

# Appendix

## Design Brief Template: Part 1

**School:** Brixner Jr. High

**State:** Oregon

**Division:** **Middle School** or **High School**

**Team Members' Names:** Leah Bartlett and Stephanie Castaneda

<p><b><u>Project Title:</u></b> Readers should have a glimpse at what the project is about and want to read more. (25 word maximum)</p>
<p>The Auto-Tunnel; what is it and how will it change the world?</p>
<p><b><u>Project Purpose:</u></b> In one or two sentences explain what this project intends to do. (50 word maximum)</p>
<p>The Auto-Tunnel is designed to move over the top of crops to prolong or jump start their season. High tunnels also regulate the conditions that crops experience, such as sunlight or humidity, to guarantee a good crop season.</p>
<p><b><u>Abstract:</u></b> Briefly describe the people who will benefit from the project and the challenges they face. Include any inequity that the project hopes to address. (100 Words Maximum)</p>
<p>The Auto-Tunnel intends to break barriers that come with farming. We specifically address women, disabled, and independent farmers, however, it benefits everyone. Farmers meet very physical demands, especially with heavy equipment. We aim to fully automate a high tunnel, so farmers don't have to physically push a high tunnel into place. Our project will help open up who can be a farmer.</p>
<p><b><u>User Research:</u></b> Discuss key information about the users gathered through your research, interviews, and ongoing discussion with the user throughout the project. What did you learn about the user and the barriers they face? (200 word maximum)</p>
<p>We had a meeting with our client at the beginning of our project, where she introduced a lot of issues and ideas to use and make a project. The one that stood out to us was automating a moving high tunnel. Our client, Mz. Katie Swanson, runs her farm by herself, so she doesn't have a big team to help push manual high tunnels. We noticed that most of the projects required pushing, which also required a lot of people, considering high tunnel frames are usually steel.</p>

We first looked at what was on the market, and all that we found were independent projects that made DIY moveable high tunnels, so that left us with little references to work with. We decided that we needed to start from scratch, and that led us to making two amazing mini-models.

We met with Mz. Katie Swanson recently to present our project to her. She was really happy with our design and wants us to go out and the land she currently has to help visualize what we've been working on all of these months. We aim to make our design even better to accommodate her needs for her farm, and herself.

**User Insight:** Discuss your team's understanding of the experiences, emotions, and motivations of the users. This insight should inform the rest of the project and help the reader have a deeper understanding of the inequity of the user. What did you learn about how the barriers affect the user? (200 word maximum)

Our client is a very capable and strong woman, however, she is the only person working on her farm. She is put at a very distinct disadvantage when it comes to how much she can do at one time, since she works alone. She also just bought a pretty big plot of land, which requires more attention and resources. We learned that she wanted something that would help make her job physically easier and less time-consuming.

Large farms with a lot of workers/employees are hard to compete with, especially if you're an independent farmer. Farm/Harvest to Table is a movement that stresses the importance of locally grown food, that is usually made by independent/smaller farms. By making it easier to grow more food locally, it makes the movement easier to participate in. This made us more passionate to get our product working and viable to be picked up by professionals.

**User Needs:** Develop a specific list of the user's needs produced from the user insight. What does the user want to help them with the barrier? (100 word maximum)

Our client had many problems that she was interested in solving, so we'll focus on the moving high tunnel.

She mentioned that she looked into movable high tunnels, but wanted one that she didn't have to push. Specifically, she wanted one that had a remote control system. This would eliminate the physical capability and attention/time barrier she has.

**Project Goals:** List project goals and describe how they are linked to and will adequately meet the user's needs and address inequities and/or barriers faced by the user. What do you want the project to do to help the user? (100 word maximum)

We want to remake our model to be even better than before. This would help bring out potential problems we don't know about, so that in the next step we would have a smoother transition.

The next step would be for our project to get picked up by professionals. Right now, we do not have the skills or resources to even begin sizing up our mini-model, let alone a fully functioning piece of equipment for our client.

Overall, getting the project moving along into a final product will help our client with her time and physical capability barriers.

**Key Features of Design:** List key features, illustrating that the design will adequately meet project goals. How will the project help the user? (200 word maximum)

First, we have our microbits. One of the microbits are hooked up to a servo (basically a motor), this is the one that receives the input in the radio system. The other microbit sends the signal with inputs (pressing the buttons on the microbit)

Second, we have the servo. The servo is hot glued to the back left wheel, which is what powers the movement of the Auto-Tunnel.

Third, we have a solar panel that powers the servo microbit. This powers the servo, and makes it spin the wheel, moving the high tunnel. This also makes the design more ecofriendly than before.

Lastly, we have the structure. Currently, we have an energy can surrounded with paper to stand in for the top part of the high tunnel. We also have supports under the energy can/microbit which will not be included in the final design because it would interfere with the crops.

This all together makes a fully functional mini-model that performs the functions we need to currently (go forward and stop). After adaptations, such as a bottomless structure and an actual high tunnel-like top, our project will fully fulfill all of the requirements needed to help our client.

**Impact:** Discuss how design addresses inequities for the user and/or removes barriers. Input from users should be included. Does the project help the user? How? (200 word maximum)

The design addresses the physical qualifications and barriers for farmers. With our design, the physical pushing of the high tunnel is removed, so the only thing a farmer has to do is press a couple of buttons, plant, and harvest. This helps remove one of the hardest things to do on a farm.

**Status of Project:** Describe the current status of the project, including feedback from users, and discuss potential next steps. What does the project do now? What would you like to work on in the future? (200 word maximum)

Our current status is a fully functional mini-model. We have fully functioning movements, with a forward function and a stop function. We also have replaced the battery pack for the servo microbit to a solar panel, which has better results than a battery pack.

Our project has a forward and a stop button, which perform great. We are currently working on trying to get a backwards function, however, when we tried it, it worked on the site (a demonstration function on the microbit website) but not in real life.

We haven't had a chance for much feedback from our client, however, when we have gotten feedback, it has been positive. Most of the feedback has been confirmation that our project would help our client on her farm, and exceeds what her expectations were.

We would like to move forward with a backwards function, and a larger-scale mini-model. When we make a bigger model, we will have to start using new technology with more energy outputs. Currently, we have a 3v output, and since we'll be using bigger servos, we'll need more volts of energy. This means that we'll have to stop using microbits and start using something else, like breadboards.

**Reflection:** Show that the team has an increased understanding of human-centered design. Examples of personal growth and insights gained about designing for others and helping them overcome challenges should also be included. What did you learn during this project? (200 word maximum)

Our group learned our strengths and weaknesses, as well as limits and perseverance. I (Stephanie) worked mostly on the coding and paperwork during this project, while Leah does most of the designing and building of the mini-model and poster. We had to accept that sometimes we had to hand something off to the other so that it could be worked on with fresh eyes. We both also had points of frustration where we had to calm each other down and talk through problems or frustrations. This made our friendship closer and healthier. It also made communication easier.

MESA became a haven to work at something that made a difference, and we both created extra time to work on the project outside of meetings. It helped us have a space to work and feel good, while creating something that truly mattered to us.

**Prototype Graphic:** A single graphic with key features adequately labeled. It should be easy to understand and the reader should have a general understanding of how the prototype functions by looking at the graphic.

