**Team:** P21677 – 3D Bioprinter **Engineer:** Mark Truskinovsky

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

1. **What did I plan to do?**

* Implement feedback from previous phase review
* Become more familiar with various aspects of 3D bioprinting
  + Biological components
  + Mechanical/electrical components
  + Software components
* Enumerate various functionalities of entire system as well as its subsystems
* Generate possible methods, practices, or solution ideas to best address the identified functionalities within the team’s constraints
* Develop system-level concept to evaluate the feasibility of in the upcoming phase
* Evaluate concepts using several methods suggested by the program
  + Morphological charts
  + Pugh matrices
* Dive into the work of the purchasing agent

1. **What did I actually do?**
   * Reassessed the CRs and ERs based on feedback from customer and faculty guide
   * Functional decomposition
   * Benchmarking and background research
   * Development of concepts through team discussion about morphological charts
     + Biological concept discussion
     + Mechanical/electrical discussion
   * Developed criteria to evaluate the concepts against one another
   * Selected concepts based on discussion and use of Pugh matrices
   * Added risk items based on selected concepts
   * Met with Dan Reynolds, Iris Rivero, and Nick Lee as supplements to the work our team is doing
   * Spent time in the lab to examine the printer and becoming familiar with its interface
   * Took the purchasing quiz (awaiting results)
2. **What did I learn? How were plan and reality different?**

While I thought it was a drag at the time, I learned a lot about the value of iteration and consideration of every element in regard to concept selection. From my (naïve) viewpoint before entering this phase, I had imagined a process where a concept was generated based on what one thinks is realistic and affordable and then continues to make tweaks until a perfected design is developed. The reality is that we want to eliminate as much of this tweaking process as possible and ideally develop a solution that answers all of the constraints and desires of all parties involved, which is achieved through a process similar to what we did in this phase.

I think the plan and the reality didn’t differ much in this phase. Our team did a good job of getting through the material and properly implementing the suggested methods to ensure we develop as high quality of a solution as possible. That being said, it took a lot longer than expected and we had to add several additional hours of meeting time to keep up.

One thing I didn’t get a chance to work on as much was my work as the team’s purchasing agent. Although this is the case, I don’t think the purchasing work was particularly pertinent to this phase. I completed the purchasing quiz and am hoping that went well. I think my work as the purchasing agent will be a lot more relevant during the upcoming phase.

**Team level goal for next phase**

In the Preliminary Detailed Design phase, we are hoping to make developments on the questions that are posed in our feasibility items. Based on the identified feasibility items, we hope to answer questions through benchmarking (with commercial products, examination of literature), analysis (setting up experiments, especially with the biological feasibility items), and prototyping. By answering questions posed by the team’s conglomerate list of feasibility items, we hope to evaluate the utility of the concepts we were able to arrive at during the previous phase.

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

* Develop finalized list of tests to conduct to evaluate elements of our concepts (~2 hours, week 1)
* Collect list of literature items to go through to perform benchmark analysis of our concepts (~4 hours, week 1)
* Get in contact with an entity on campus that can help us 3D print a publicly available print head design (~2 hours, week 1)
* Begin looking into championing the Purchasing role and begin to plan out materials to ensure that the team is prepared when purchasing becomes necessary (~4 hours, weeks 1-3)
* Perform tests once we develop them (~10 hours, weeks 2-3)
* Perform test runs with the printer and become more familiar with the electrical components and the software (~5 hours, weeks 2-3)

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

* I am still inexperienced and have lots to learn. Once I get a better idea of specific things I need to learn, I will hopefully be able to do a more targeted research and learning process.
* Not knowing the extent of our budget and the potential costs of material(s) required for the project.
* Time. It’s been a busy semester. I’m hoping that I can improve my schedule distribution so that things can be a little easier for myself and the team.
* Potential resource availability of items or devices we can use to perform our tests.