**Team: P21677 Engineer: Hayley Miller**

**What were the outcomes of the prior phase?**

1. What did I plan to do?

In the prior phase, I expected to break our 3D bioprinter system down into multiple components, focused on each of the major functions. I planned on meeting with the biology-focused team a lot in order to analyze that portion of the printer. I also expected to create overall concepts for the printer itself.

1. What did I actually do?

During this phase, we accomplished everything that I listed above. In more detail:

* Benchmarking – looking into current commercial products on the market
* Concept generation – breaking the printer down into its most basic functions and creating multiple concepts for each function.
* Morphological chart generation – created sketches of our final function concepts and created morphological charts for the bioprinting and electrical/mechanical aspects of the project. Used these charts to create overall bioprinter concepts.
* Pugh charts and final concept selection – used a Pugh chart to analyze our concept ideas, choosing the best-performing concepts as the our planned solution to investigate in the next phase.
* Feasibility – analyzed the feasibility of our chosen concepts and created rough plans for how we will address our concerns

1. What did I learn? How were plan and reality different?

I learned a lot about the details of the project, especially relating to different materials, types of crosslinking, and so on. We reached out to a few different sources and discussed what is commonly done in terms of 3D bioprinting, something that was especially helpful for our work this phase. I also went to see the printer and tested it out, which taught me how the current prototype functions and what I will be expanding upon. I think my plan was pretty similar to reality this term. I expected to meet with the biological team more often, but we mostly stayed together as a team. I think this is probably due to the fact that this was at the systems level, and that we will break into niche teams as our work gets more detailed.

**Team level goal for next phase**

In the Preliminary Detailed Design phase, we will divide work and develop specific schedules for the bioprinting and mechanical/electrical/software teams. Each team will work on design and conduct feasibility tests for their appropriate subsystems in order to determine viability of the selected concept and discover necessary adjustments to the system. Specifically, some feasibility tests that will be conducted include cell and material combination, crosslinking implementation, compatibility of existing electrical equipment, print head design details, and extrusion pressure limits.

**What do I plan on doing to ensure that my team has a successful review at the end of the next phase?**

In order to have a successful review, we will need to perform a lot of work regarding our chosen concepts. In order to help with this, I plan on doing a lot of individual research regarding more detailed aspects of the system (specifically on the biological side). As we start conducting feasibility tests, I think my experience in a lab setting (especially when it comes to planning and conducting experiments) will come in handy. Hopefully my current knowledge of different protocols and wet lab practices will help us accomplish as much as possible before the next review, with fewer road blocks.

**What is standing in my way of meeting my next phase goals?**

1. Time is the main thing that is in my way. I have a lot on my plate right now, unfortunately.
2. Access to materials. We will all have to figure out what we need and gain access to it so we can start conducting feasibility tests. I suspect that we will need to find some alternatives to test with rather than the actual materials (for example, using toothpaste to test preliminary extrusion parameters rather than our expensive biomaterial).