Meeting notes for 2017-10-11

Action Requirements:

- Send rough draft of problem Statement to Dr. Bailey - Everyone
- Research SDKs and toolsets for VR development - Everyone
- Make a list of decisions that need to be decided upon - Everyone

Decisions that need to be made:

- Game engine
- Volume based versus vertex based geometry
- List of basic painting/sculpting features
- List of lighting features
- Texturing versus normalizing, or any other surface effects

Notes:

- Discussed possible interface design
- Richard discussed an interface by which the user can hold a wireframe [continue later]
- Braxton discussed different methods that generating geometry could be generated, noting the possibility of voxels or NURBS
- Richard noted that graphical modeling programs (such as Maya or Blender) would be a good start for looking at geometric generation interface
- Braxton noted that the option selection should be less of a standard windowed gui and more of a virtual ‘toolbelt’
- Richard brought up Braxton’s point about a ‘toolbelt’ to note that a three dimensional interface would be possible in VR space.
- Dr. Bailey, Braxton and Richard discussed the possibility of a rotary tool display that appears in front of the user and presents different tools in a circular pattern.
- Chris brought up the idea of allowing the user to place notes in the VR space.
- Braxton brought up the suggestion of using procedural texturing for ease of development and computational efficiency.
- Dr. Bailey brought up that many of these decisions would need to be explainable to a layperson, given that our target audience are not people who are highly technically skilled.
- Everyone was involved in a discussion regarding what toolkit and engine to use. It was generally agreed that the best engine would be either Unity or Unreal. Chris was of the opinion that Unreal would be better suited, while Richard suggested Unity. It was decided that there should be more research was needed before any decision could be made.
- Chris mentioned that he spoke to his bosses regarding using motion capture equipment from their company for the project.
- Chris brought up that it is possible to stream motion capture data to a game engine, suggesting using a physical clipboard as the UI.
- The group began discussing possible UI options, including gesture based controls.

- Braxton discussed the use of voxels versus discrete geometry. Bailey pointed out that they do not have to be mutually exclusive. Richard made the point that discrete geometry would be easier to program, and potentially more efficient. Braxton brought up possible methods that could be used to implement voxels, and mentioned several advantages, with Bailey mentioning that they are better for intersections, which would make selectively erasing objects easier.
- Chris inquired about who the target audience of our project would be. Bailey stated that the primary audience would be artists, but that additional, more technically skilled audiences may become available.
- Richard inquired about the IP ownership of the project. Bailey stated that the standard procedure for Capstone projects is that each party involved in the project would have non-exclusive rights to the project, which was unanimously agreed upon.
- Braxton inquired about what specific types of features Dr. Winters was interested in developing for the project. Bailey stated that no solid decision had been made as of yet, suggesting that we begin developing the project, and confer with Winters at a later date.
- Braxton brought up the point point of how 3D modelers will often use reference images, and how a system for implementing images in such a way would be useful. Richard brought up how there are VR programs currently available that use motion capture sensors to scan objects and import them into VR space to be painted on.
- Bailey and Braxton brought up the question of whether all objects in the program should be legal solids. It was agreed that doing so, while more challenging for certain operations, would be ultimately better for the program.
- Bailey noted that as of now, part of the specifications would include that all geometry would be made up of legal solids.
- Bailey brought up that the exclusive use of legal solids would likely require challenging interpolation systems. Braxton noted, however, that using voxels (possibly exclusively) would make this considerably less challenging, as all voxels are, by definition, legal solids. He brought up considerations for methods for non voxel geometry. No specific decisions were made.
- Bailey brought up the addition of lighting effects, questioning how light sources should be handled, such as if there should be ambient lighting, or a preset ‘sun’ effect. Richard mentioned that in Maya, until a light source is manually added, the program defaults to flat lighting.
- Braxton questioned the level of realism for the lighting systems.
- It was questioned how textures could be painted on. Richard suggested that for procedural texturing have the initial UV coordinates be semi random, and for image texturing, have a UI element that allows to to place a point on the image itself to have as the starting UV coordinate when you begin painting.
- Braxton suggested different methods for an ‘engraving’ effect, and suggested various methods to implement such a feature.
- Chris questioned if there should be different ‘modes’ for viewing or editing.
- Chris further brought up questions regarding the latency and framerate. Bailey mentioned that latency is an increasingly solved problem. It was discussed, however,

that frame rate may be the primary limiting factor. This began a discussion regarding different techniques to combat this.