

# Development of a New Cooking Device

## Background:

This January 2014, I received a grant from the "The Westphal College Creativity Award" in the amount of \$14,550 to develop Steamii (Now Blossom), a silicone vegetable steamer filling an unmet need in healthy food preparation.

The Westphal Creativity Fund was established by the Office of Research to build capacity in Westphal's portfolio of research and creative work. The fund is supported at a level of \$50,000 annually, from which grants that range in size from \$5,000 to \$50,000 will be made. Grants are made to Westphal faculty who are actively seeking external funding and/or recognition for their research and creative work. The Creativity Fund places a high priority on supporting the research, creative work, and aspirations of Westphal's junior, tenure-track faculty.

The award was granted to help move product development of Steamii forward by supporting the creation and refinement of working prototypes for a silicone vegetable steamer. Funds are being used to create 50 to 100 working silicone prototypes. The budget is slated to fund engineering, tool design, and molding of test parts and the production of 50 to 100 food safe prototypes. Prototypes will be distributed for in-home user testing. After testing, refinement of the final design will be made, and a Kickstarter or similar funding effort will be launched to produce a viable new product in the healthy food prep market.

The original concept, called Steamii, was conceived for "What's Bubbling?" The World Kitchen International Design Competition. What's Bubbling? invited designers to present ideas for "Kitchen Tools imagined for the 21st century". The goal of the competition was to have designers spotlight changing lifestyles and their impact on food preparation.

My entry was Steamii, is a simple tool for rinsing, cooking and serving vegetables or other foods that can be steamed. It is designed to be a complete cooking solution that can go from prep to table, making it the only vessel you need for cooking and serving fresh produce with optimum results. Steamii can be used in microwave ovens, convection ovens, and convection impingement ovens. It was it is the intent to create a tool to be used by couples, families and home entertainers who want to cook fresh produce simply and efficiently, without dirtying multiple tools and



World Kitchen International Design Competition: **Steamii** | Submitted January 2011

World Kitchen spotlights changing lifestyles and their impact on food preparation in its call for entries into the 2011 What's Bubbling? Kitchen Tools International Design Competition. What's Bubbling? Invites designers to present ideas for "Kitchen Tools" designed for the 21st century.

My Solution: Steamii is a simple tool for rinsing, cooking and serving vegetables or other foods that can be steamed. It is designed to be a complete cooking solution that can go from prep to table, making it the only vessel you need for cooking and serving fresh produce with optimum results. Steamii can be used in the microwave, convection ovens, and convection impingement ovens.

It was it is the intent of the designer to create a tool to be used by couples, families and home entertainers who want to cook fresh produce simply and efficiently, without dirtying multiple tools and dishes. It responds to a current trend towards appropriate portion sizes. It offers better steaming performance by limiting the amount of water used during cooking and circulating steam for even cooking.



Steamii | fill | rinse | microwave | enjoy

## Steamii

carrot top w/ snap  
tooling 20K piece price \$ 0.75

strainer  
eastman britan copolyester  
tooling 45K piece price \$0.35

top w/ integrated cover  
low durometer silicone w/ satin finish  
captures condensation and recycles steam  
tooling 30K piece price \$1.50

base with push stem:  
high durometer silicone w/matte finish  
integrated pinch lock strainer and water reservoir  
tooling 35K piece price \$1

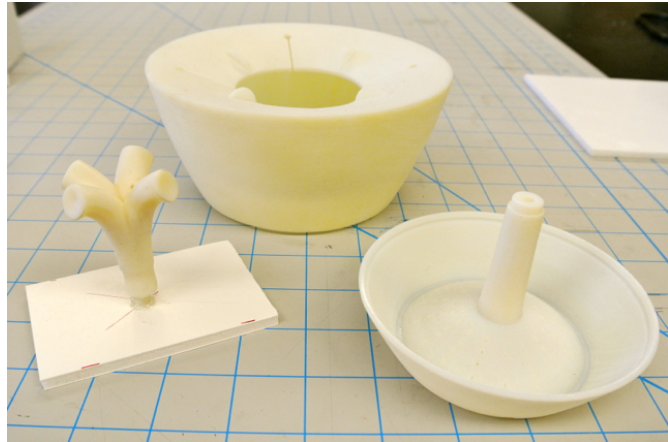


This image is a composite of the entry I submitted for the "What's Bubbling?" World Kitchen International Design Competition held in 2011.

It represents the original idea that led to the current Blossom concept.

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In 2012, the Steamii concept was awarded \$2,500 through an Antoinette Westphal College of Media Arts & Design mini grant. These funds were used to produce one nonfunctioning proof of concept model, and support user testing to vet the design and to gauge market viability. The funding also helped the project conceptually shift from an intellectual and creative exercise to keep my mind and skills sharp over a holiday break, to a design research experiment to fuel my fascination with experiential design and creating joy for mundane human tasks through objects that are imbued with whimsy. Tests conducted during the mini grant funding focused predominately on use and marketability. Testing of experiential design and joy will be conducted with the updated design and working samples.



Steamii parts fresh off the Objet printer, being prepped for painting

#### Heathy Lifestyle | Obesity Literature:

While an extensive literature search was not conducted as part of the design process, several articles and reports I found online did help influence my decision making and confirm my contention that this is a tool for healthy eating habits. The hypothesis is that by developing a product that provides joy when using, improves cooking time and success rate, and reduces the amount of prep and cleanup, combined with a cooking technique that improves nutrition, I can offer people great benefits.

- *The benefits of cooking veggies in the microwave - Harvard Health Publications*  
[http://www.health.harvard.edu/healthbeat/HEALTHbeat\\_070808.htm](http://www.health.harvard.edu/healthbeat/HEALTHbeat_070808.htm)
- *Kahlon TSI, Chiu MC, Chapman MH. Steam cooking significantly improves in vitro bile acid binding of collard greens, kale, mustard greens, broccoli, green bell pepper, and cabbage.* Nutr Res. 2008 Jun;28(6):351-7. doi: 10.1016/j.nutres.2008.03.007.
- *Lewis CE, Smith DE, Wallace DD, Williams OD, Bild DE, Jacobs DR, Jr. Seven-year trends in body weight and associations with lifestyle and behavioral characteristics in black and white young adults: the CARDIA study.* Am J Public Health. 1997;87:635-42.
- *Food and Diet - Harvard School of Public Health*  
<http://www.hsph.harvard.edu/obesity-prevention-source/obesity-causes/diet-and-weight/>
- *How to Eat More Vegetables - United States Department of Agriculture*  
<http://www.choosemyplate.gov/food-groups/vegetables-tips.html>
- *Cook More Often at Home - United States Department of Agriculture*  
<http://www.choosemyplate.gov/weight-management-calories/weight-management/better-choices/cook-home.html>

**“ How you cook your vegetables may make a big difference in how much nutrition you get from them. You might be surprised to learn that using a microwave may help retain the vitamins, minerals, and other compounds that make vegetables such a health boon to begin with.”**

- Harvard Health Publications

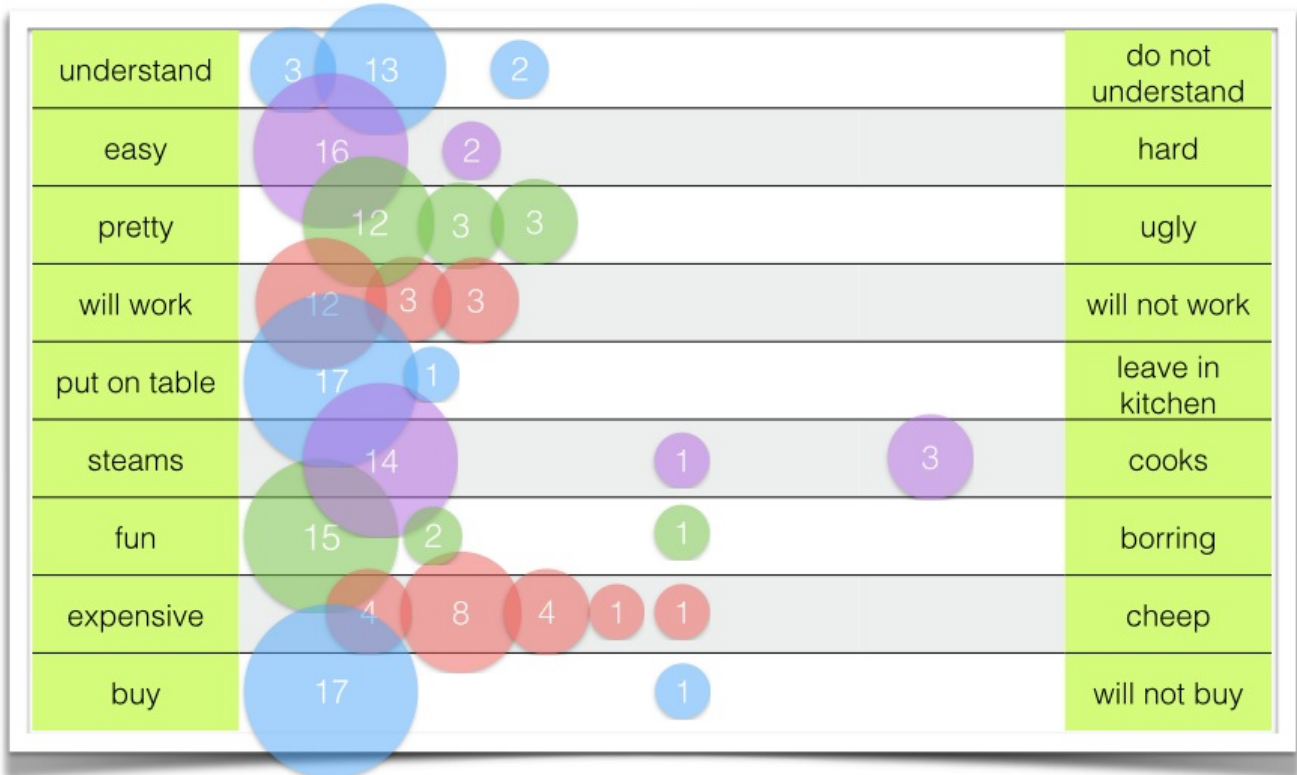
### User testing:

To gauge users' reactions and understand the potential market, a full scale photorealistic 3D print was made using an Objet Alaris30 Polyjet machine and custom paint. While the model was non-functioning, users could provide feedback on aesthetics, perceived user interface, size and concept. Along with the data collected what turned out to be most helpful was a Semantic Differential employed to understand the emotional response to the object.

### Semantic Differential

Semantic differential is a type of rating scale designed to measure the connotative meaning of objects, events, and concepts. The connotations are used to derive the attitude towards the given object, event or concept. The respondent is asked to choose where his or her position lies, on a scale between two bipolar adjectives (for example: "Adequate-Inadequate", "Good-Evil" or "Valuable-Worthless"). Semantic differentials can be used to measure opinions, attitudes and values on a psychometrically controlled scale.

### The Steamii Semantic Differential Results



18 respondents were shown a non-functional prototype along with a diagram of how to use it. Subjects were then asked to rate Steamii on the scale above. The results show favorable understanding of the Steamii concept and willingness to buy. The 18 individuals were between the ages of 23 to 38 comprising of 11 women and 7 men, 6

## Development

At the time of submitting this document the project is in the process of being developed. Steamii has gone from a conceptual design that was submitted in January 2011 to the World Kitchen International Design Competition to a fully working prototype in just under 3 months of relaunching the project. I have contracted the design and engineering firm Tomorrow Lab in New York City to aid in the mechanical engineering development and prototyping of test articles and in documentation of final CAD files. The lead engineer is Dean DiPietro, who was a lead product engineer at the OXO company for almost 8 years before joining Tomorrow Lab. Also working with the Steamii Team and their role are:

**Dan Grossman** - *Design Director at Martha Stewart Living Omnimedia.*  
Role: Test Kitchen Lead - Test Development

**Micheal Elegbede** - *Chef de Partie, Eleven Madison Park*  
Role: Testing Protocol and Recipe Development - Recipe Testing

The project over the past three months has gone through a significant redesign with bringing on a team. From the start we revisited the original concept a picked it apart. This was necessary since other than user testing, the concept had never been vetted. The goal was to make the product real while retaining the character and intent of the original design. The review identified five design changes that were driven by several insights and opportunities in moving Steamii from concept to reality, prime to the revision are the following goals:

1. Optimize the part to take advantage of the silicone material
2. Reduce likelihood of food contamination such as Salmonella
3. Improve easy of cleaning by hand and dish washer
4. Improve manufacturability and reduce cost of parts
5. Improve quality and success of microwave cooking

At our first review meeting with all members of the development team, the two issues that were addressed right away were:

1. Using the container to both rinse and cook the vegetables was deemed a health risk. Chef Michael Elegbede advised that rinsing and cooking in the same vessel was a Salmonella and other food and human borne bacterial no-no. The rinse feature was removed.

2. Dean DiPietro, lead mechanical engineer was concerned that the amount of stress that I was placing on the silicone lid which needed to stretch back on itself repeatedly was a potential failure risk and a molding concern. The lid feature was also removed.

This meant going back to redesign the Steamii's details. Eliminating the lid and the strainer turned out to be a blessing in disguise for we came up with a more creative solution, creating a better aesthetic and a more manufacturable product while not losing any of the magic or whimsical nature that I wanted in the product.



units ready to test



testing in progress



amount of steam produced was measured



visual quality and doneness was also measured



Testing varying degrees of openness

## Testing:

As part of the redesign I purchased 5 currently available silicone steamers from Amazon in various sizes and colors. An interesting observation is they all mimic existing cooking utensils and act just like a casserole dishes but only made of silicone. A testing protocol was set up so that each was tested identically, and our benchmark was a serving of baby carrots.

Each unit was tested with: 3 oz of water and 20 carrots and cooked for 2 minutes at high power in a standard Frigidaire microwave. Each test measured: level of doneness, consistency of doneness across the 20 carrots, amount of visible steam when opened, amount of water left in bottom, and aesthetic appearance of the carrots. The results from all five units surprisingly varied in all categories. Our only speculation was that thickness and color of silicone play a factor in the absorption or refraction of the microwaves. Not all units sealed tightly and one had vent hole in the lid, which may have played a factor in the variation.

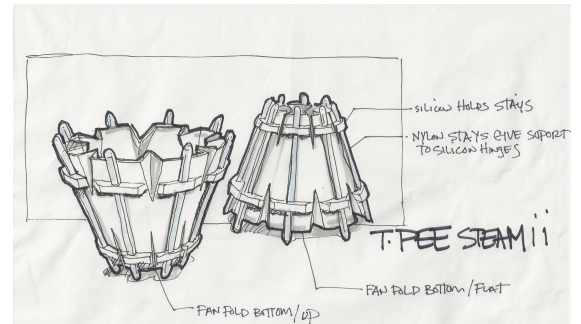
While testing I also started sketching and modeling a concept to address the changes that were suggested by the team. Ideas focused on the lid, form and silicone action.

The big break came when a second round of experimental testing was undertaken. This time we varied the amount of openness in the lid or top of the unit tested. What we found was that letting some steam escape out of the top improved the cooking process in all categories. Our hypothesis: a closed or sealed container traps the steam and actually overcooked and dried out the carrots. Trapped steam cooked the vegetables from the outside in and microwaves cooked from the inside out, causing double cooking and a reduction of moisture remaining in the vegetable. Moving steam cooked less and kept vegetables moist. Vegetables were constantly cooked more accurately and less variation as hot spots in the container were eliminated.

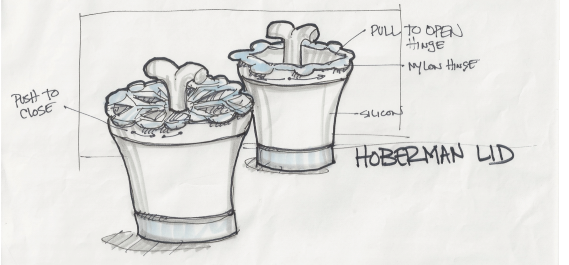
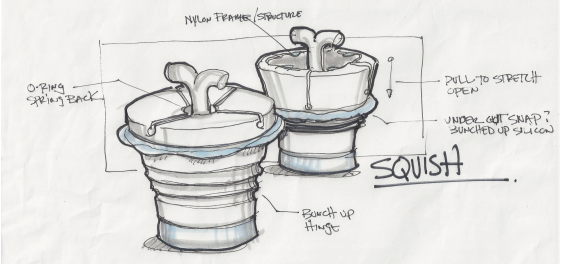
With this knowledge, things started to fall in place. I picked up a concept that I had modeled in foam core resembling a flower. It did not get considered previously as it did not seem practical without a lid, but now we understood it was a viable. What is exciting about this solution is that it captures everything that we set out to do: It has wonderful natural whimsy and magic in the movement in popping open and closed, it got rid of the need of the lid or top, and it simplified the parts and cost. It appears to cook well and it retains the original idea of moving from flowerpot to flower. Perhaps most important is that it still goes from prep to microwave to table to dish washer with one single product.

## Current Status

We just received our first silicone prototype. This is an evaluation prototype to test the engineering and fine tune the interaction before committing to an order of 50 to 100 units. We had prototyped the silicone bowl and inner stem, and we are currently using 3d printed parts for the outer locking ring until we fine tune the shape and inner diameter. We are currently testing the unit and have found several areas to improve.

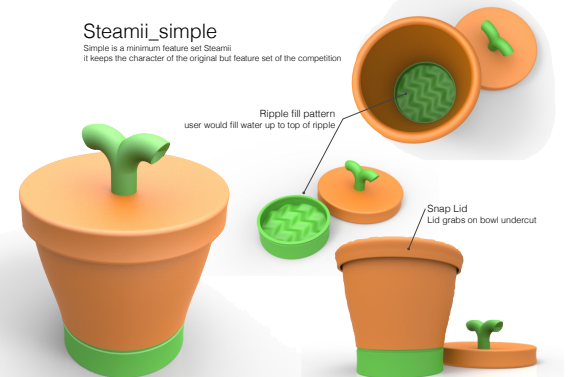


Concept Sketches for Blossom



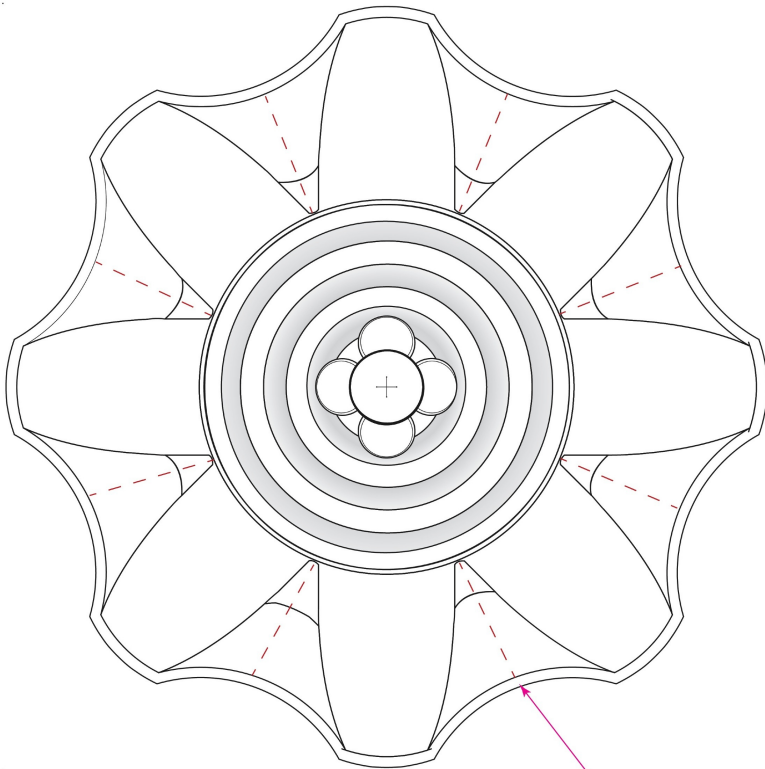
## Steamii\_simple

Simple is a minimum feature set Steamii  
It keeps the character of the original but feature set of the competition

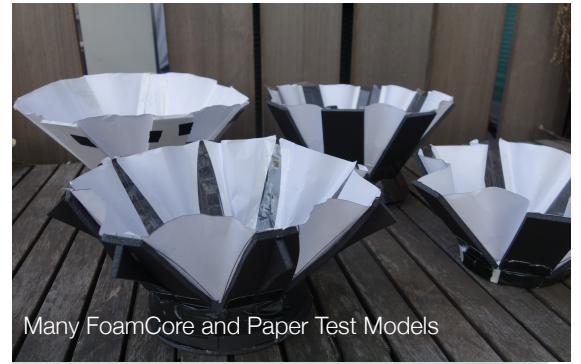
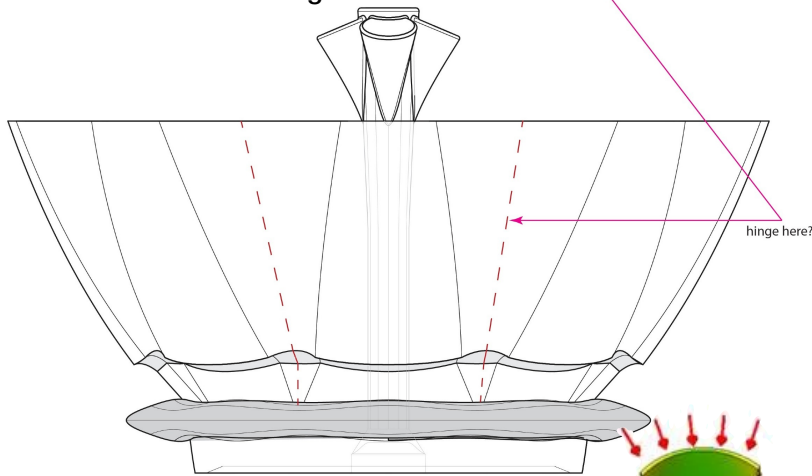


Alias CAD on simple Steamii concept





Communication Drawing



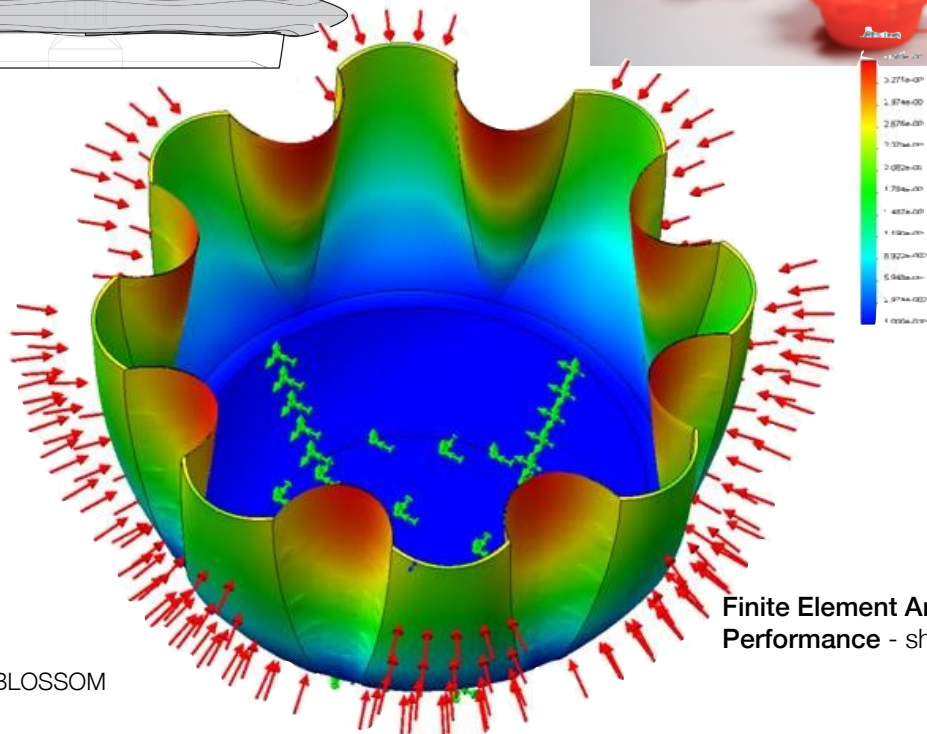
Many FoamCore and Paper Test Models



Early Blossom MakerBot Print



Many 3D print failures



Finite Element Analysis of Silicone Performance - showing it will work



Blossom is a fun and interactive silicone bowl that offers a modern alternative to traditional means of steaming and serving vegetables. It streamlines the process by offering one single tool for both prep and presentation, taking advantage of silicone's flexible properties to allow the user to go from microwave cooking to serving with a simple, playful squeeze. It brings whimsy to a previously mundane process, encouraging a healthier lifestyle based on eating and serving vegetables prepared in a healthy and nutrient-rich way.

### Whats Next

Our remaining timeline is as follows: Release Second round of prototype silicon bowl, stem and locking ring by September 29th

After evaluation: Order final 50-100 working prototype parts by Oct 8th

Start User testing: Oct: 17th

Launch KickStater Campaign: Nov. 1st



# Blossom

