

Voxyl Lo-Fi Prototype Report

Team

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Introduction

Value Proposition

Voxyl is a tool for photographers and other visual artists to share their inspiration with creative collaborators through the medium of virtual reality. In our needfinding, we found that artists whose creative processes are highly detail-oriented struggle to convey those details to their creative partners, and many details that were crucial to their inspiration are lost in the final product. Some of the artists that we interviewed also expressed a desire to connect one-on-one with other artists by sharing inspiration and seeking critical feedback. Our mission is to provide a natural, physical way for artists to form representations of their ideas for new pieces of art in a virtual 3D space.

Problem Overview

A photographer we interviewed spoke to us about the moment he has during all of his shoots in which things 'click' with the model. Specifically, he described showing them a photo of themselves, in his chosen setting, where he felt that what they were doing fit in the shot and aligned with his 'vision'. He talked about how this is typically the turning point in his shoots - from the moment when the model can find herself in the landscape, and on a broader scale, his idea of where the shoot should go, she knows what to do and how to move about. That's when the good shots come, and when the art finally starts being made.

Solution Overview

When he talked about this process, there was a bit of frustration evident. We can understand why - communicating an idea can be difficult and testing, especially when it's holding up the artistic process. We're creating Voxyl to make that flow of sharing ideas easier. Taking inspiration from the concept of 'finding oneself *in* the shot', our product will be a virtual reality solution that allows artists to surround the user with their ideas. We expect that the ability to literally surround someone with curated inspirational images, music, and custom created color palettes and lighting will facilitate a truly comprehensive communication of images. Voxyl will allow artists to create a landscape filled with the things that inspired them, and the things that

they think will inspire the right feelings in other people. When the person receiving the vision groks what the photographer is after, we know we've done our job.

Design

Sketches

Voxyl consists of three main parts:

1. The **creation phase**, in which the artist assembles their 3D canvas using visual media, lights, colors, and sounds
2. The **sharing phase**, in which the artist shares their 3D canvas with at least one other person
3. The **viewing phase**, in which someone other than the creator views the 3D canvas using some form of augmented reality

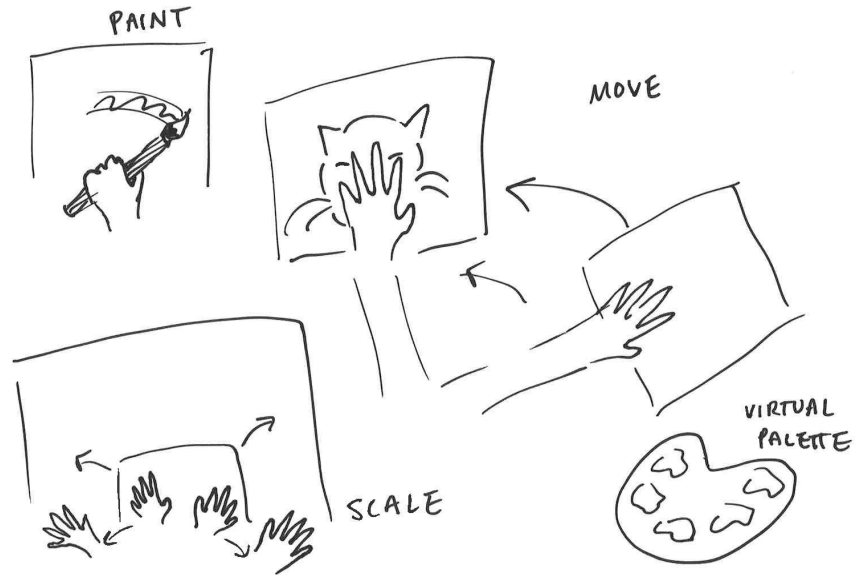
We sketched out 3-4 design ideas for how to implement each of these phases, reasoning that we would fit together the ideas from each phase that made sense together.

Creation

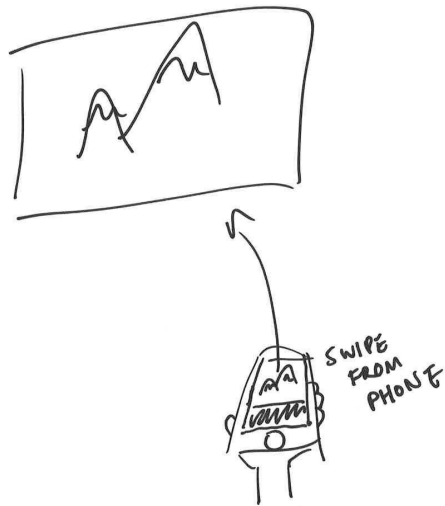
We sketched out 4 design concepts for the creation phase: a virtual reality interface with gestural interaction, a mobile phone interface (iPhone), and two different web interfaces.

Virtual Reality Interface

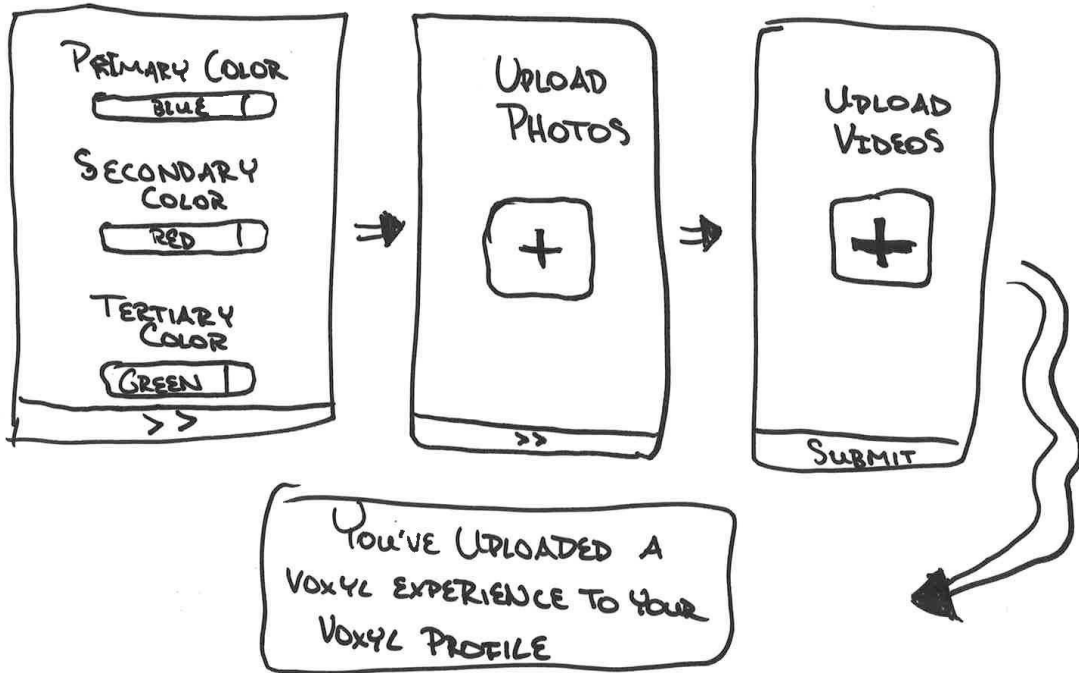
Voxyl for Artists - 3D Gallery w/ Gestural Interaction



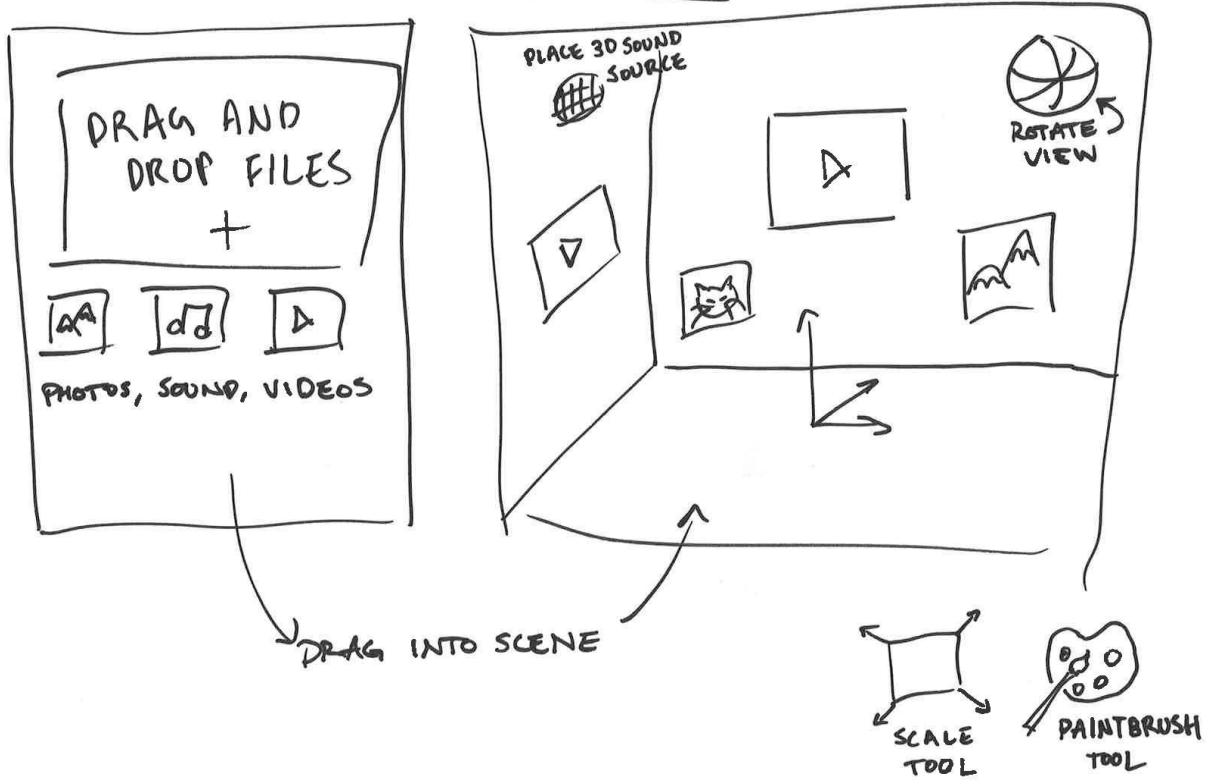
Voxyl for Artists - 3D Gallery w/ Phone Integration

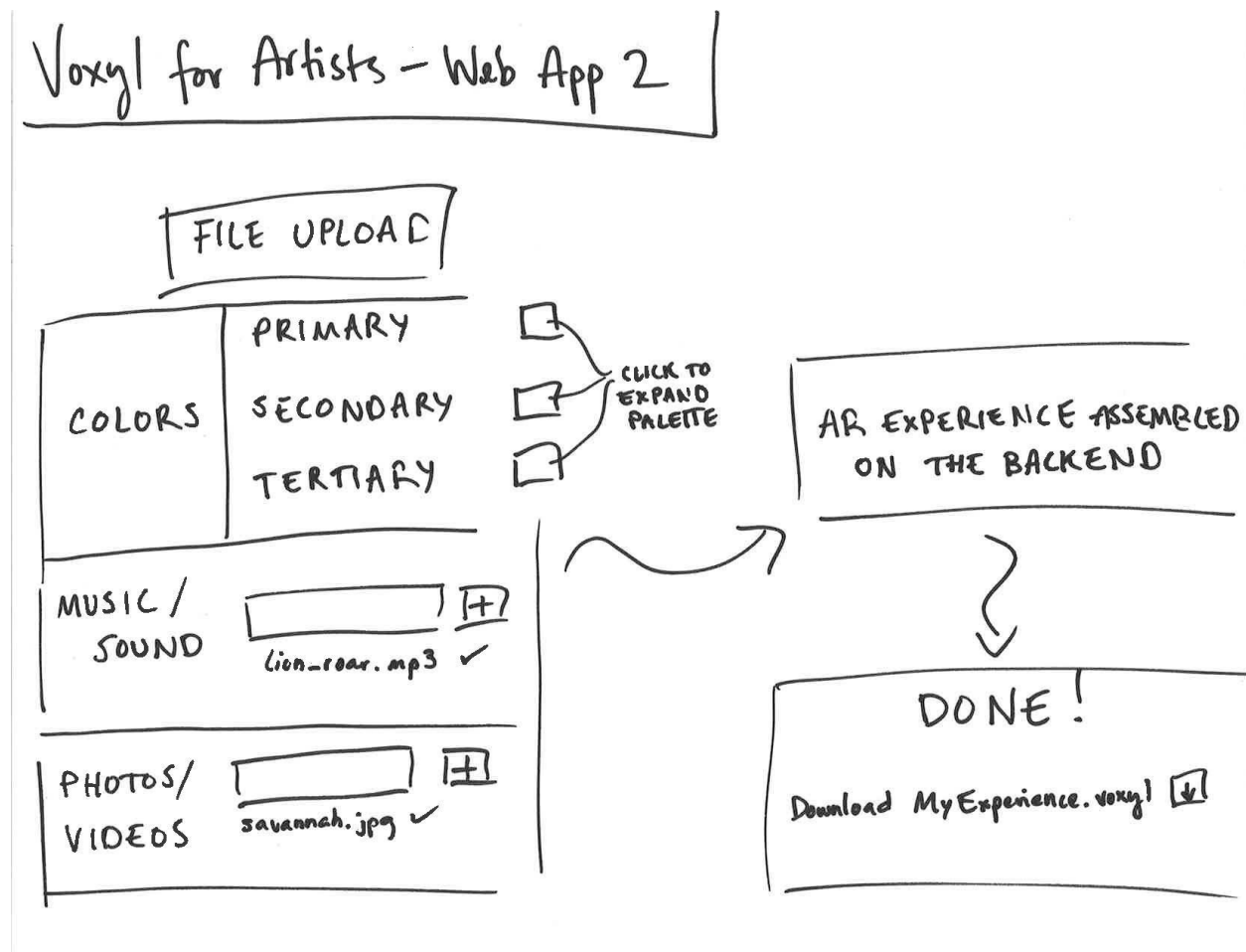


VOXYL FOR ARTISTS: MOBILE APP



Voxyl for Artists - Web App 1



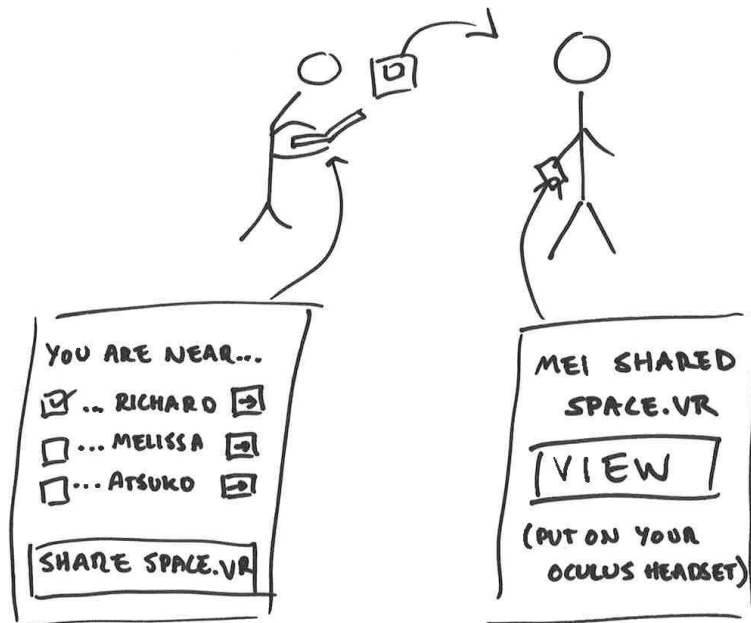


Sharing

We sketched out 3 design concepts for the sharing phase: AirDropping files to someone's mobile phone or laptop by meeting with them in person, sharing the files to a Facebook newfeed or other social media, and integrating a social profile aspect into Voxyl itself (imagined here as a mobile phone application).

AirDrop in Person

Voxyl Sharing - AirDrop Files In Person



Voxy! Sharing - FB Newsfeed

ARTIST

VOXYL

SPACE.VR


SHARE ON FB

✓ ANYONE

VIEWER

CINDY MEYER
ugh... week 5 ï
6 comments

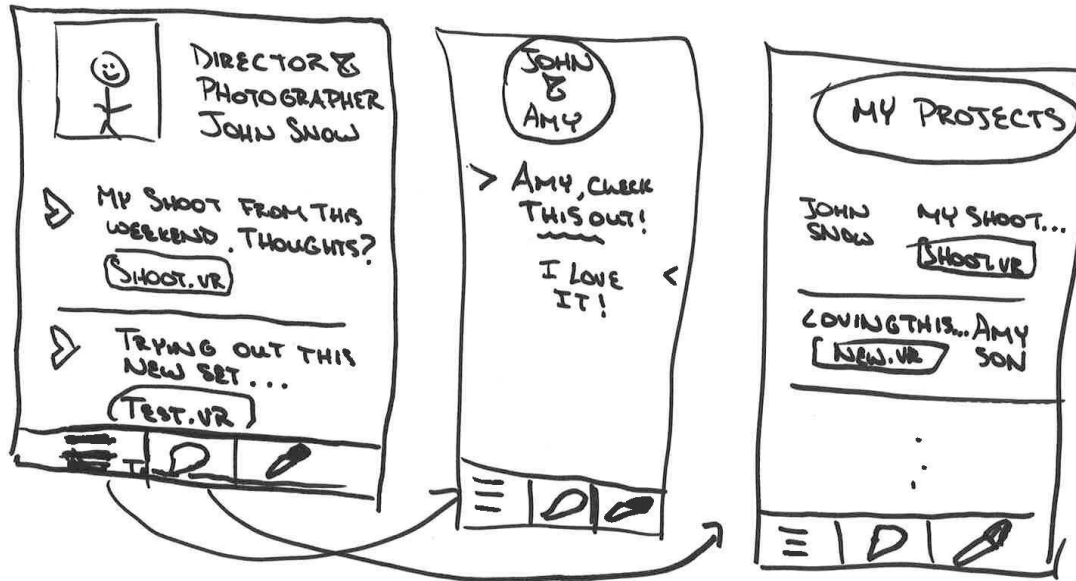
MEI WANG
Hey, I created a new
experience in Voxy!
Let me know what you
think!

SPACE.VR 

11 comments

DAN GREENE
I took the Disney princess
quiz and my spirit
princess is Merida!
Find out your Disney
princess here!
spamlink.com/dumbquiz.html

VOXYL PROFILE : WEB EXPERIENCE



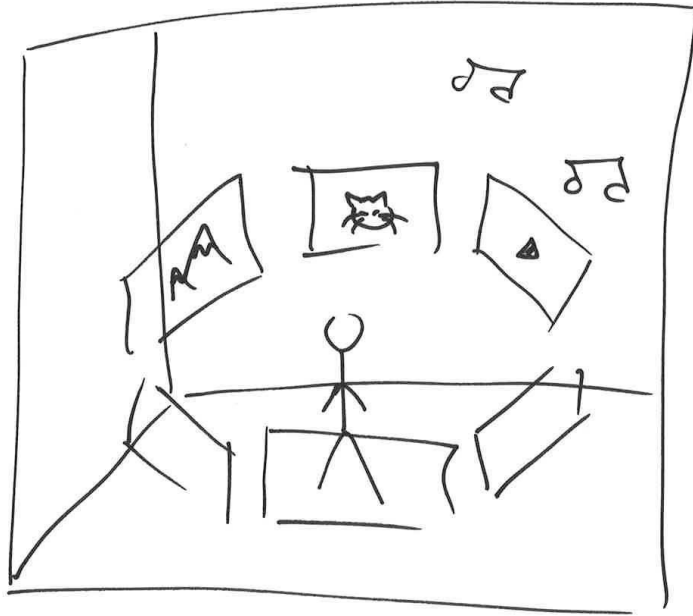
Viewing

We sketched out 3 design concepts for the viewing phase, all of which incorporated augmented reality:

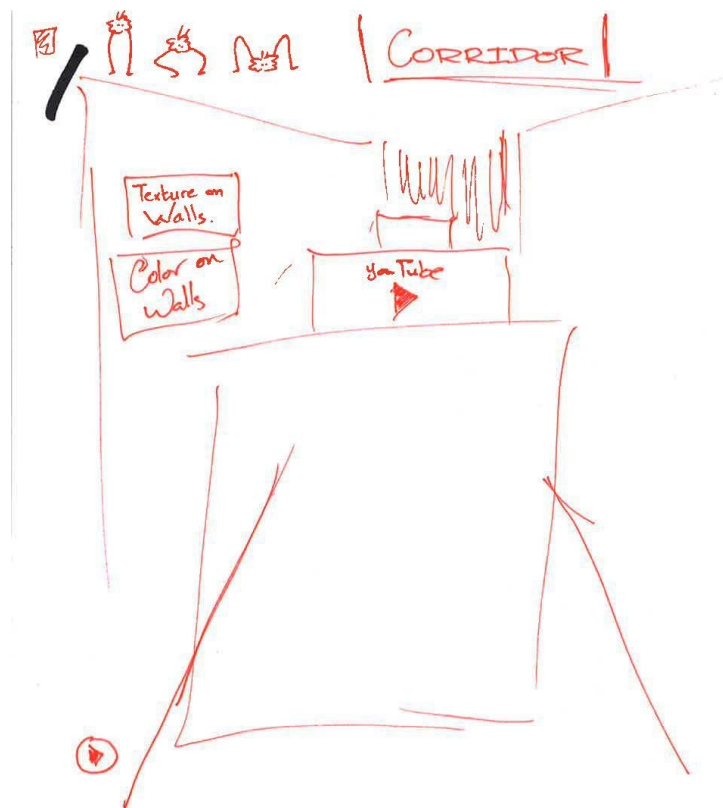
1. A **3D** room in which the viewer can look around in all directions, but can't move. Colors, lights, and sounds are static, although they may fade in or out depending on what the viewer is looking at.
2. A **corridor** that the viewer can progress down at their own pace, looking at media and experiencing different phases of dynamic lighting, sound, and color as they move through the canvas.
3. A **boxcar experience**, in which the viewer progresses through the experience at a predefined pace, "on rails." Similar to the corridor idea, but with more control given to the artist and less to the viewer.

Room

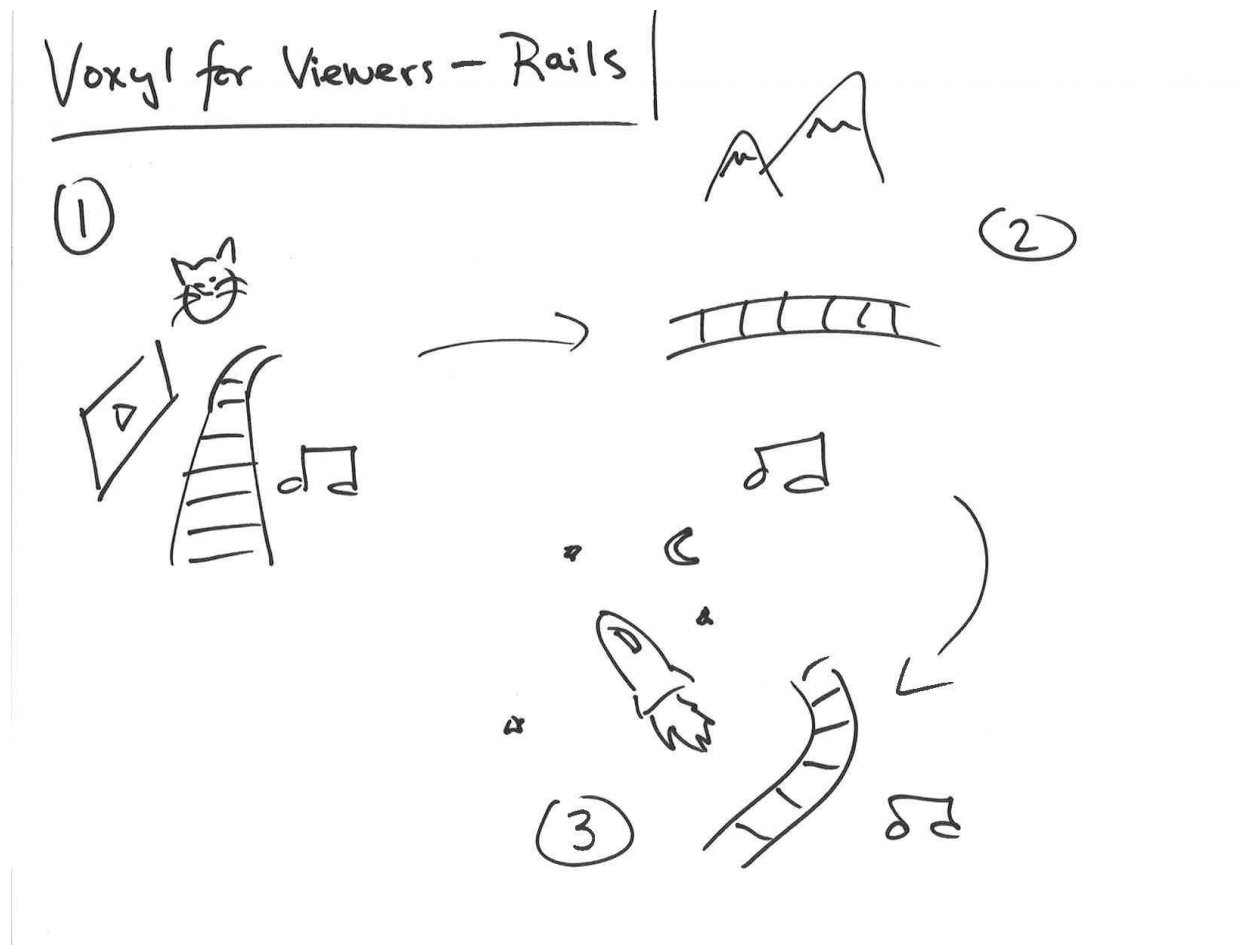
Voxy) for Viewers - 3D Room



Corridor



- Color balance.
- Weather
- Lighting
- Scale. (size of pictures?)
- Temporality
- Open-ness (or not)
- Stitch images together?

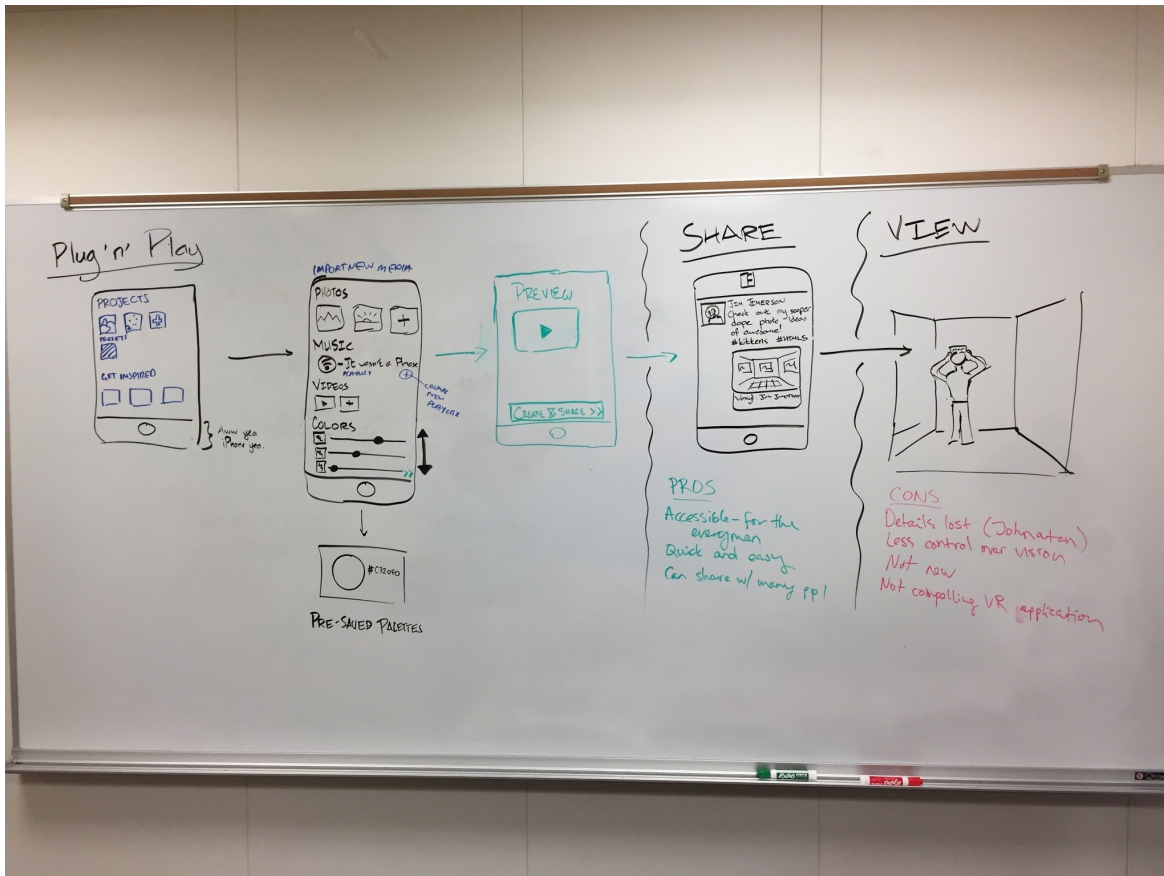


Storyboards

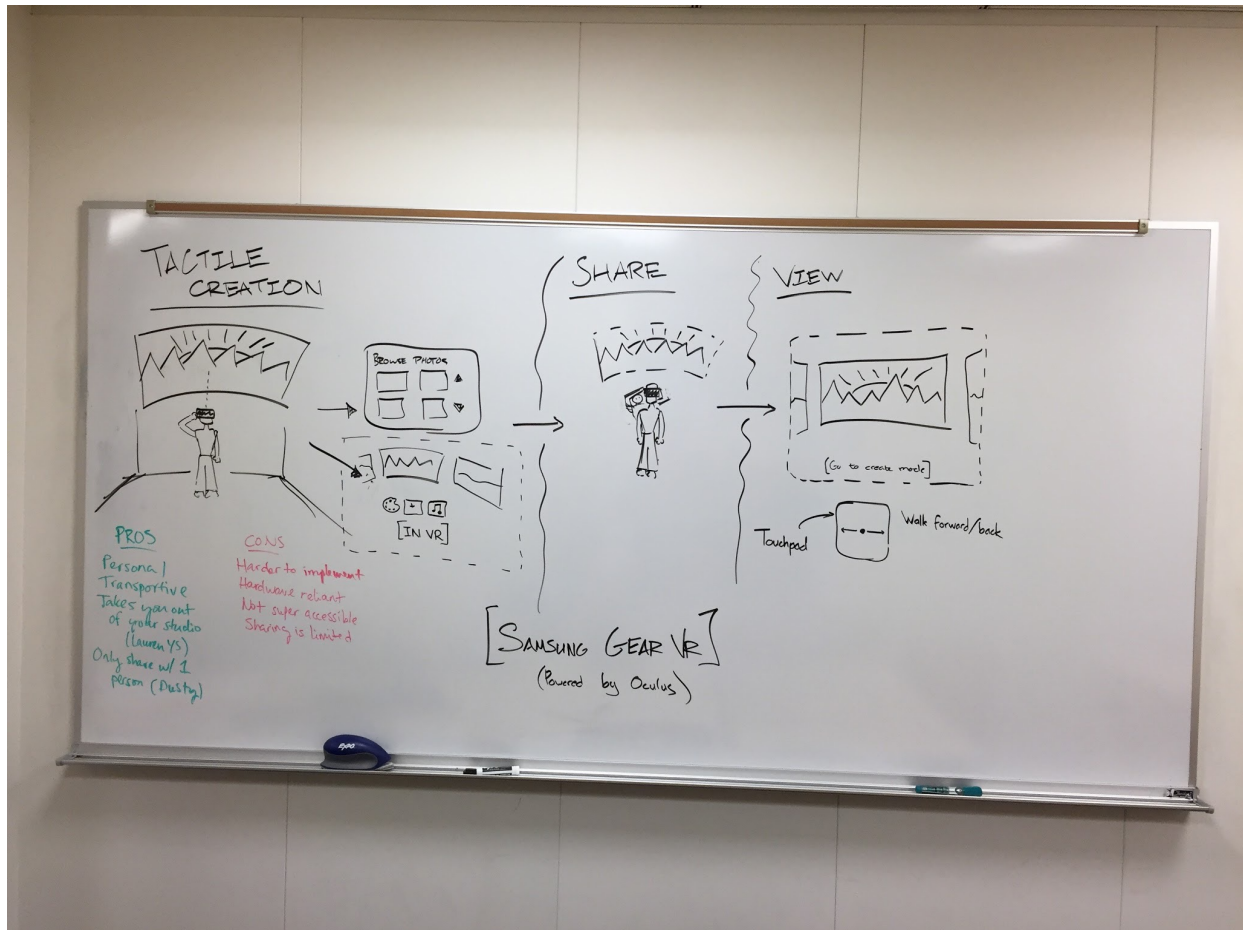
After thinking through the various combinations of our design concepts for each phase, we chose two winning combinations that we felt provided cohesive, dynamic experiences, and were sufficiently diverse from each other:

1. The **Plug 'n' Play** design, incorporating a mobile app creation interface, Facebook newsfeed sharing, and a 3D room viewing experience that takes place on the viewer's mobile phone.
2. The **Tactile Creation** design, incorporating a tactile, gestural VR creation interface, one-on-one sharing in person, and a viewing interface similar to the creation interface, even incorporating edit functionality in order to allow the creator's chosen collaborator to iterate on their design and make changes or improvements.

Plug 'n' Play



Tactile Creation



Selected Design

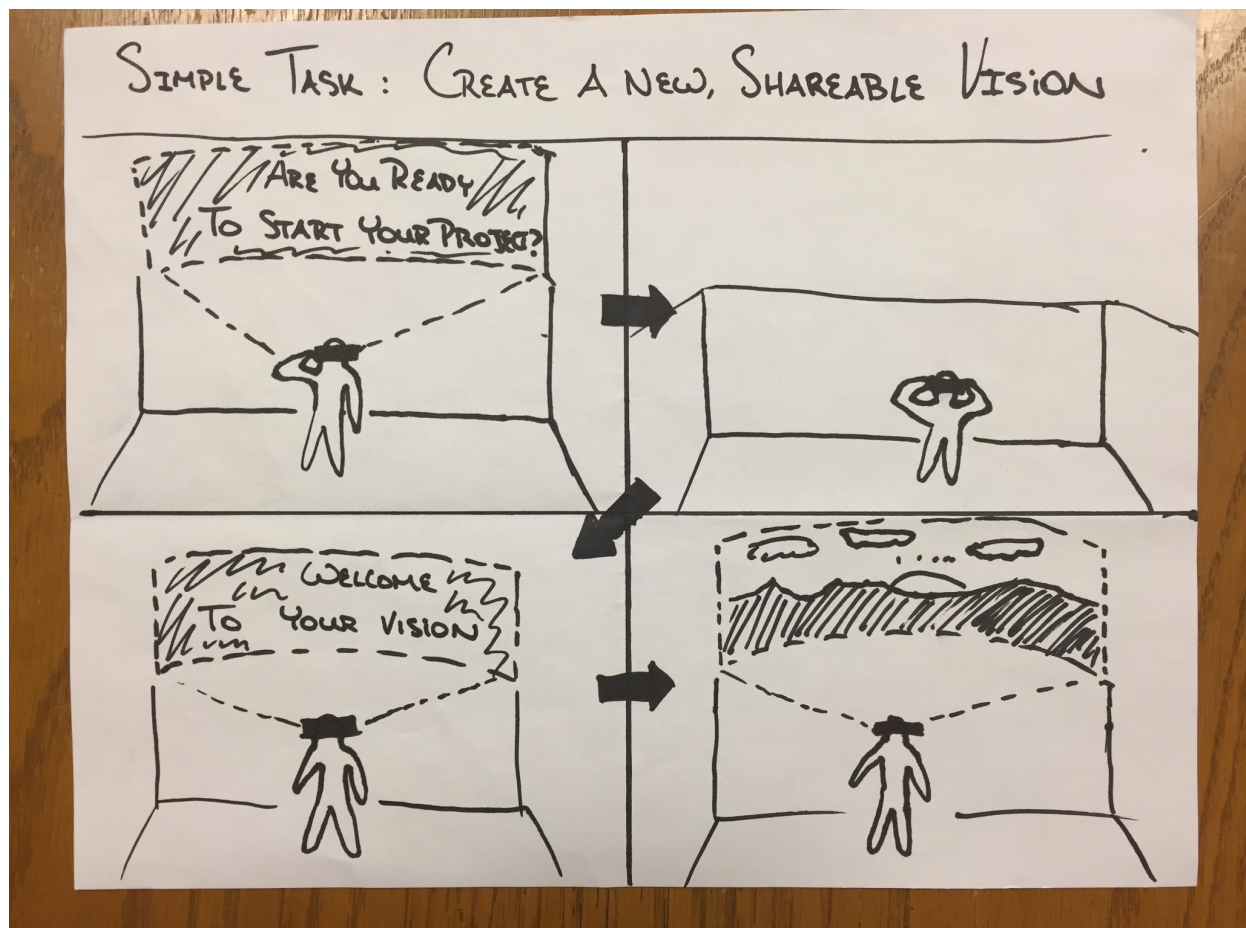
After carefully evaluating the pros and cons of the top two designs, we chose **Tactile Creation** as our winner. All four members of our team felt more excited about and connected to the tactile interface, and it fit more of the design criteria we had determined from our needfinding than **Plug 'n' Play**.

The pros of the Tactile Creation design included its personal, transportive nature. It takes the artist out of their studio, a need communicated in great detail by one of our strongest sources of needfinding, Lauren YS. It throttles the sharing phase down to a highly personal collaboration between two people, a dynamic that was extremely important to the creative process of another of our interviewees, Jonatan Lind. From a design standpoint, the creation process feels more natural, and the artist has an enormous amount of control over the details of their creation. The cons are, for the most part, related to the design's dependence on pricey and complex equipment (the Samsung Gear VR), anticipated difficulty level of the software engineering required, and the aforementioned limited nature of sharing.

The major pro of the Plug 'n' Play design is its accessibility; most, if not all artists have access to a mobile phone and a Facebook account. The barrier to entry is significantly lower than that of the Tactile Creation design. The creation process is quick and easy; the artist is merely required to upload their media and choose from a selection of colors and lighting types. The components of the experience are assembled on the backend, and the artist can choose to upload the finished product to Facebook to share with their friends. However, the main reason we rejected this design was because we felt it was contrary to our needfinding results. The artists we interviewed desired a high amount of control over their creations, and none of them expressed a desire to share their creations with huge numbers of people; to the contrary, most of them expressed a desire to share with only one trusted person at a time.

After making our decision, we storyboarded the Tactile Creation interface in more detail, drawing out a series of interactions for our simple, medium, and complex tasks.

Simple Task: Create a Voxyl Project



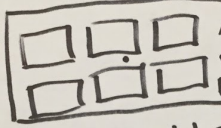
Medium Task: Add Media and Color

Medium Task: convey concrete details using photos, video, and colors

① Equip VR headset



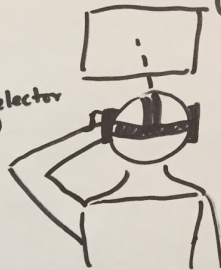
② Choose media from gallery



Hover viewpoint selector over desired media and press select button on headset

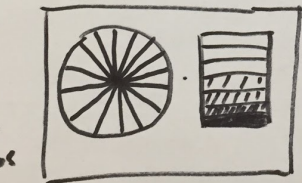
color selector (see 5)

③ Position media in 3D space using head tracking. Press select button to place. Press back button to return to gallery.

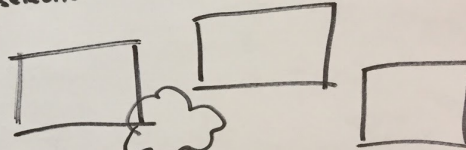


④ Repeat step 3 for multiple photos and videos.

⑤ Select color box. This expands the color selection interface.



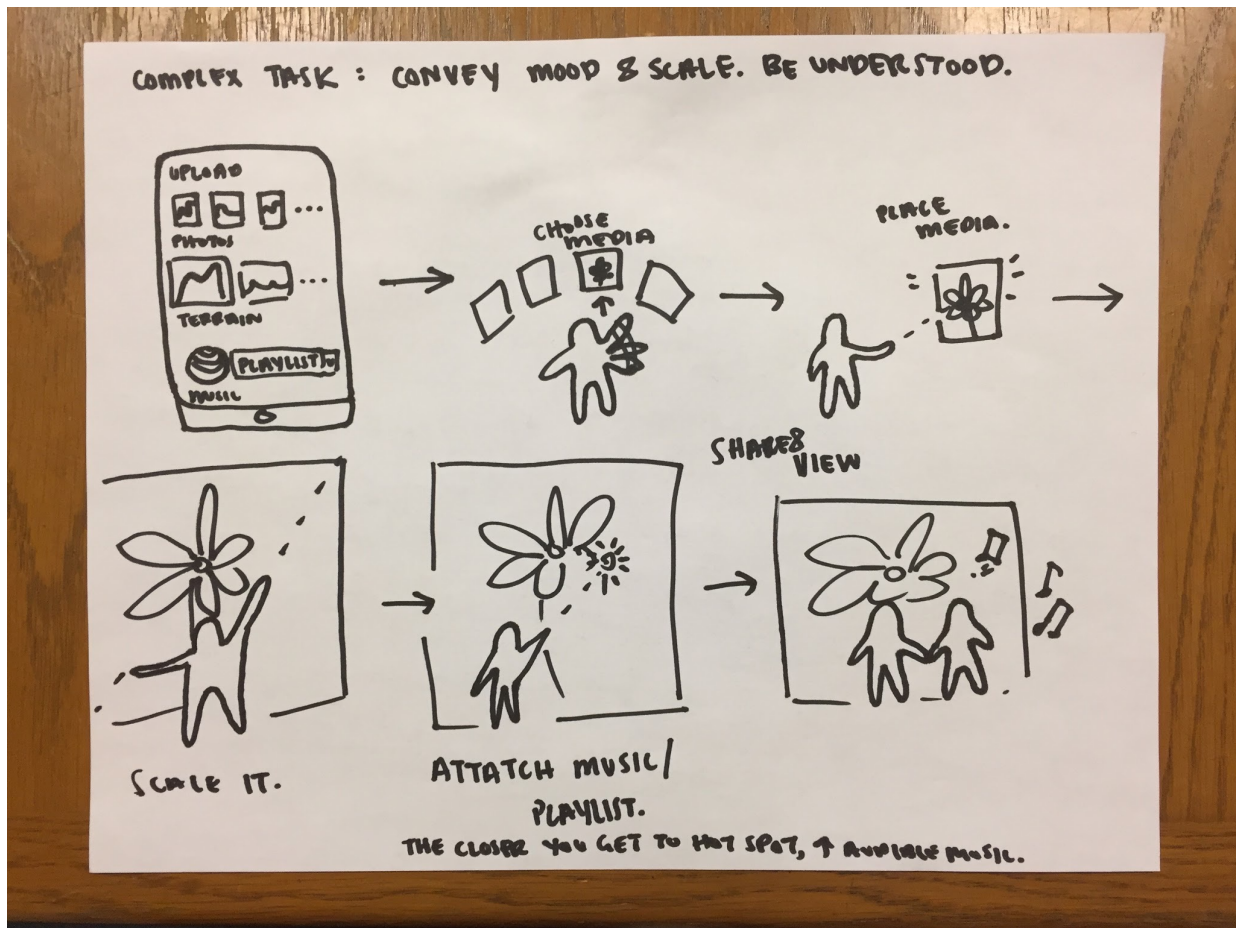
⑥ Pick color on color wheel and weight from right-hand chart.



⑦ Add splashes of color to the scene using head tracking and the selector button.



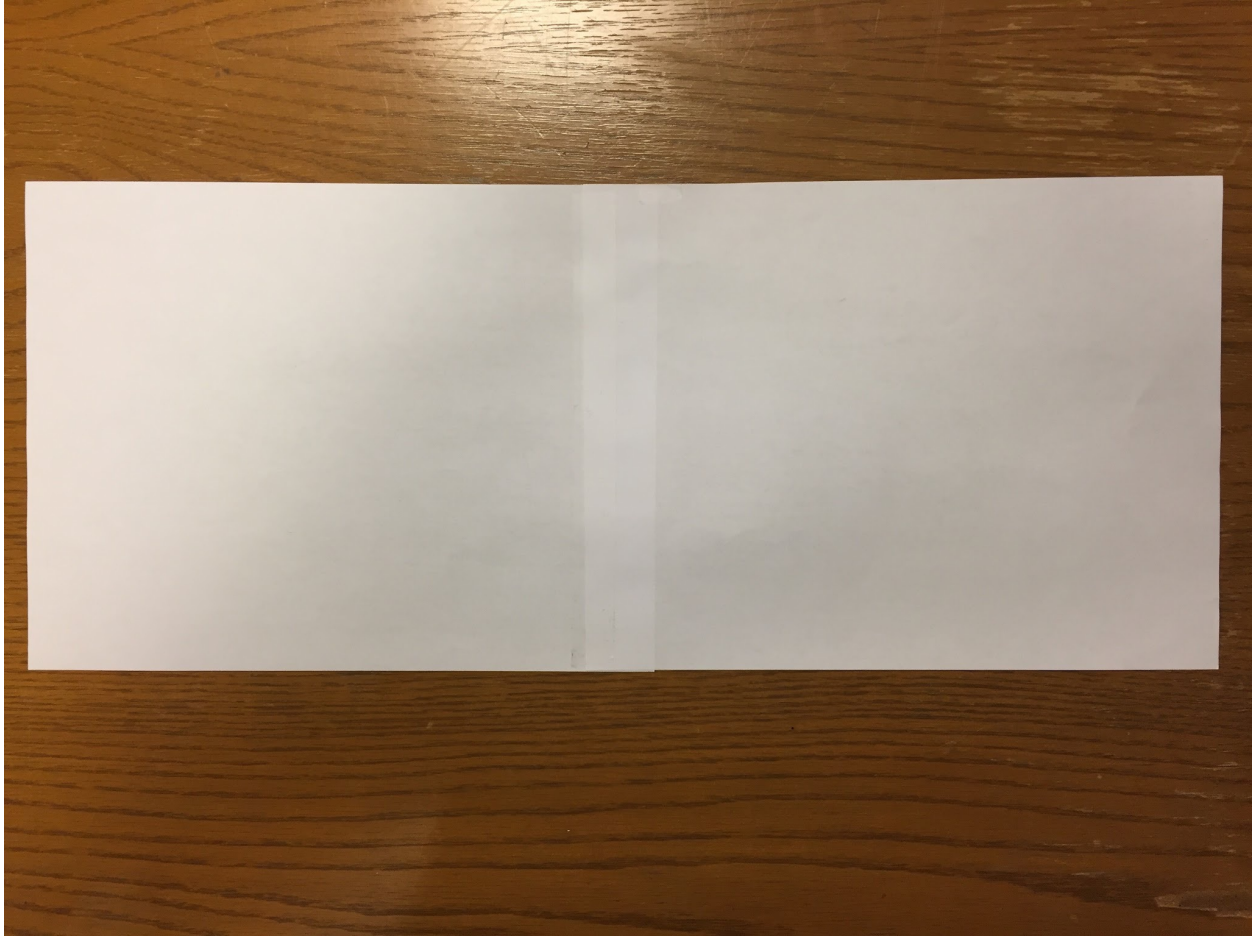
Complex Task: Convey Mood and Scale



Prototype

Our main challenge in creating our prototype was how to allow our testers to feel like they could truly be creative. Voxyl is unique, in a sense, in that it does not want users to follow a defined path. Aside from the initial creation of the environment, there are no transitions of screens to convey. There is no 5 step checkout process to prototype, no workflow to follow to achieve a desired task. In fact, we felt as though something as such would be more limiting than anything. Rather than prescribing processes, Voxyl seeks to link the mind and the environment - if you have to think too much, we've done something wrong.

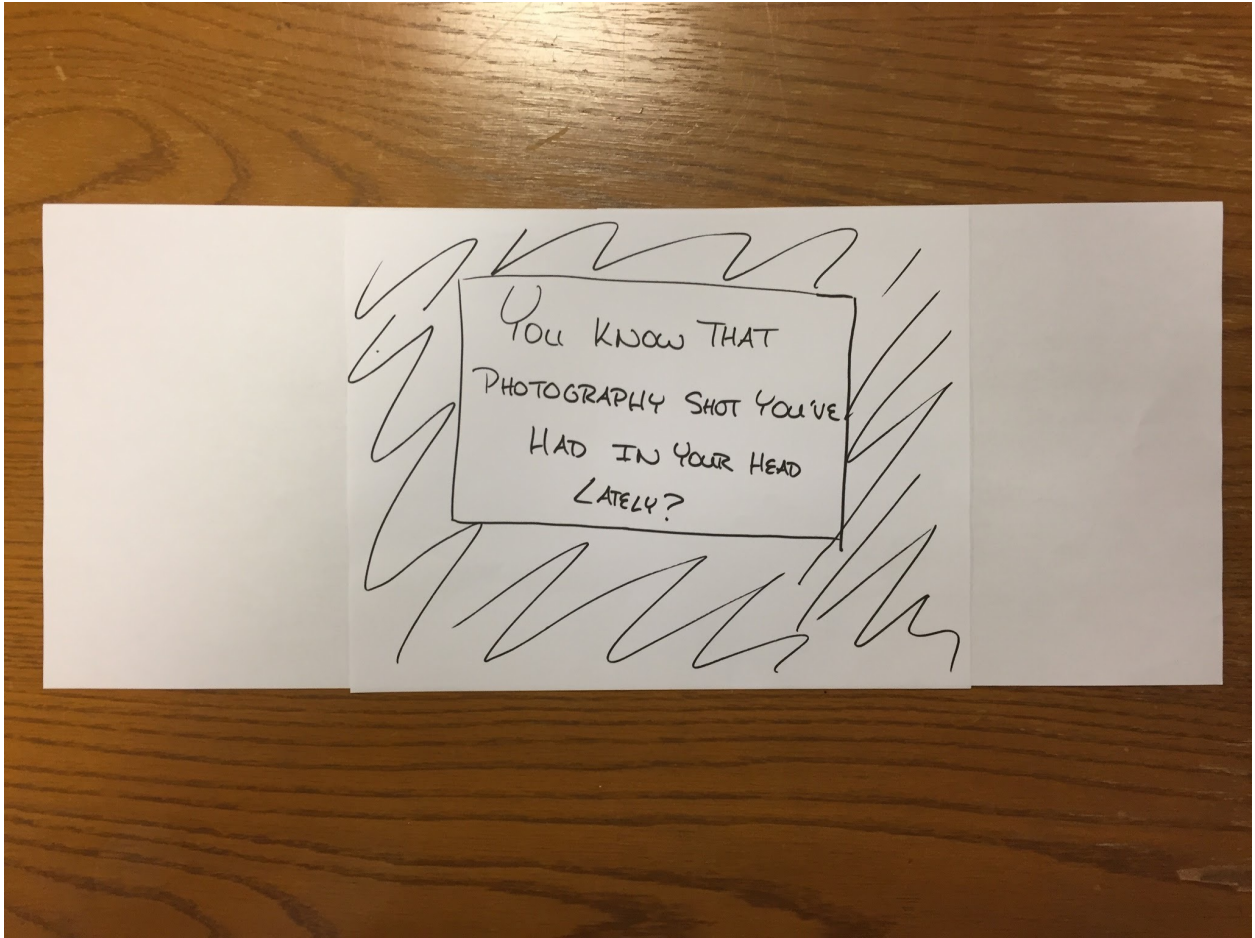
For our prototype, we settled on an interface in which our testers could show us a picture they wanted to put up, and we would slap it on a large sheet of paper after quickly sketching it on a post-it. The large paper represented the tester's field of view in virtual reality (another challenge, incidentally - how do you convey the immersiveness of VR on paper?). We held this up in front of them, and let them play around with how they wanted their images placed and arranged.



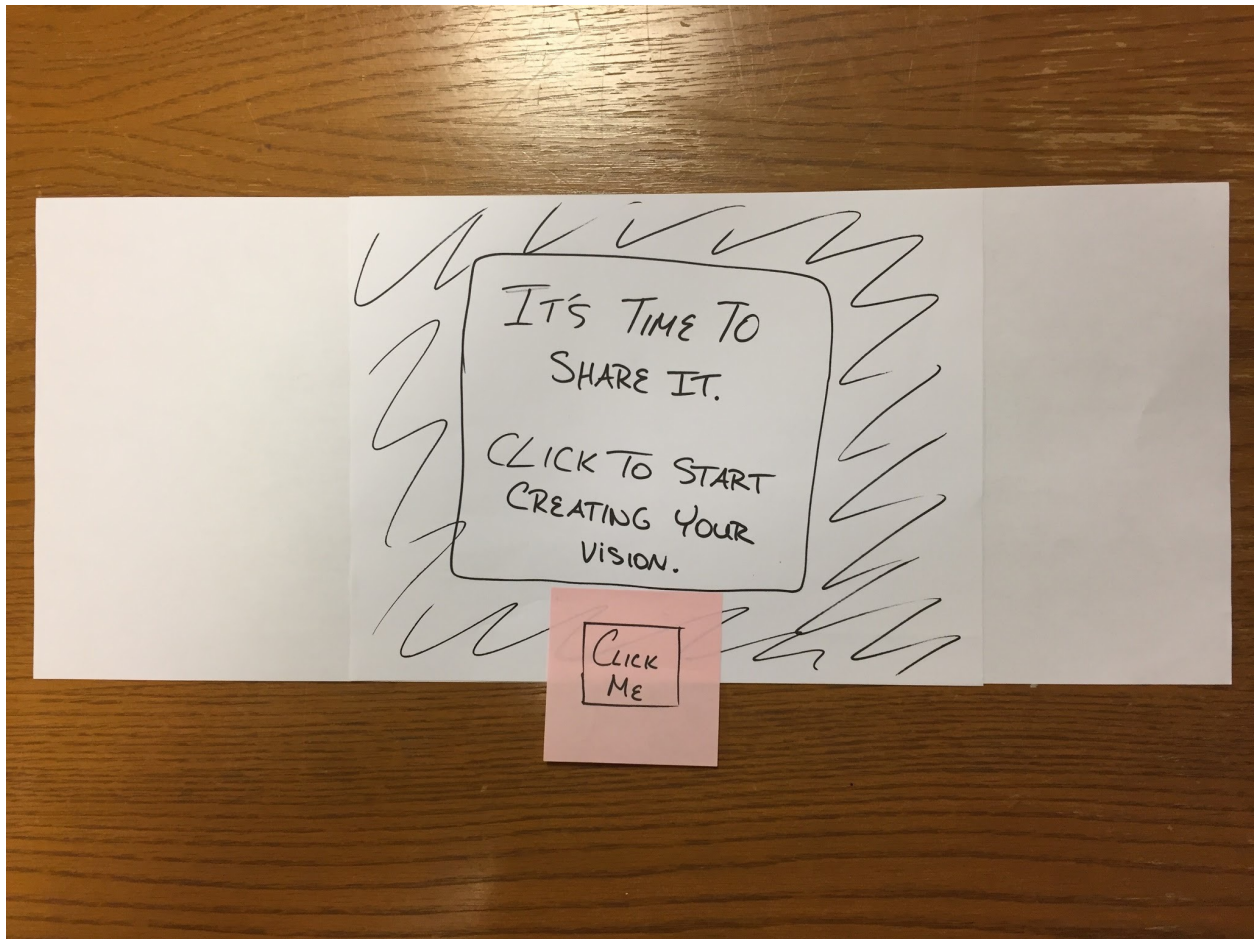
Large, blank sheet of paper representing an empty 3D canvas.



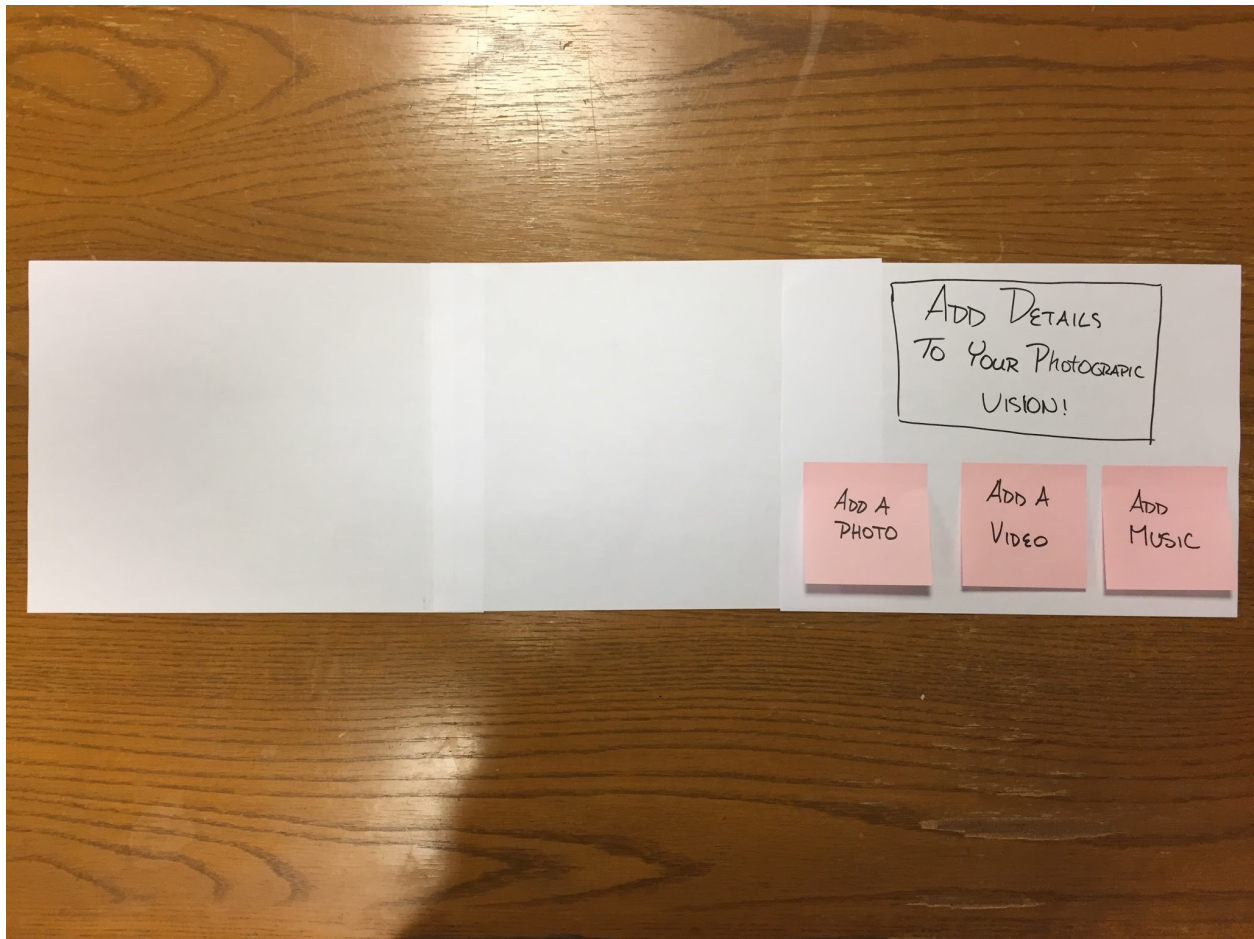
Voxyl welcome screen 1.



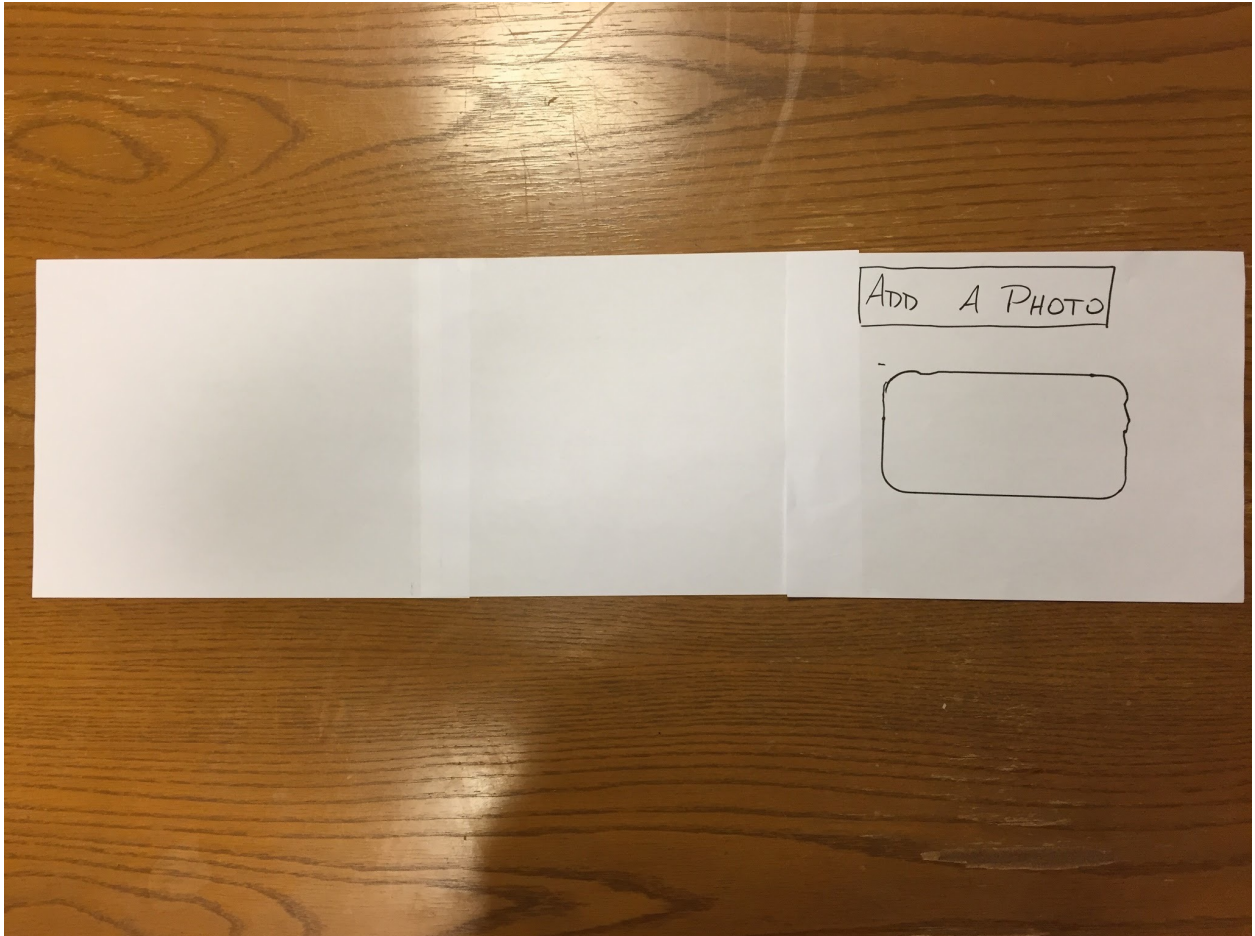
Voxyl welcome screen 2.



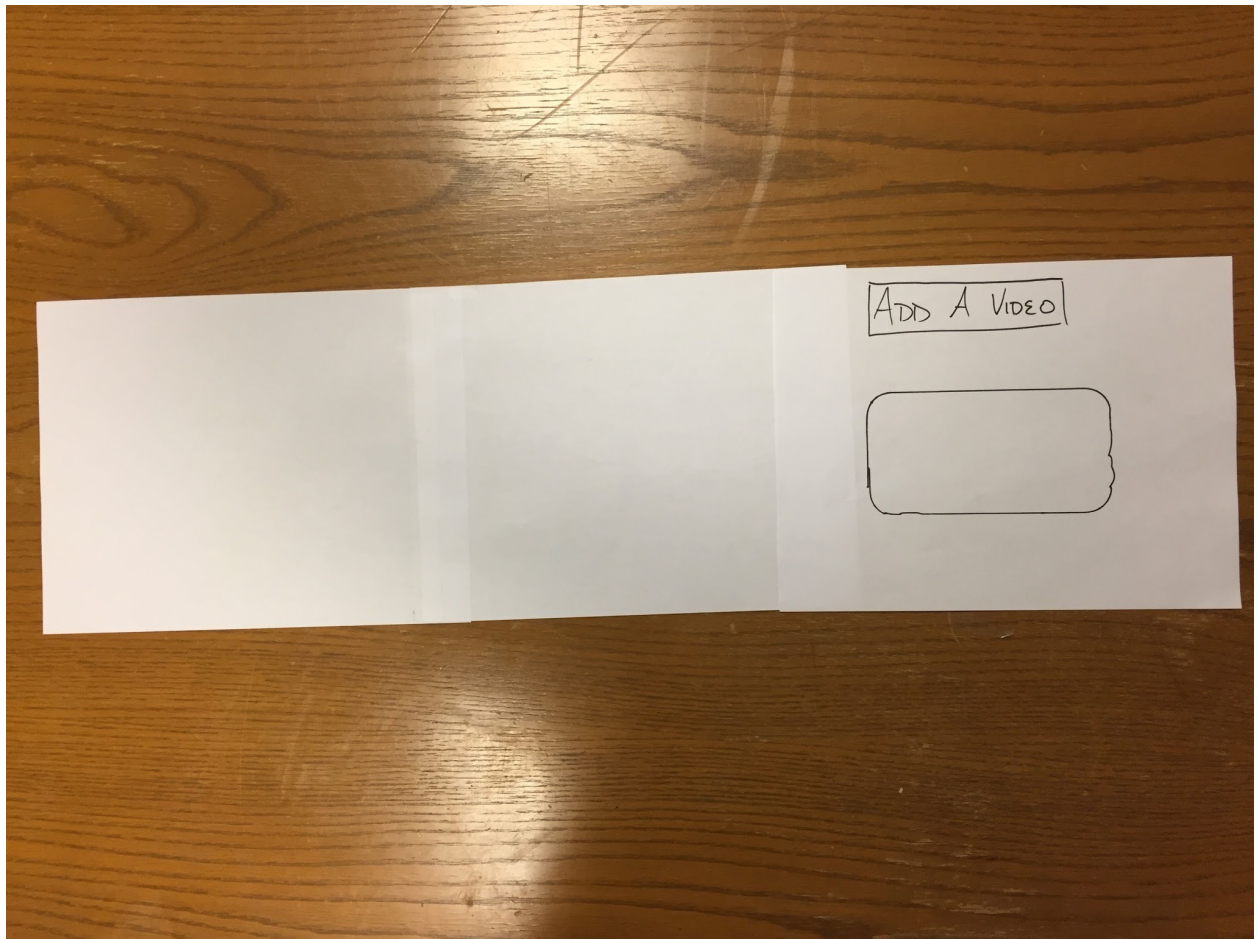
Voxyl welcome screen 3 and button for Task 1.



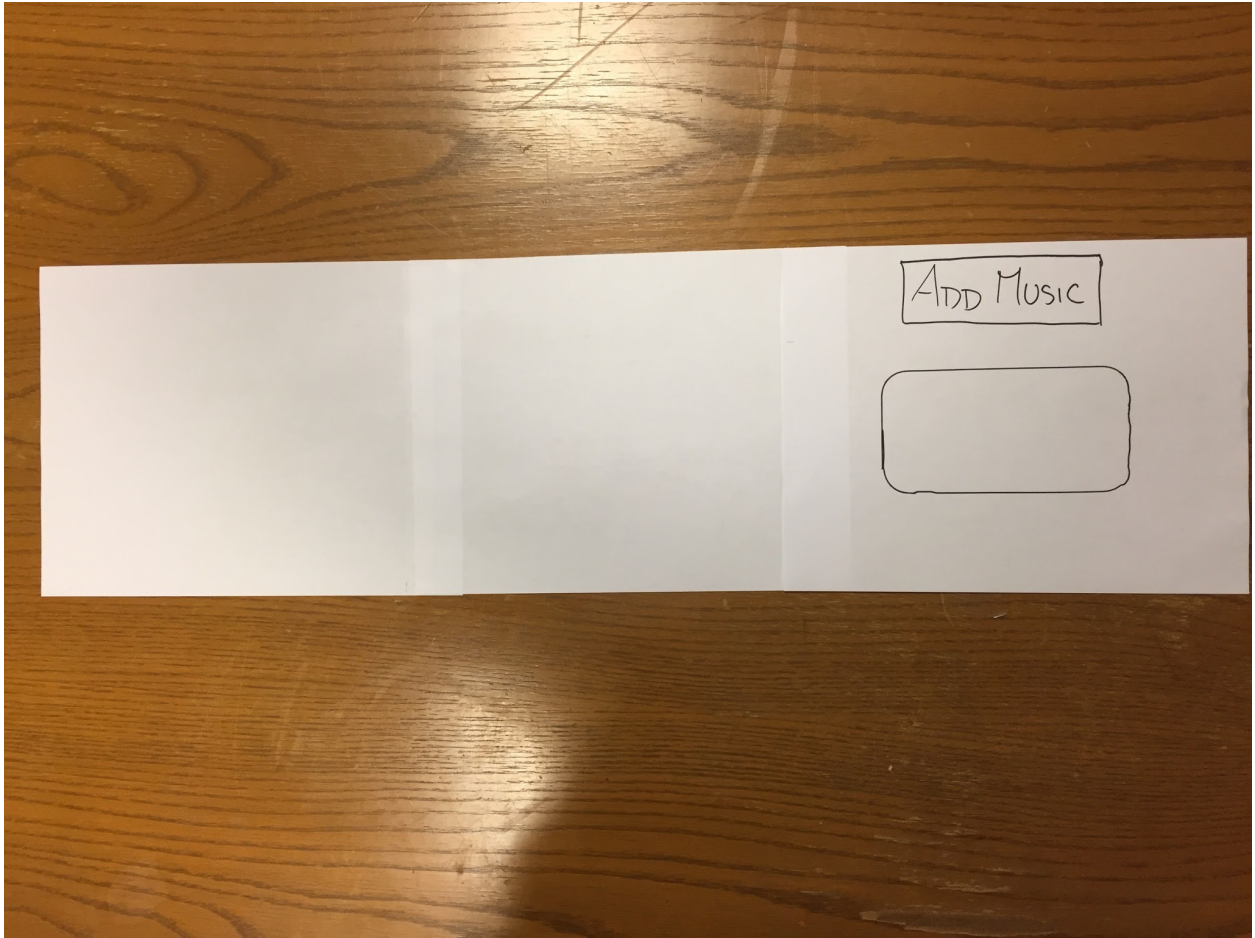
Blank canvas with detail selection interface on the right side of the user's field of view. Remember, this is all happening in a Samsung Gear VR headset!



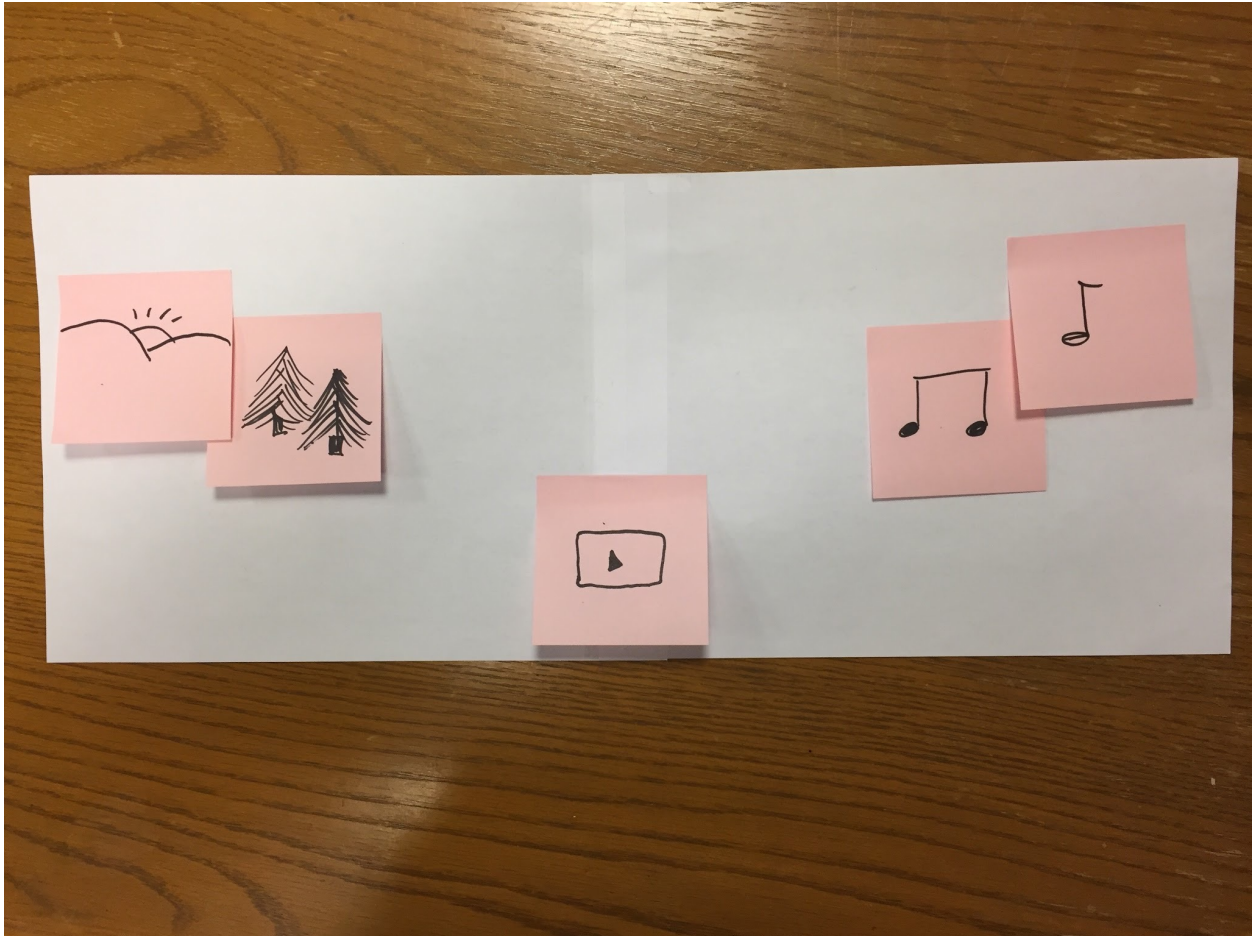
The display after the user selects "Add a Photo."



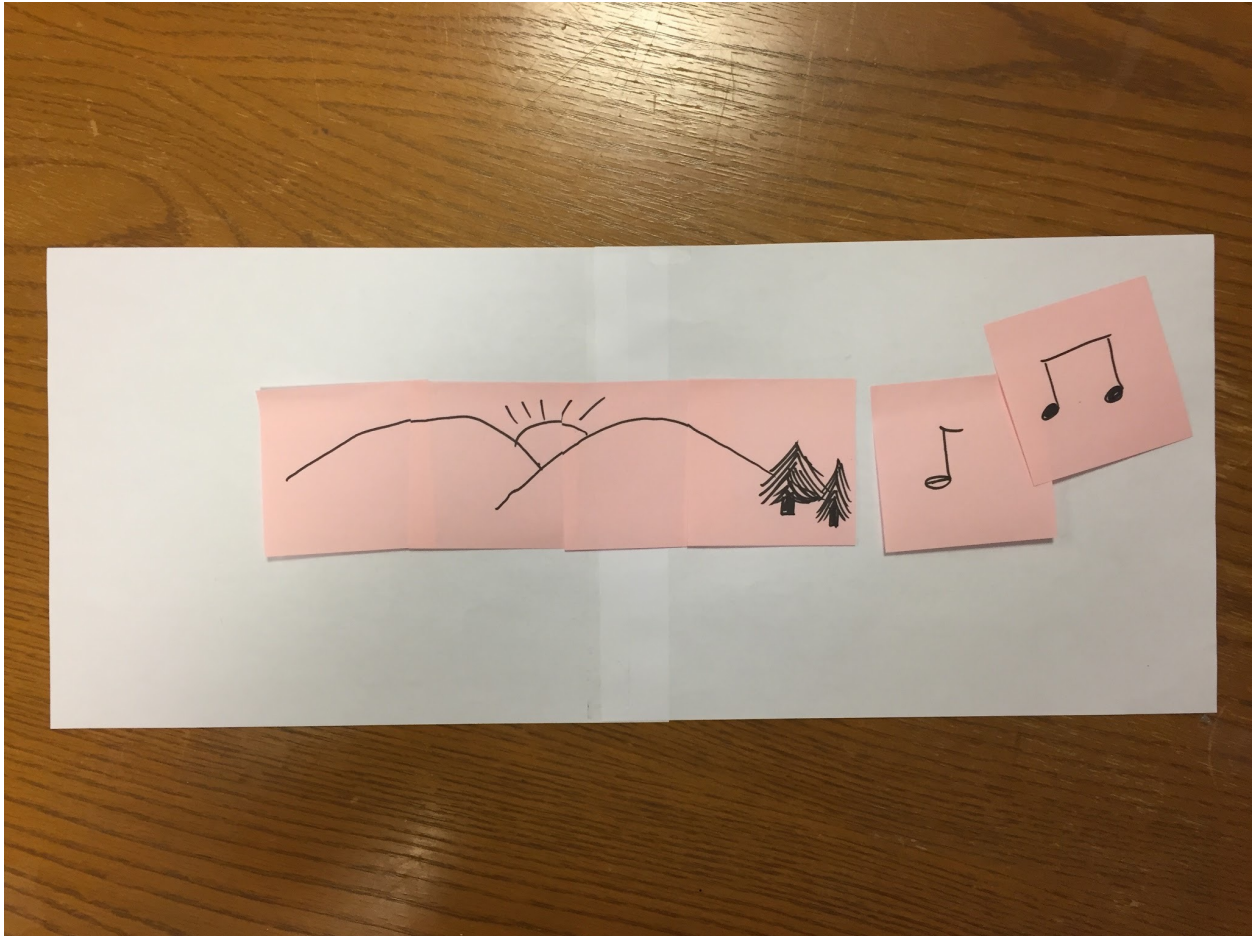
The display after the user selects "Add a Video."



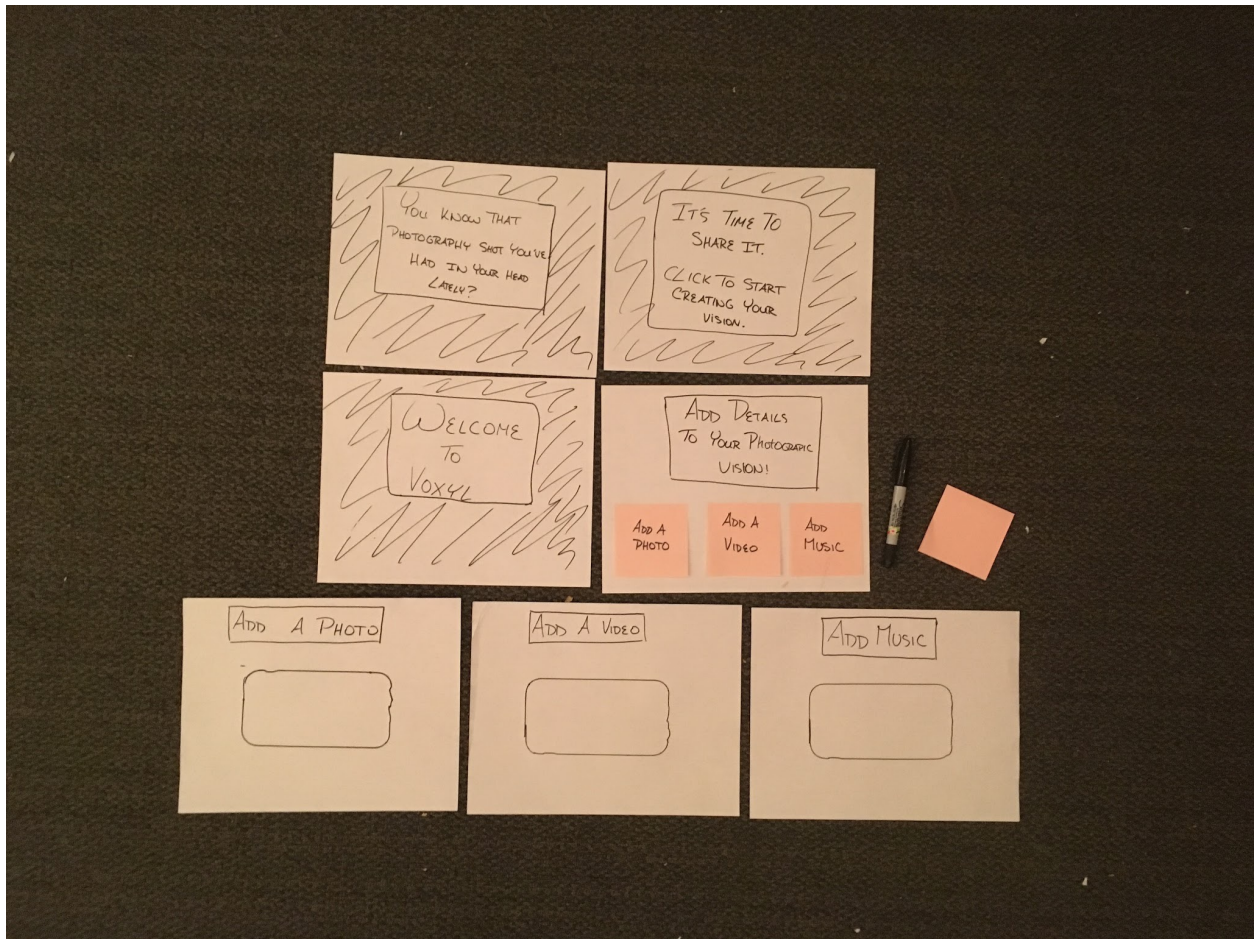
The display after the user selects "Add Music."



A user's creation for Task 2. The user placed some simple features on the canvas: two pictures, a video, and two musical tracks. After this task, the canvas contained all of the elements the user needed to convey their vision, but the elements were not yet arranged or scaled, and the user had not added color or lighting to the canvas.



A user's creation for Task 3. The user expanded on their creation for Task 2 by communicating the scale of their vision. They scaled up the mountain image, positioned the tree image to overlap with the mountains, and arranged the music in a sequence to be played. Not shown in the image are the lights and colors that the user chose to accompany their canvas features.



All screens of our prototype, except the canvas.

To convey color scheme, we had our users color their paper in whatever pattern they desired. We also played music for them, and positioned a flashlight where they wanted it in the room to convey lighting. The user scaled and repositioned their media using gestures: moving their hands apart to scale up a piece of media, moving their hands closer together to scale down, and focusing on a feature to "select it" and repositioning it to where they wanted it on the canvas. A Voxyl team member acted as the computer behind the interface, tracking the user's head movements and hand gestures and simulating the way the interface would respond.



The canvas media produced during testing with Participant B.

Testing

Method

We recruited participants for our testing based on involvement with photography and visual art. Participant A, for example, is a professional photographer. We recruited friends of friends and acquaintances; we did not offer them compensation for their time. Ages ranged from early to late 20s, and all participants were male. Testing was carried out in ordinary rooms, the goal being to see if we could create an immersion and experience without the need for excessive isolation.

In order to test the effectiveness of our prototype as a tool for communicating ideas, we asked our testers to do just that. We tasked them with coming up with an idea for a photo shoot location, and then using our prototype to try to convey that idea to us. We walked them through our tasks, building in complexity to try to allow them to convey as much as they could. They first created their scene with a simple movement through our initial interface, and then got to work

conveying their features. Their final task was to add nuances like music, lighting, and meditated image positioning to convey more complex things like the mood of the shoot.

At the end of their time with the prototype - after they told us they were done playing around with everything - we asked them what they felt was helpful about the tool, and what they felt didn't really do much for them. After that we described to them what we had gotten from what they had shown us - the vision they had transmitted, in essence. With that in mind, we asked them what other features or tweaks to the tool might have allowed them to communicate themselves better/ more clearly.

Results

Participant A

Critical Incident	Task	Severity	More Details
Welcome flow is good	Simple	0	Welcome screens were simple and intuitive. Navigation was easy.
Screen or headset?	Simple	2	Participant wasn't sure whether to click "New Project" using the headset or by clicking the screen
Head rotation confusion	Simple	1	Participant wasn't sure what rotating his head would do to the display (answer: nothing)
"Cool!"	Medium	0	Participant found choosing photos to be exciting
Smile at soundtrack	Medium	0	Participant chose "Tallest Man on Earth" soundtrack and smiled
Picking photos from online	Medium	2	Participant wanted to choose photos from Internet as well as phone gallery
Changing terrain or time of day	Medium	2	Participant wanted to change the terrain and time of day in the photographs

Confusion about movie	Medium	3	Participant didn't know how videos would work; are they always playing? Does the creator choose a time segment to play on loop?
Scaling is slow	Complex	1	Redrawing the pictures on bigger paper took a while. This is a problem with our prototype, not the design.
Too much blank space	Complex	2	There is too much blank space on the canvas. An interesting problem we'll need to put time into thinking of a solution for.
How to finish and share?	Complex	4	No obvious way to complete and share project. This was a failure of both communication and design.
Editing and removing objects	Complex	3	How to edit and remove objects that no longer fit the creator's vision? No obvious way to do this.
Changing seasons in a single canvas	Complex	2	Participant wanted to share multiple versions of their vision, occurring in different seasons.

Participant B

Critical Incident	Task	Severity	More Details
Feels like a game	Medium	0	"This reminds me of Little Big Planet!" "Is it going to have fun sound effects?"

Gestures feel silly	Simple	1	"Do I really have to do this?" Most likely a problem with our prototype, the veil between the "human machine" and the canvas was basically non-existent
Picking color	Medium	0	Expressed satisfaction in having multiple reds to choose from and being able to pick the "right red"
Convey material	Medium	1	Participant found himself coloring in highlights and saying "this is where the light is reflecting off the metal"
Changing Perspective	Complex	1	Participant found himself walking around the canvas and projecting the 2D into 3D space
Music option unexpected	Complex	2	"I was imagining this as a static shot", thought music would be intrusive. Didn't think music could be extended to background noise, which he thought would contribute to his vision"
No motion	Complex	2	Wishes he could include motion and actions, such as the model moving or things gently swaying to convey the mood better
Lighting unexpected	Complex	0	Found it to be a detail he hadn't considered. Thought it was very cool!

More!	Medium	0	When adding in media. "Make another one! And one more. And one more. And one more."
Smell?	Complex	1	Wondered if he could control lighting and angle, if smell could come into play.

Participant C

Critical Incident	Task	Severity	More Details
Can't grasp size of canvas	Simple	1	Couldn't get a good grasp on the canvas occupying a larger space once wearing the headset.
Interacting with VR	Simple	0	"Wait I can control it with my head? Cool"
How to import media	Medium	1	Confused as to how media would make it from their phone to the VR world in the real deal
Slow	Medium	2	Visually impatient when waiting for Voxyl member to finish drawing or moving things around
Rewarding	Medium	0	Very satisfied when they saw their vision on the canvas
Collaboration?	Complex	2	Wondered if they could give the project to someone else and have them edit the scene, or if two people could co-create at the same time "like google docs"

Amused with lighting	Complex	1	“I see what you’re doing here” Amused that lighting came into play and how we simulated it. Expressed that it helped the shot feel less “sterile” for them
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Discussion

Overall, our participants seemed happy with the tool as a whole. Notably, they seemed to understand what the purpose was and how they might use it. There was a notable satisfaction to the interactions - a sense of “hey, this is cool”. It seemed as though perhaps we had succeeded in prototyping something that felt, simply, ‘right’.

Additionally, the product helped participants solidify their vision in their own head. It serves as a form of creative rapid prototyping for them.

This indicates to us that we’re on at least a reasonable approximation of the right path. Our job in the remaining weeks, then, would seem to be to iron out interactions to preserve that feeling.

Many of the initial interruptions to the feeling of using our tool should be fixed with the port to legitimate VR - confusion over the purpose of head movement, for example. In contrast, we appear to have more work to do on our general utility interactions. This is not, on the whole, surprising - none of us have extensive experience with VR, and figuring out how to represent common tasks like finishing a project in a different space will undoubtedly require some thinking. Notably, doing so will carry with it the added challenge of designing with immersiveness in mind. There is a very real possibility that an overtly present UI will ruin the feeling of being inside the photographer’s inspiration. This, of course, is the very feeling that we seek to create. Putting forth a control flow that is both intuitive, noticeable, and dismissable at the same time will be an interesting challenge.

One ‘incident’ that particularly interested us was that in which the participant commented that the canvas contained too much blank space. At least two things were notable about this observation, namely: 1) In contrast with many of our other problems, this will only increase in VR. In fact, it will increase dramatically. And 2) this brings to light a common but subtle problem with interfaces such as the one we are trying to create. To properly curate a visualization, and to use it to inspire a particular feeling for a work of art, requires a degree of artistry in and of itself. This is something that we will have to pay close attention to as we develop, as our overarching goal is to ease the path to the creation of art, not make it longer.

Overall, our testing would indicate that we have a viable idea which, if executed properly, should provide a fulfilling and inspiring experience.

Appendices

Testing Script

Introduction

Hey, so the aim for what we want you to be able to do here is to communicate your vision for a photography shoot.

The first step is coming up with an idea. Try to think of a photography shoot you would want to do. Picture it in your head.

Now let's say we're working together on this and I'm in charge of finding that place, and getting all the logistics taken care of. Try to describe your vision to me.

Let's create a place for you to express yourself.

Directions

You'll be using a paper prototype of what will eventually become a virtual reality application using a VR headset and motion tracking bracelets. In the paper prototype, this large piece of paper is a canvas representing your 3D creation space. When we add new features to this paper canvas, what we're actually doing is adding features in 3D space around you.

We'll be filling in to perform the actions that the app will eventually perform for you. After we explain how the prototype works, we'll ask you to perform three tasks ranging from simple to complex. It's OK if you're not sure how to do something; telling us what you're confused about will help us fix problems with the prototype. Go ahead and think out loud while you interact with the prototype.

Demo

The first thing you'll do is put on your VR "headset." This paper canvas represents the display inside your headset. The headset tracks your head movements; you can select an element by looking at it and tapping a button on the right side of your headset.

You can open a media gallery containing photos, videos, and music by saying "Open Gallery." Right now, we're going to simulate the process of actually choosing a photo by having you pull up pictures on your phone or laptop. Then select a media item to return to the canvas; we'll quickly sketch this picture onto a piece of paper so you can add it to your canvas. Moving your head repositions the item on the canvas; tapping the button on the headset fixes the item's location.

You can resize items by selecting them on the canvas and either pulling apart with your hands (demonstrate) or moving your hands closer together (demonstrate).

You can add splashes of color to the canvas by returning to the gallery, selecting the color box in the corner to bring up a color wheel, and selecting the color you want. Then you return to the canvas and pick a spot to add a splash of color.

Task 1

We're going to start with a simple task: create a new project.

Go ahead and interact with the UI to accomplish this task. It's OK if you make mistakes.

Task 2

The second task is slightly more complex. We're going to have you think of an interesting photograph you would like to shoot; in particular, three key details that are necessary for the shoot, such as the subject and two aspects of the setting. Add photos, videos, or music representing these details to the 3D canvas.

Task 3

For the last task, we're going to have you continue working on the vision you started to convey for the second task. Continue to add aspects of your vision to the canvas, resizing and repositioning as necessary, until you feel like the canvas is a good representation of your creative vision for this shoot.

Closing Questions

Okay cool!

So our first question for you - Is there anything you wished you could have done that you couldn't? Anything you think wasn't really helpful? General feedback?

Now let me describe what this conveys to me:

[Describe it]

What was off about what I just described as compared to what was in your head? What would have helped you convey it more accurately?

Notes for Team

Keep a log of any "critical incidents" that occur, whether positive or negative. Keep these separated by task and tester; we'll be categorizing them by severity later. Make sure to have them sign consent forms (<http://hci.stanford.edu/courses/cs147/2016/au/assignments/consent-form.html>).

Sample Consent Form

The Voxyl application is being produced as part of the coursework for Computer Science course CS 147 at Stanford University. Participants in experimental evaluation of the application provide data that is used to evaluate and modify the interface of Voxyl. Data will be collected by interview, observation and questionnaire.

Participation in this experiment is voluntary. Participants may withdraw themselves and their data at any time without fear of consequences. Concerns about the experiment may be discussed with the researchers (Hana Lee, Josh Cohen, Kaley Kunzelman, and Alex Bertrand) or with Professor James Landay, the instructor of CS 147:

James A. Landay

CS Department

Stanford University

650-498-8215

landay@cs.stanford.edu

Participant anonymity will be provided by the separate storage of names from data. Data will only be identified by participant number. No identifying information about the participants will be available to anyone except the student researchers and their supervisors/teaching staff.

I hereby acknowledge that I have been given an opportunity to ask questions about the nature of the experiment and my participation in it. I give my consent to have data collected on my behavior and opinions in relation to the Voxyl experiment. I also give permission for images/video of me using the application to be used in presentations or publications as long as I am not personally identifiable in the images/video. I understand I may withdraw my permission at any time

Name _____

Participant Number _____

Date _____

Signature _____

Witness name _____

Witness signature _____