

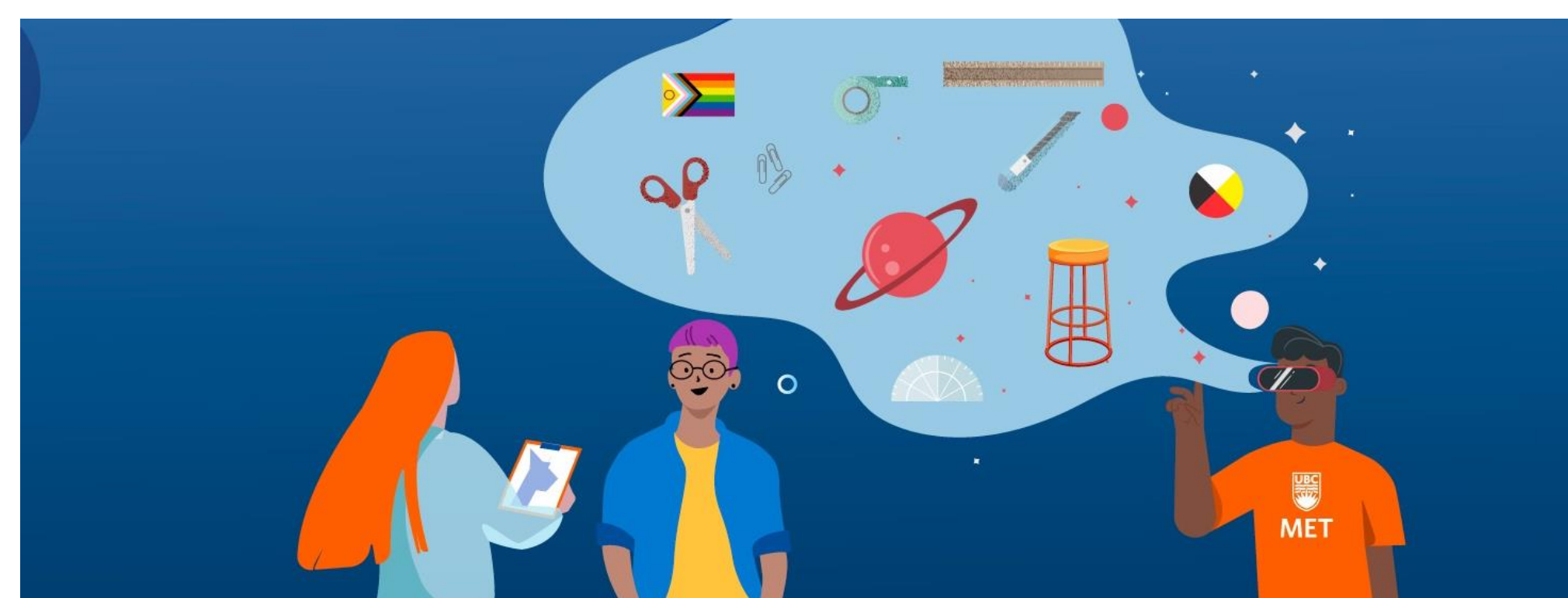
Virtual Reality Makerspace

Spring 2024

BACKGROUND

The Virtual Reality (VR) Makerspace project, in collaboration with UBC Language and Literacy Education department, seeks to provide an open space to foster creative thinking and problem-solving skills in students. It is built with inclusivity and accessibility practices in mind and will be used by students in the Online Master of Education in Literacy Education program, with potential expansion to K-12 classrooms.

VR Makerspace employs the Liberatory Design Thinking Theory that centers equity to encourage participation from all learners and establish a comprehensive educational framework. A VR-enhanced makerspace will allow access to even learners in remote areas and provide equal opportunities for participation.



PROJECT DETAILS

The objective of this project is to design and develop an inclusive VR makerspace where students can ideate and build together. Through the practice of building, makerspaces seek to involve learners in meaningful real-world activities that cultivate innovation, critical thinking, and collaboration skills.

The core functionality of the project centers around a "cardboard challenge". Students are asked to reimagine the use of cardboard, an often-discarded material, to create objects that solve real-world problems.

DEVELOPMENT

VR Makerspace is created using Unreal Engine 5.3.1 (UE5). The base project was completed in first person, then migrated to VR. The project is compatible with a variety of headsets, including the Oculus Quest, Playstation VR, and VIVE. Core user functionalities was created using UE5 Blueprints.

Core User Functionality Features

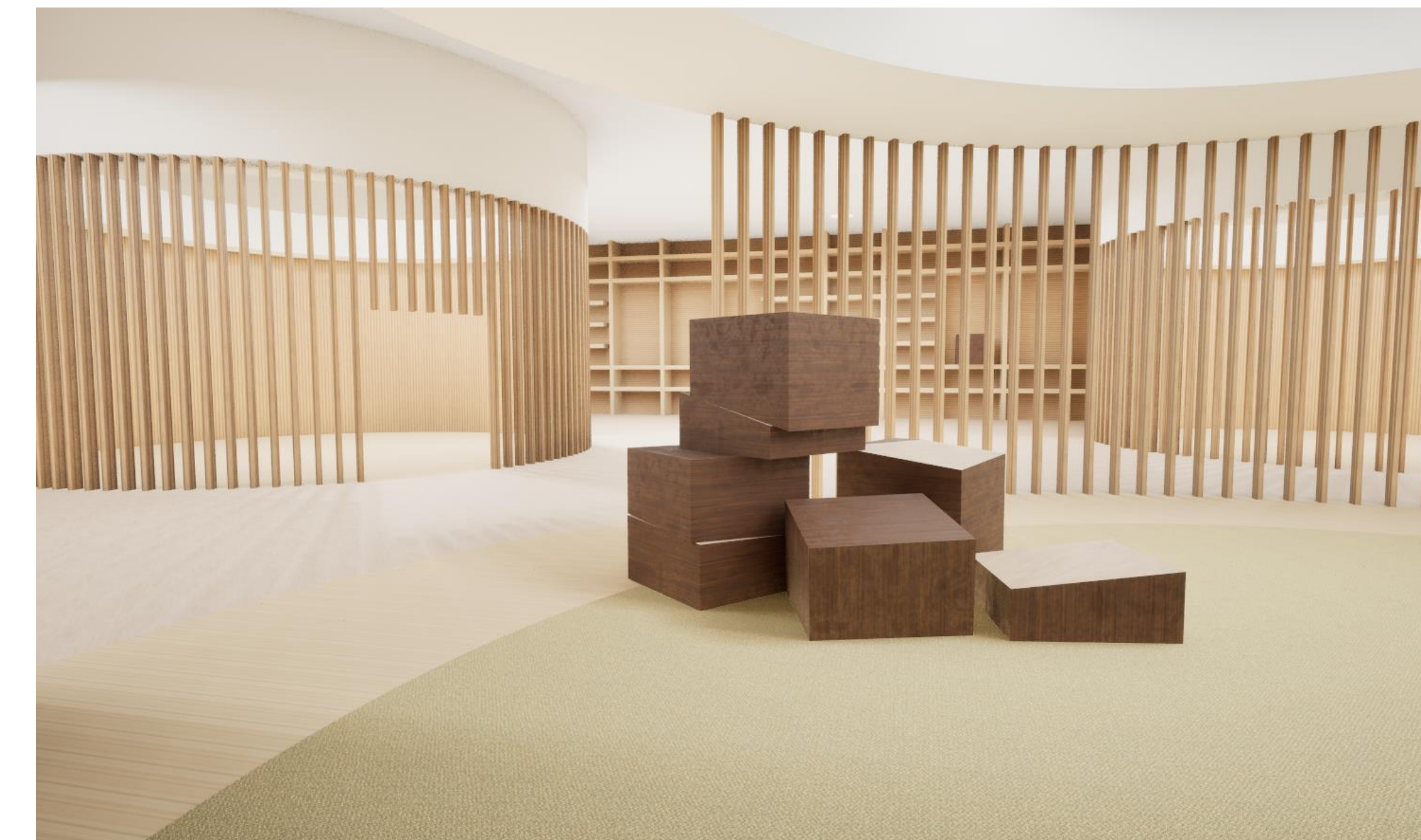
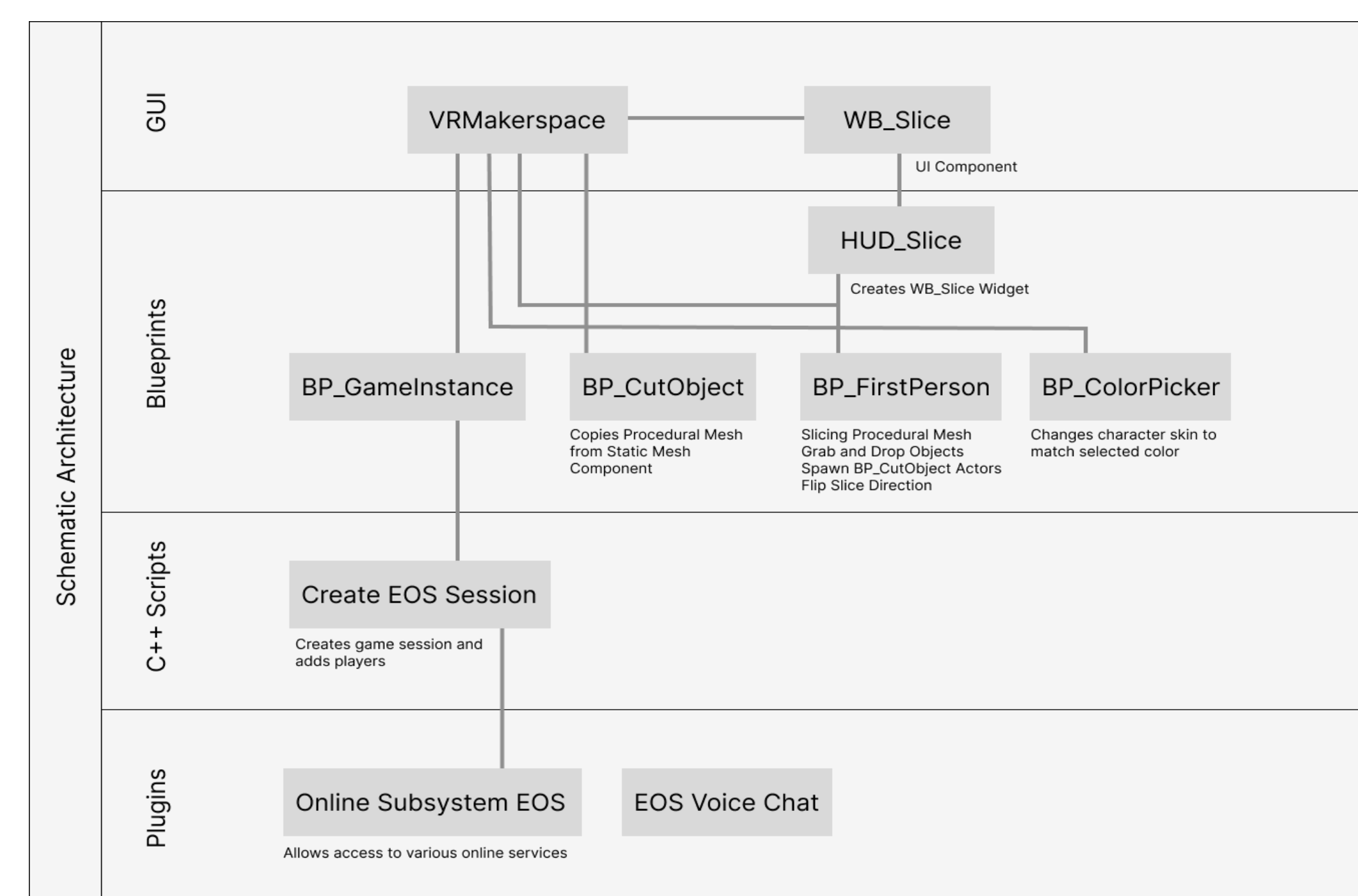
- Grab-and-drop
- Object spawning
- Object slicing

Multiplayer

The project utilizes Epic Online Services (EOS) to allow for up to 100 unique users to connect and communicate using voice chat.

A UI of three buttons was built to facilitate user account login/creation, multiplayer session creation, and multiplayer session connecting. Using EOS, a multiplayer session is created when a user creates or attempts to join a session when one does not exist.

EOS Voice Chat is used with listen servers to implement and manage user voice input and output.



DESIGN

Environment Design

Initial environment vignettes are modelled and rendered using Autodesk Revit, Twinmotion, and Unreal Engine.



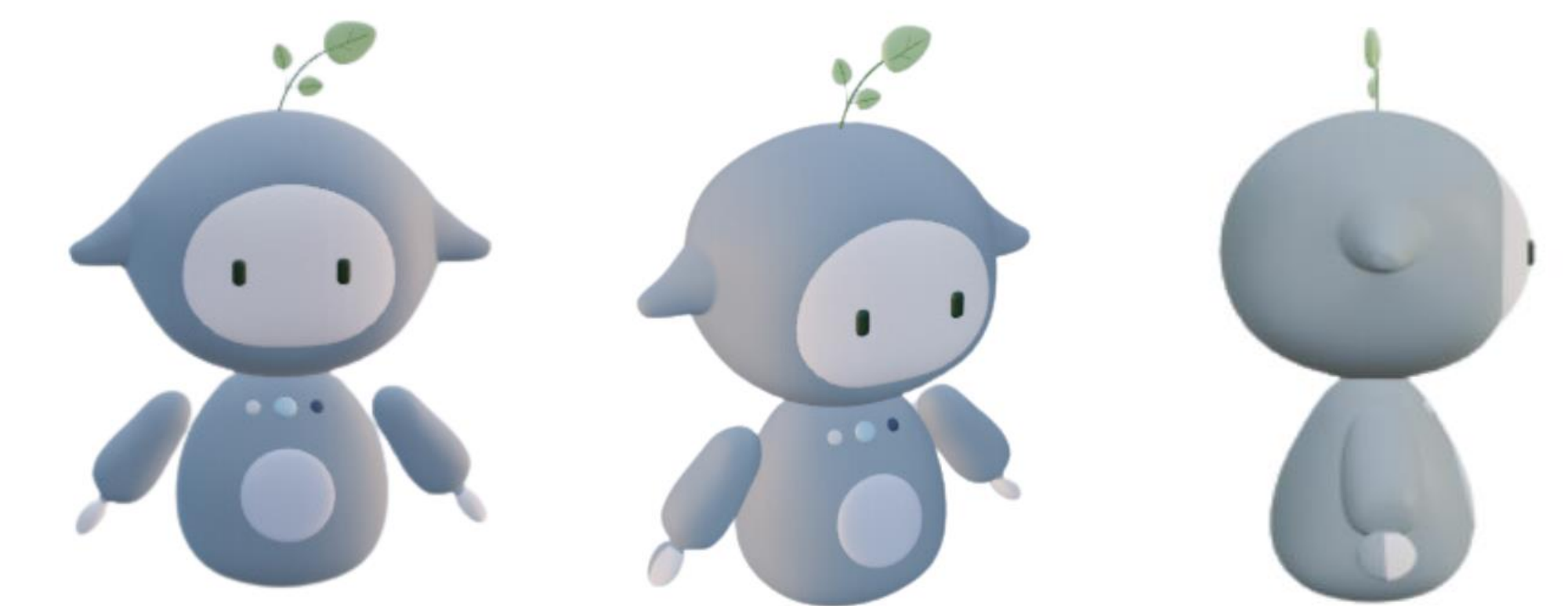
The semi-open design allows visibility of other working groups and establish an open area conducive to collaborative work.

Posters of the Liberatory Design Thinking Model, as well as other inclusive artwork are featured on the walls to foster a welcoming space.



Avatar Design

The avatar's design, modeling, and rigging were executed using Blender. The decision to portray the avatar as non-human stemmed from our commitment to establishing an inclusive environment within the virtual space.



NEXT STEPS

Further development include:

- Increasing user functionality with objects, including the ability to potentially join objects
- Adding UI components for certain actions
- Adding a tutorial screen and other UI designs from working Figma prototypes

ACKNOWLEDGEMENTS

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