

What were the outcomes of the prior phase?

1. What did I plan to do?

My plan for the last phase was to gain a systems level understanding of this project. I planned to have a couple of design concepts, sketches of possible concepts, and decide on an idea that incorporates a feasible way to cycle water. I also planned on researching some ways to better the sensors and decide on materials to use for the infrastructure.

2. What did I actually do?

The team was able to come up with many different design concepts in a function tree and transformation diagram and conduct a Pugh Analysis to choose the best concepts based on scores. The team was also able to visit Webster Schroeder High School and see their aquaponics system. Using the Pugh Analysis, we narrowed down our design to three concepts and then decided to take the best of each concept to create a hybrid design idea. We also generated a backup idea in case the hybrid solution was not feasible. We also started to gather data on the nitrogen cycle and started adding ammonia to a bucket of water. We've been testing daily to see the nitrate and ammonia concentration to determine how long the cycle needs to get started.

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

After conducting an informal interview with the manager of their aquaponics system, we were able to grasp a lot of valuable information and advice. I feel like we accomplished more we planned on accomplishing during this phase. We learned through youtube videos and online concepts that a water wheel could work to cycle water through our system autonomously. I also learned that without an oxygen pump, a way to aerate the water is through agitating the water from the surface. We planned to come up with a concept by the end of this phase and we ended up with not only a solid design concept, but a more feasible backup concept as well. I learned that we have to build a small-scale version of this concept to see how the design would work.

Team level goal for next phase

Further develop our systems design and possibly build a small-scale prototype to test the rope pump with the water wheel concept. We can start planning on testing the nitrogen cycle with the use of goldfish and see if they are able to survive and thrive in the water. We can continue taking data measurements on the water to see if the nitrogen cycle is still thriving with the addition of fish. Furthermore, we can look into cost efficient alternatives for the sensors and develop a final design concept should the rope pump and water wheel idea fail.

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

1. Come up with a more cost-efficient alternative to the existing sensors (2 hours, Saturday 10/19)

2. Look through the MSD approved vendor list for a somewhat accurate BOM (2 hours, Thursday 10/24)
3. Research and possibly simulate flow rates for water circulation. (2 hours, Kesh, Tuesday 10/29)
4. Check EDGE to make sure things are all properly maintained. (2 hours, Armand, Thursday 10/03)

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

Lack of actual numbers to be able to calculate flow rate and determine whether the rope pump will work. The design idea was bold and will definitely run into obstacles such as getting the flow started and continuous cycling will result in a loss of energy. Eventually, we may have to settle for a backup idea if this idea doesn't work. The lack of materials to build a small-scale prototype is also an issue if we wanted to try and test the design before committing. And finally, everything goes back to the cost. Hopefully ideas don't result in failures and wasted material.

Note to teams: Consider using an abbreviated form of this for your daily/weekly check-ins with your team and/or guide, similar to an Agile standup:

- What have I done since the last class to move the team toward its phase goals?
- What do I plan to do next to move the team toward its phase goals?
- What blockers are preventing me from getting my work done?