SLS with VR) includes the **SimX** simulation platform, which combined with the **Oculus Quest,** delivers a totally wireless, untethered user experience where participants can physically explore virtual healthcare spaces, interact with virtual patients, and work together to manage patient care in a safe virtual realm.

Maintaining high psychosocial fidelity means minimizing equipment failure, so good setup and maintenance are important to a good simulation experience. Working within a virtual space also presents real hazards if the physical area isn't clear and people aren't careful, so follow all safety instructions.

NOTE: The Oculus Quest **must be connected to a wireless network** to connect and participate in a simulation on the SimX platform.

General Oculus Support Links

This guide contains setup information as it relates to using the SimX VR application; for general Oculus hardware setup, see the following pages:

Oculus Business Edition

If you are using the **enterprise edition of the Oculus Quest (1 or 2)** and **Oculus for Business,** see **Oculus for Business Support** at **business.oculus.com/support**↗ to find support for your device as well

as Oculus for Business tools. Here, you can find guidance for many areas, including Hardware Setup, Care and Maintenance, Wi-Fi, Troubleshooting, and more.

- **Getting Started** at **business.oculus.com/support/764685520644699**↗ is a good resource to review before you begin device setup.

Oculus Consumer Edition

If you are using the **consumer edition of the Oculus Quest (1 or 2),** see **Quest and Quest 2 Support Center** at **support.oculus.com/quest**↗ to find support for your device. Here, you can find guidance for many areas, including Hardware Setup, Care and Maintenance, Wi-Fi, Troubleshooting, and more.

- Under **Hardware** on the left side are links for helping with initial device setup:
  - **Oculus Quest 1 – Consumer Edition: Getting Started** at **support.oculus.com/855551644803876**↗
  - **Oculus Quest 2 – Consumer Edition: Getting Started** at **support.oculus.com/795778631158860**↗

System Performance

- Under optimal use, the SimX system with the Oculus Quest will provide approximately 120 minutes of continuous use; however, simulation time in the Quest can be significantly extended by always plugging in the Quest and charging between sessions.
- Hand controller battery life will vary, but a fresh set of AA batteries will typically last 8-10 hours of continuous use.
  - Storing hand controllers carefully and avoiding accidental button depression will help extend battery life over multiple sessions.

Setting Up the VR Play Space

- You will need a minimum 10' x 10' (maximum 25' x 25') physical space indoors clear of obstructions for the VR play space.
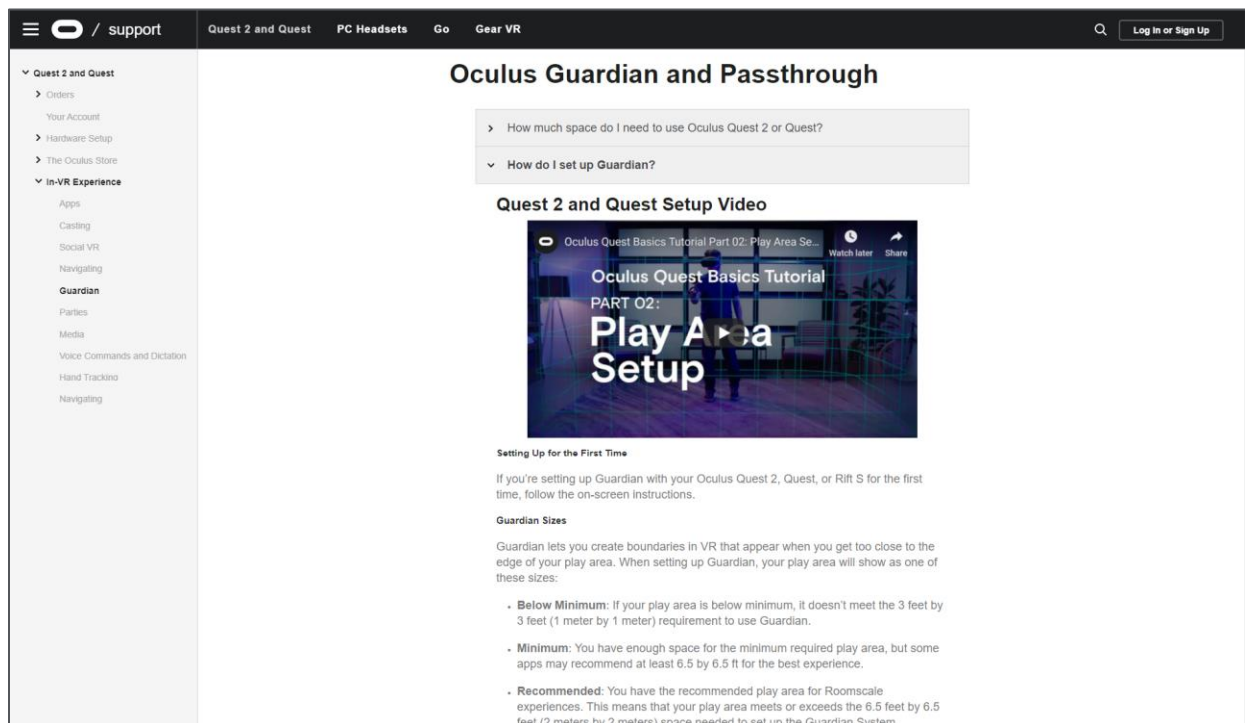 - NOTE: We recommend using pieces of masking tape to mark the corners of the VR play space.

o NOTE: Some VR simulations require more than the minimum 10' x 10'. These scenarios are noted within the VR Scenario Index (located in your SLS with VR Evolve course in **General Resources**).

- **NOTE:** The VR system uses light to track participants, so avoid shiny surfaces such as highly reflective walls and windows, which may cause errors. We recommend covering windows, glass and other shiny surfaces with a cloth or window shade.

Setting Up the Guardian

The in-VR **Guardian** is Oculus' name for the **virtual boundary** to keep participants safe within physical space.

Follow the directions for setting up the Guardian on Oculus' support sites:

- **Consumer Edition Guardian Instructions** at **support.oculus.com/1217524098600450**↗ – Click **How do I set up Guardian?**

- **Enterprise Edition Guardian Instructions** at

  business.oculus.com/support/755360251634157 ↗ — Scroll to **Guardian** and click **How do I set up Guardian for my Oculus for Business headset?**
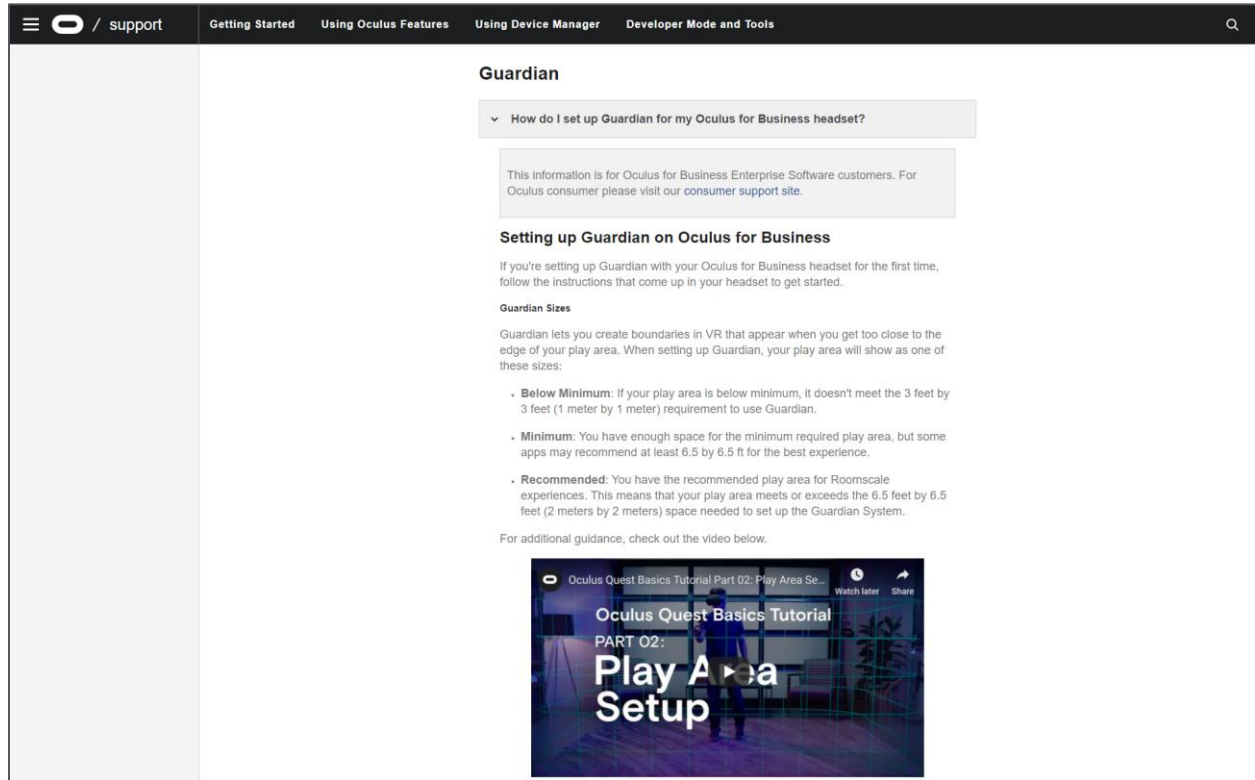
NOTE: Oculus notes the minimum space requirement is 6.5' x 6.5', but for an optimal experience in the SimX VR environment, follow our guidelines to create a minimum 10' x 10' space.

- The VR boundaries will not be visible during play until approached.
- The in-VR Oculus Guardian will be remembered if you continue using the headset in the same play space. If you move to a different play space, you will need to set up the Guardian in the new play space.

Centering the Simulation Play Space

Part of preparing for the simulation includes ensuring the physical play space meshes well with the virtual play space. After delineating your physical play space with the Guardian in the previous section, do the following to find the optimal virtual environment center for the physical play space.

1. Stand in the center of your physical play space, and using SimX Moderator, start a SimX group, select a scenario, join the scenario on the headset through the SimX Quest app (see **Start or Join a Sim Group** if needed), and press the **Oculus** button on the **right controller for 3 seconds.**
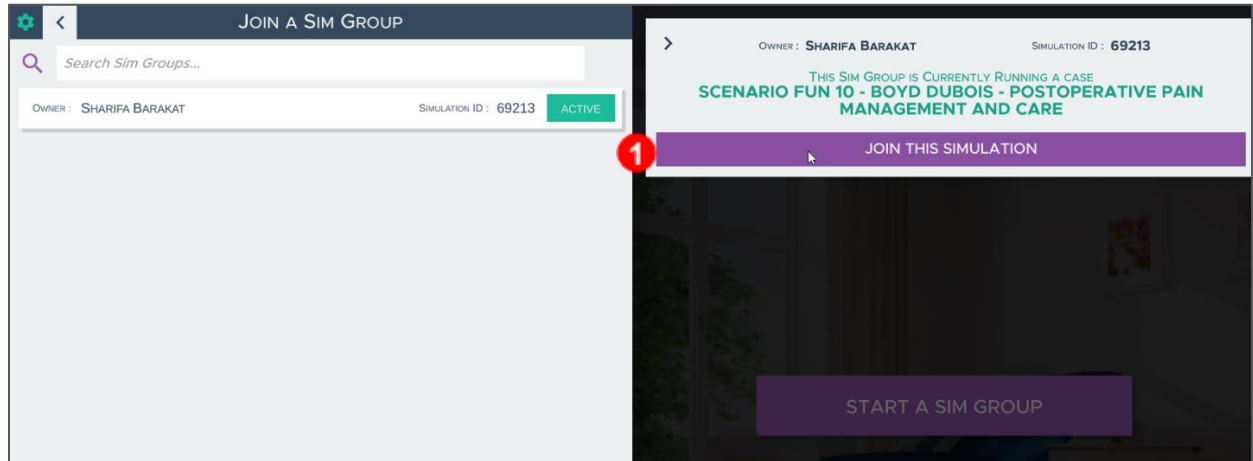
- SimX places you into the virtual room. Make note of where the scenario starts you, including where you are in the VR environment and the direction you are facing. For example, *I'm facing the side of a hospital bed, standing at its middle and about a foot away,* or *I'm facing a cardiac monitor, standing about three feet away.*

2. Walk to the edge of the play space to activate the Guardian mesh. Look around the VR scenario and make sure all necessary parts of the environment (patient and tools) are within the Guardian mesh. If you cannot reach everything, you must recenter the VR environment, so everything falls inside the Guardian mesh.
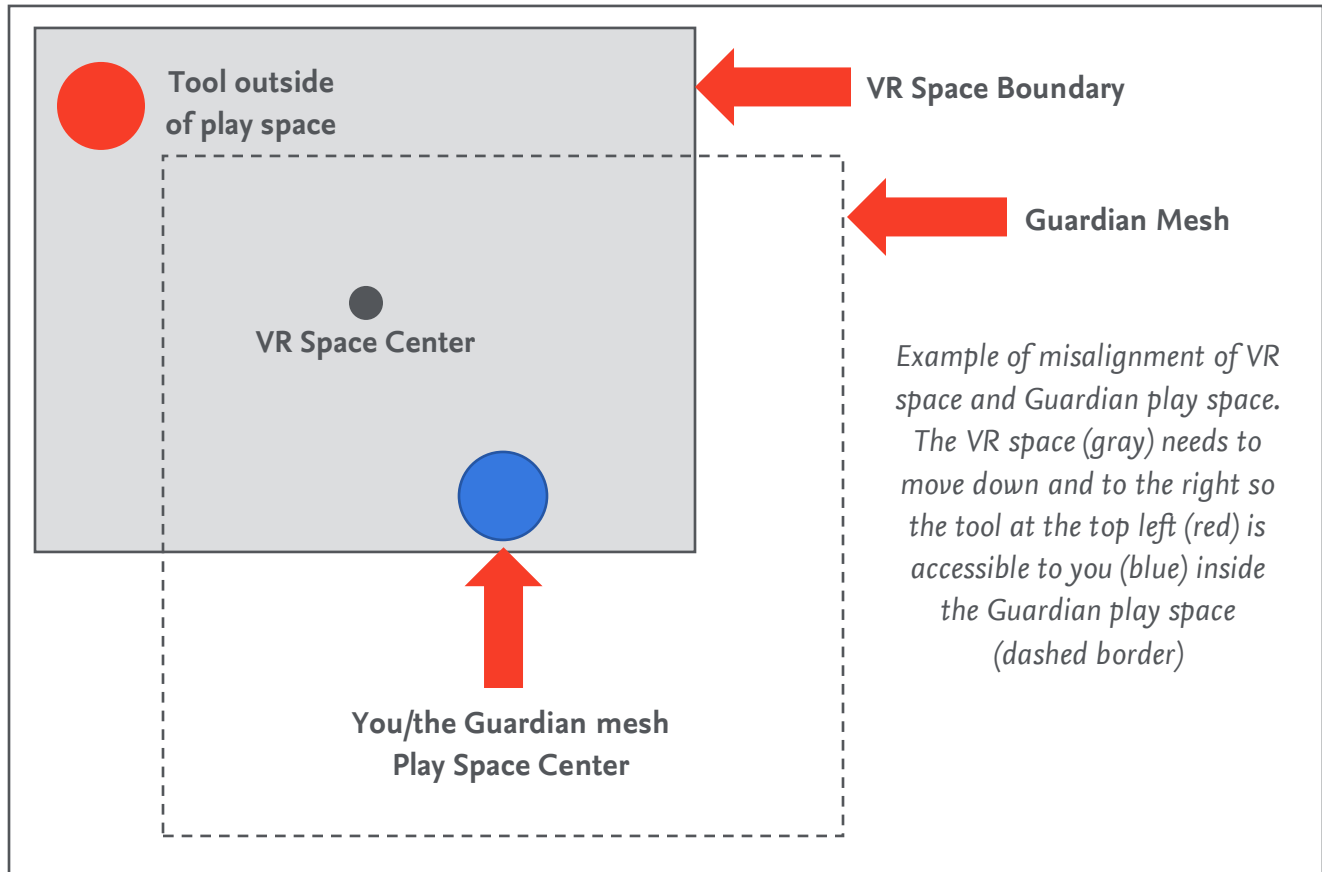
Tool outside of play space

VR Space Boundary

Guardian Mesh

VR Space Center

Example of misalignment of VR space and Guardian play space. The VR space (gray) needs to move down and to the right so the tool at the top left (red) is accessible to you (blue) inside the Guardian play space (dashed border)

You/the Guardian mesh Play Space Center

3. If two necessary objects in the VR environment are BOTH outside the Guardian mesh and located on opposite sides of you, your physical play space is likely too small for the selected scenario, and you must move to a larger physical play space.

Tool outside of play space

VR Space Boundary

Guardian Mesh

VR Space Center

Tool outside of play space

Example of the Guardian Play Space (dashed border) being too small for the VR environment (gray).
There is no way to move the VR space so both tools (red) move into the Guardian border.

You/the Guardian mesh Play Space Center
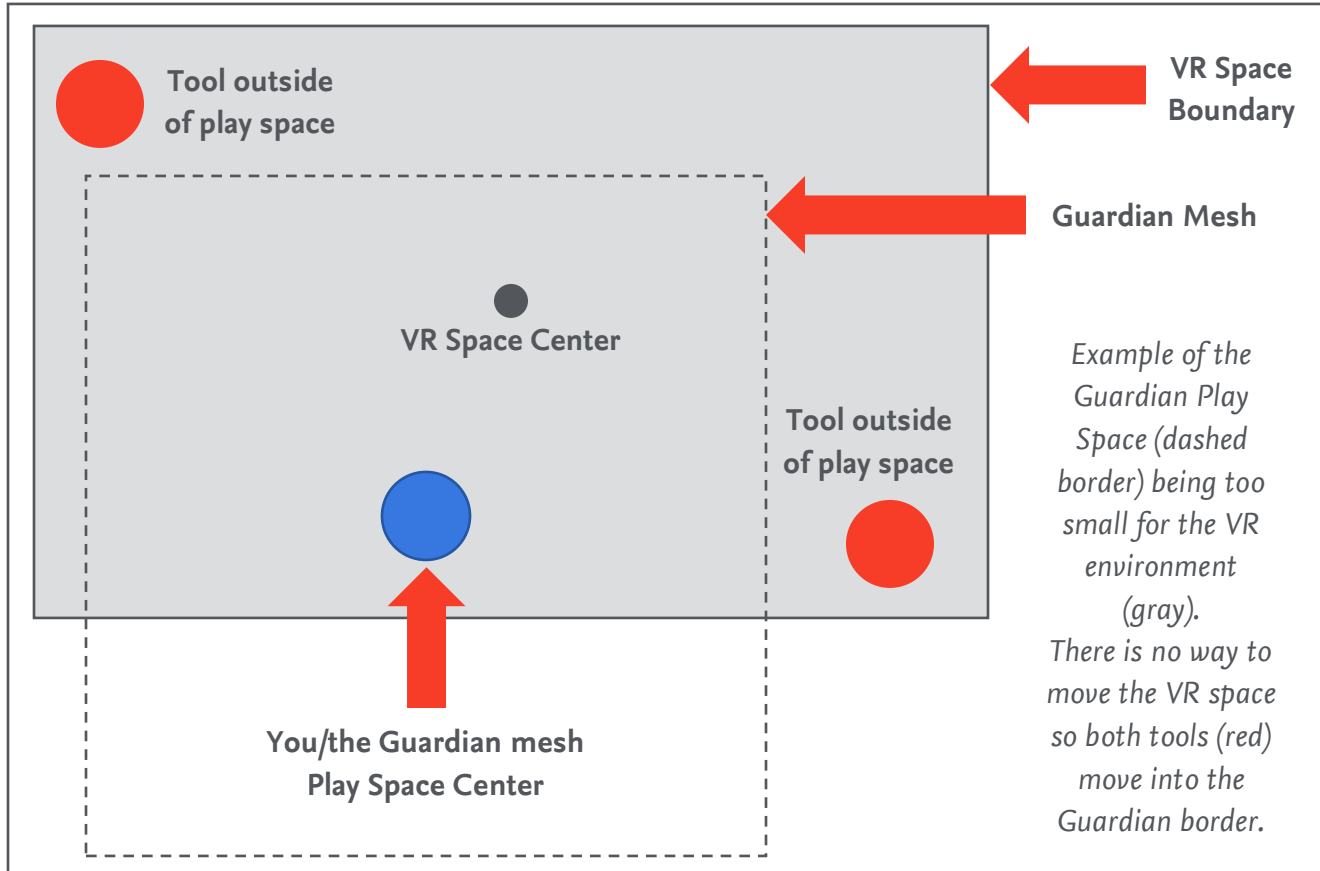
4. If your play space is large enough, note which direction and what distance the VR space needs to move to make the problem area fall within the Guardian mesh. Let us look at the first example again. It appears the tool at the top-left corner is in the 10:30 direction (315 degrees) about 3 feet from the Guardian mesh.
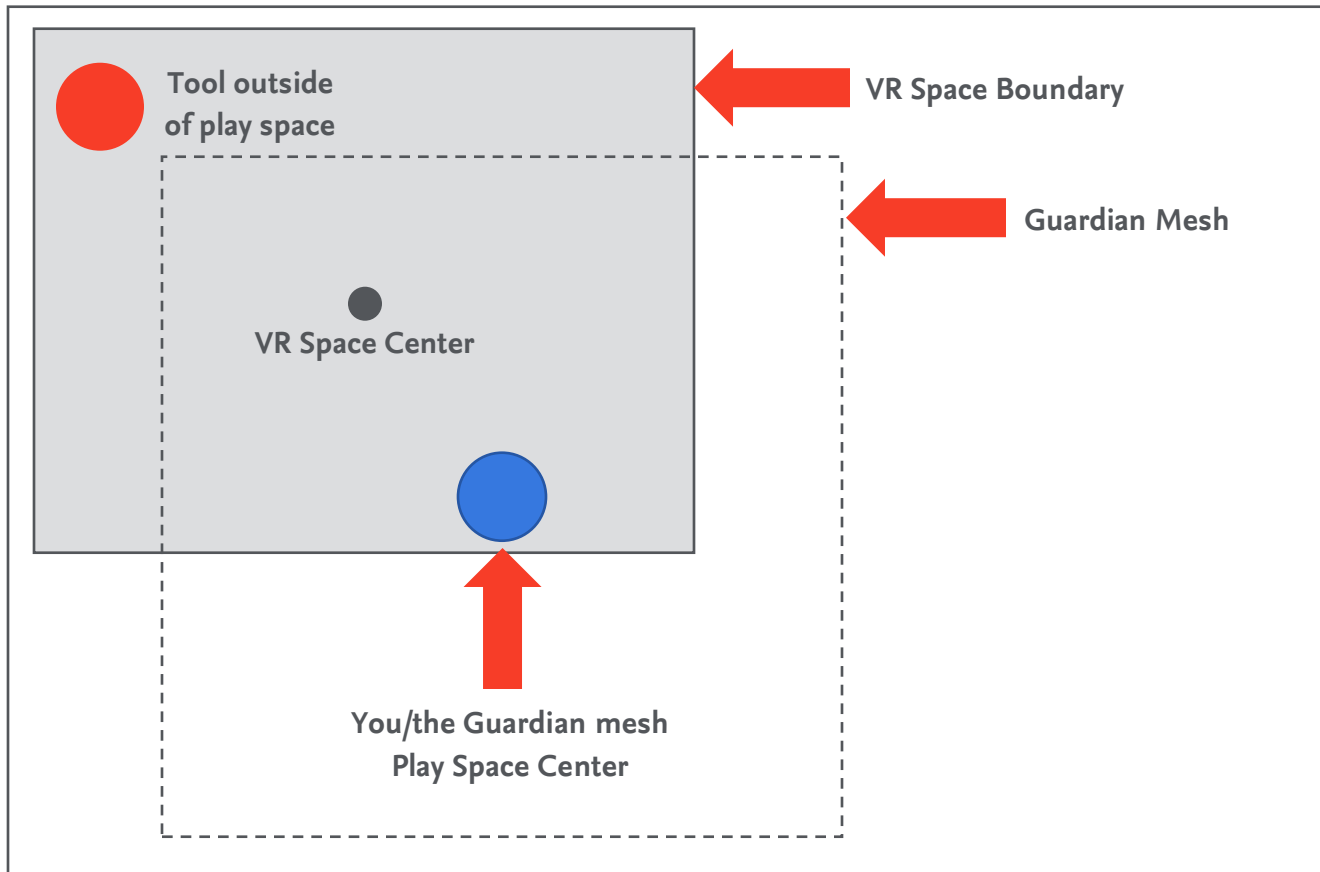
5. To have the tool move inside the boundaries, the entire VR environment needs to move down and right at a 45-degree angle in the opposite direction about a foot.

   a. To accomplish this, walk back to your starting location and orientation (i.e., *facing the side of a hospital bed, standing at its middle and about a foot away*).

   b. Now without changing your orientation, move down and to the right at 45 degrees to bring everything diagonally a foot over toward the bottom right. Make sure you are still facing the same direction as you were at the beginning.

   c. Press and hold the **Oculus** button on the **right controller for 3 seconds** to move the VR space over to the new starting point.

Tool outside of play space

VR Space Center

The direction you need to move

You/the Guardian mesh Play Space Center

VR Space Boundary

Guardian Mesh

Example of moving the VR space (gray) to make a tool (red) fit inside the Guardian mesh (dashed border). You move the VR space by returning to your original position and orientation (blue) and moving in the direction (purple arrows) directly opposite the the amount and direction the tool (red) is sitting outside the Guardian Mesh.

Tool is now inside the Guardian mesh

VR Space Center

You/the Guardian mesh Play Space Center

VR Space Boundary

Guardian Mesh

After moving in the direction and amount of the purple arrows, the tool (red) is now inside the Guardian mesh (dashed border), and all necessary areas of the VR environment (gray) are now reachable.

6. The relevant parts of the VR space should now lie within the Guardian mesh play space, and you should be able to reach the tool that was out of reach. Continue to adjust as needed if other tools may still be out of the Guardian bounds or have moved out of bounds while you were recentering.

7. When you have found the optimal VR environment center, mark that spot down in the physical play space using masking tape in the shape of an arrow in the direction you were facing. By
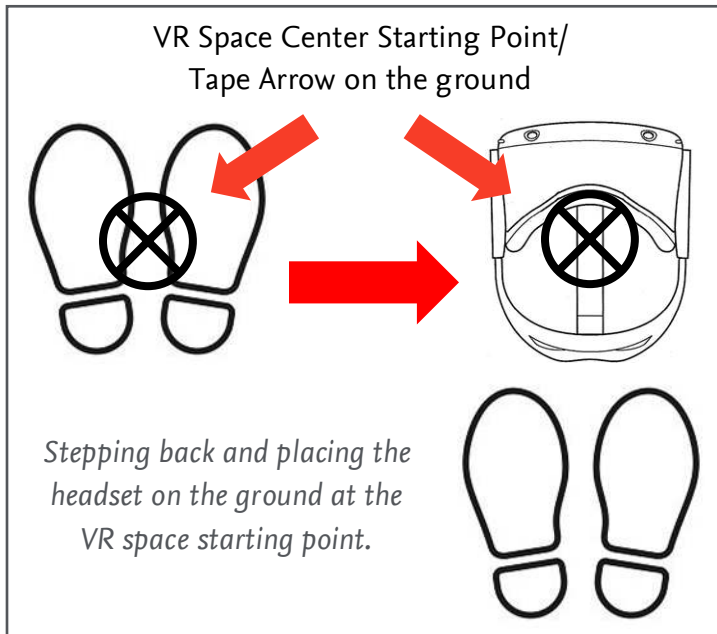
doing this, users can always go stand on that arrow to recenter the play space as well as synchronize headsets.

Synchronizing Headsets

If facilitating a VR simulation with multiple learners in the same physical play space (as opposed to remote multiplayer), the headsets must all be synchronized so their VR spaces overlap.

NOTE: If VR spaces are NOT synchronized, then players will not appear in the correct location in the VR space with respect to their physical location, which may lead to collisions and injury.

1. Set up each Oculus headset per the **Setting Up the Guardian** and **Centering the Simulation Play Space** sections above, including drawing the Guardian for each Oculus (with all the Guardians ideally matching each other as closely as possible.)

2. Using the SimX Moderator, start a Sim Group (see **Start or Join a Sim Group** if needed) and select the desired case.

3. Run the SimX Quest app on all headsets.

4. Select the appropriate Sim Group to join the simulation on all headsets.

5. Using only the **FIRST** headset, walk around the Guardian and VR environment to ensure that all necessary tools and parts of the patient are reachable. Follow the **Centering the Simulation Play Space** again if you need to recenter the VR space.

6. Once the VR space is appropriately located within the Guardian mesh and physical play space, move to the VR space center that you marked with tape previously, and stand in the starting orientation. Take a small step backward.

7. Without stepping back farther or moving your feet, take off the headset and place it on the ground where your feet were, with the front of the headset still facing the same direction as you, (i.e., the same direction as the arrow you placed previously).

VR Space Center Starting Point/
Tape Arrow on the ground

Stepping back and placing the headset on the ground at the VR space starting point.

8. Leaving the first headset on the ground, press and hold the **Oculus** button on the **right controller for 3 seconds** to recenter the space again. This is now the synchronization location for all other headsets.

9. Place the first headset aside.

10. Place the second headset on the ground in the same location and orientation as the first headset was placed.

11. Press and hold the **Oculus** button on the **right controller for 3 seconds** to recenter the VR space for the second headset, then set the headset aside.

12. Repeat steps 11 and 12 for any remaining headsets.

13. All headsets should now be synchronized. This can be easily checked by having users don all headsets and attempting a gentle "high-five" or handshake in VR. If synchronization is correct, their real hands (holding the controllers) should collide as their virtual hands meet.

14. Recenter any headsets that are not in synch with the others by repeating step 11 for that headset.

NOTE: Headsets lose synchronization when they leave the play space, such as someone walking out of the play space with it on, or someone placing a headset outside the play space between simulations, so a best practice to implement is to have users synchronize their headsets in the

marked optimal center in the play space (the taped arrow on the ground) before every simulation begins and attempt a gentle "high-five" or handshake in VR.

*** NOTE: Other users' avatars may not be to scale when synchronizing multiple headsets in the same play space. Be sure to keep adequate physical space between yourself and other users to avoid collisions that could result in injury. A spotter should always be used to monitor the play space and physical positions of participants when using multi-participant single play spaces. ***

Troubleshooting

Losing Synchronization

Occasionally, headsets may fall out of sync with each other or the play space. To avoid this:

1. Avoid blocking the front of the headset completely when it is not in use.

    - Do not carry the headset with the front facing you.

    - If resting the headset on the ground or other object, do not walk in front of it.

2. Do not leave the headset outside the play space for too long.

3. Avoid using the headsets in the center of large open spaces.

    - If operating in large gymnasiums or conference rooms, set up play space in a corner or at lease near one wall.

    - If flooring is very uniform and wall are far off, try using tape that contrasts with the floor to mark out your play space, and try decorating the floor with random pieces of tape.

4. Avoid using headsets with glass or shiny walls.

    - If unavoidable, pull down shades/blinds or cover walls/windows with crepe paper or cloth to minimize reflections.

Floor Is Wrong

If there are tools on the floor out of reach, reset the play space by setting up the Guardian again, starting with re-calibrating the floor. Refer to your Oculus instruction manual or Oculus Support to make sure the Guardian is properly set up.   *END OF GUIDE*