

ICEBERGS

a pool toy system for kids

Design and Development Summary

by Wyanne Tsang



Current pool toys are limited in the play experience they offer the users; most toys focus on supporting the weight of the user in the water. Inner tubes, pool noodles, and ride on top floats fall into this category. Aquatic play habitats also exist but are not reconfigurable, providing few opportunities for creative use. Other toys, such as dive toys and water blasters, have single prescribed uses.

A more engaging and creative aquatic toy or system could inspire kids to swim and play in the water more frequently.

Social activities encourage kids to play and learn together. Having the support of their peers motivates children to try new things and explore their own potential.

Therefore, there is also an opportunity to create a social experience for youth in the water that will encourage them to be creative and play while building confidence in the water.



< noodle \$0.99



^ inflatable lounge with water gun \$54.99



< dive rings \$12.75

< blaster board \$33.49



^ inflatable serpent \$28.99



^ inflatable rocker \$79.99



^ cube habitat \$89.99



> inflatable boat house \$99.99

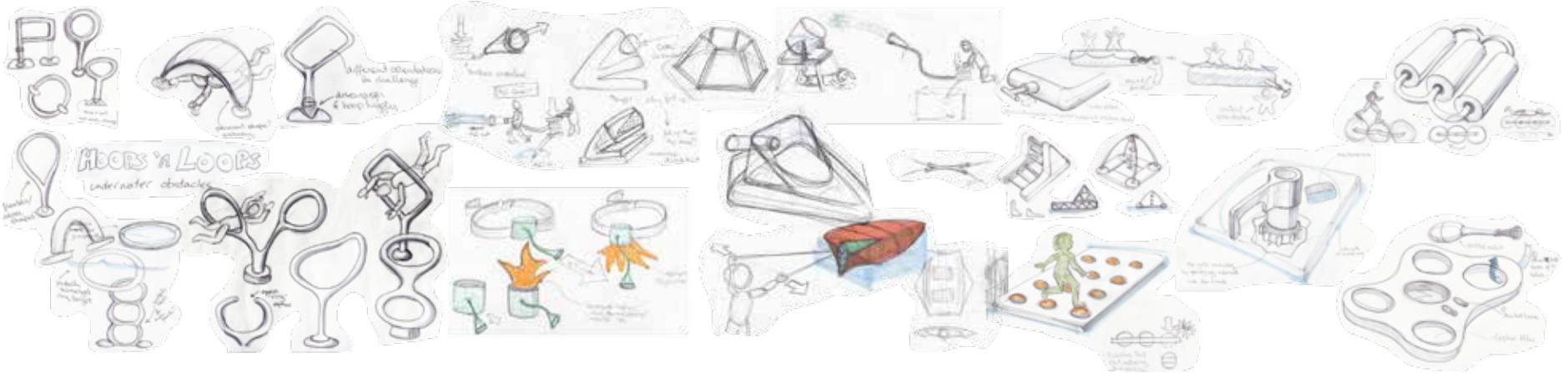
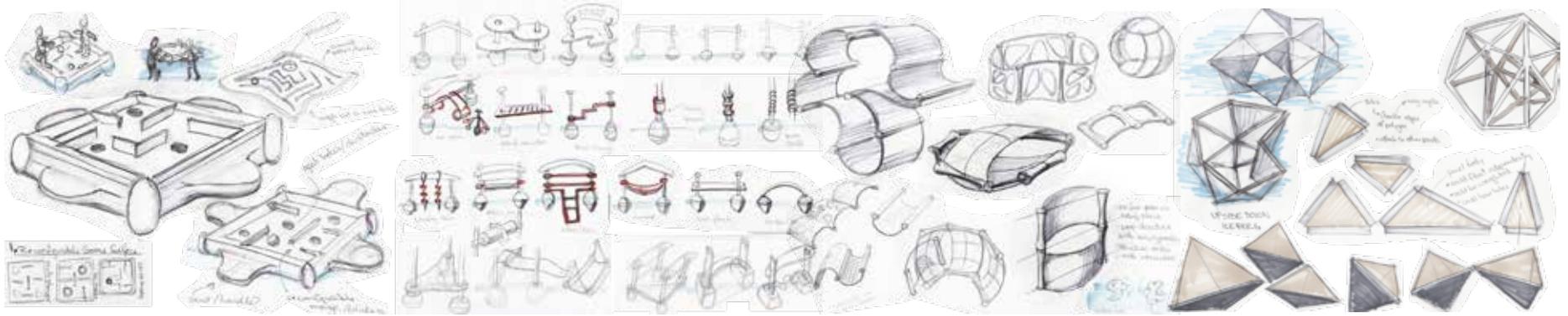


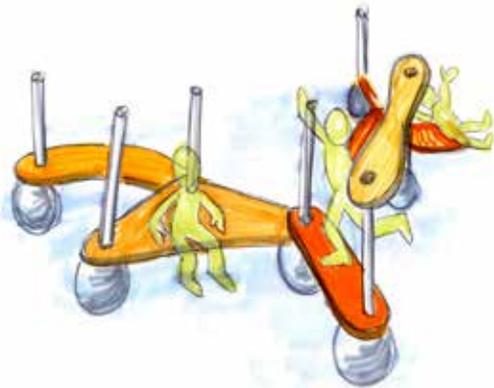
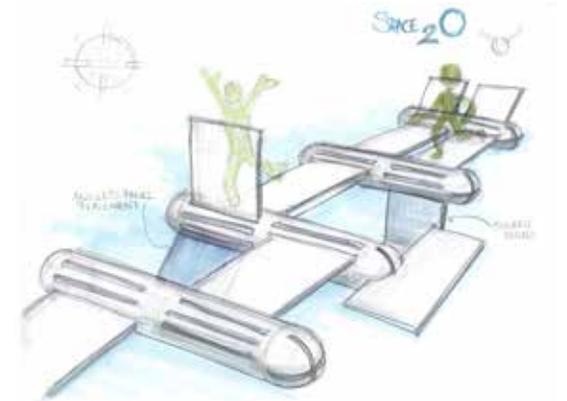
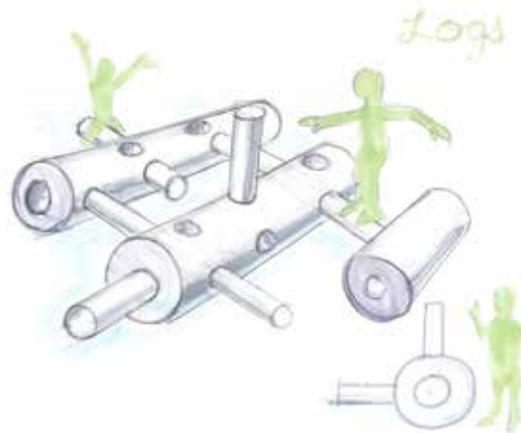
Problem Statement and Project Goals

Get kids excited about swimming and playing in the water through an engaging play experience.

Share the experience with their friends through competition and collaboration.

Express their creativity in the aquatic environment.





The observational research session with the group of school children was useful to understand the inner workings of their minds.

Their fascination with forts and booby traps revealed their **desire to 'win'** against their friends. Winning gains them **respect** and **power** which they will also try to maintain.

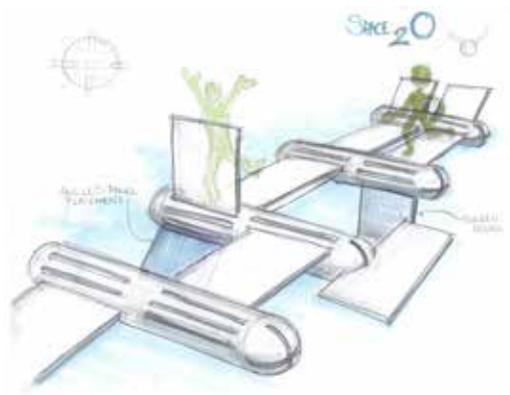
The variety in creations shows their **imagination**s at work, especially when coupled with the **running narrative** that they provided.





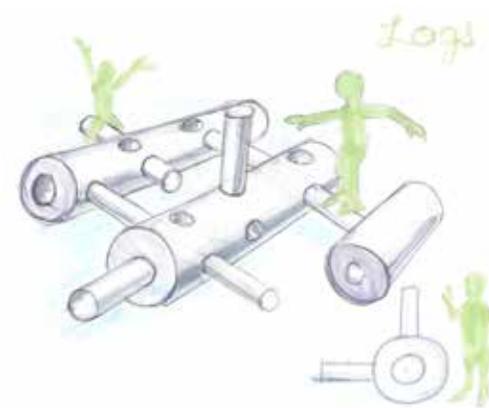
"I like all the angles and it looks like you get lots of different options and how they can stack" - Karith

"Storage is a concern but if they click together, that'd be great and easy." -Mary



"This is one of my favorites. The kids would have so much fun chasing each other" - Mary

"Aligning things is an older kid skill so finding a way to have young kids involved would be better." - Edie



"Just looks super fun to rearrange and do crazy balance games and knock each other off" - Mary

"If there were ridges to secure pieces in, I would feel better with the kids climbing over it" - Edie



Mock Up Construction

Three kids (George, Sun Woo, and Gillian) helped to test out the Iceberg concept and Space Logs.

They played well with the pieces for Space Logs after some experimentation. Vehicles for personal flotation and transport were the main creations. Attempts at creating rafts to stand on were met with mixed success. The noodles were not rigid enough to prevent bowing when supporting someone.

The scale and number of pieces might have limited options but the ability for the interchangeable pieces was enjoyed by the kids.

They also attached pool blasters (belonging to the host) into the pool noodle logs, effectively creating the turrets concept on their own. There seemed to be a preference for a square space as opposed to a linear expansion.

The iceberg pieces were briefly played with by Sun Woo and George. They tried to sit on the smaller blocks and used them to float on their backs. The small icebergs also became cargo for their transportation rafts as they played.



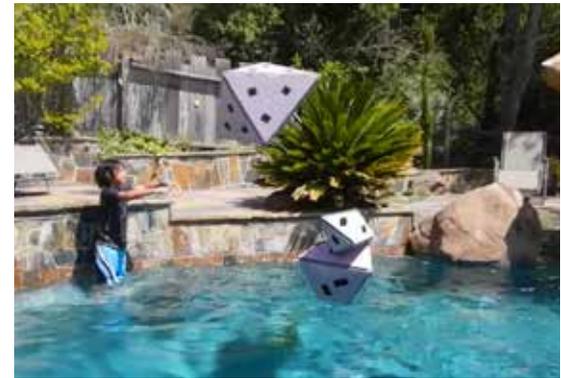
A second pool testing day was held with improvements to the mock ups.

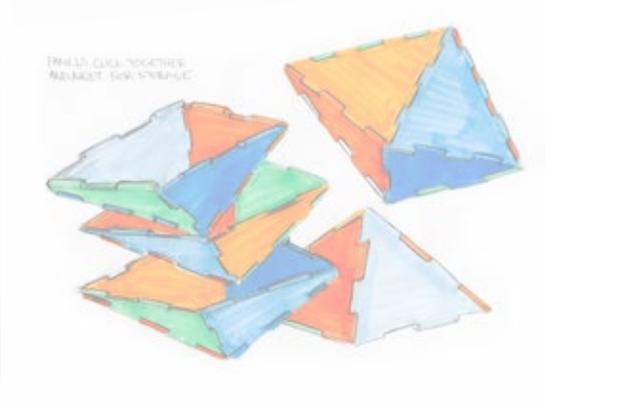
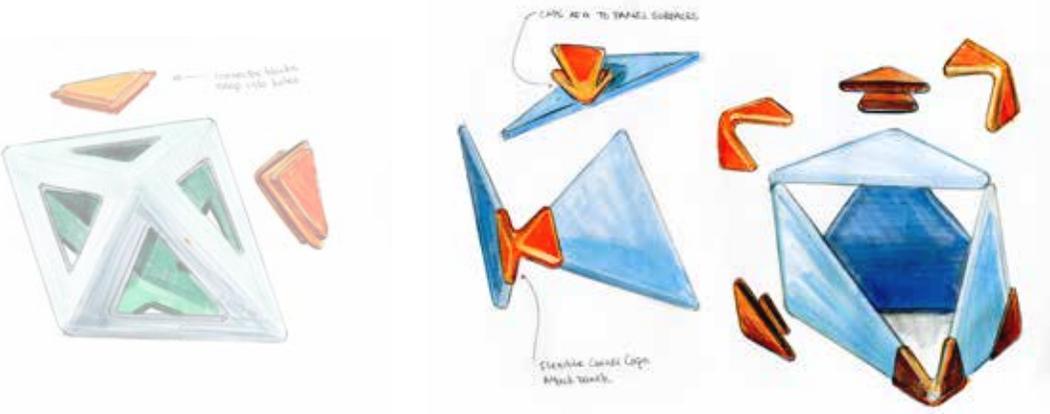
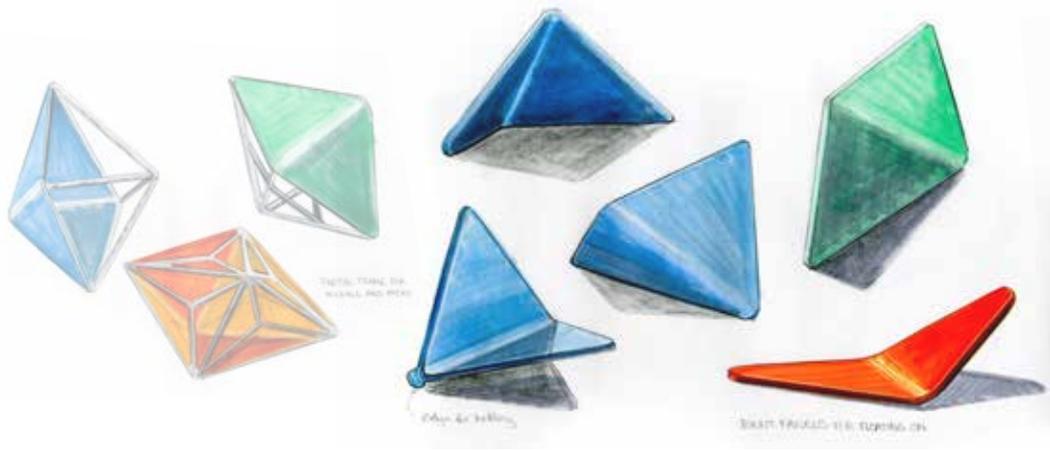
The kids were still intrigued by the concept and the form but the pieces were not portraying the same potential as the drawing. This time, I brought more pieces with varying properties: some pieces were foam-filled, some were hollow with holes (this let the pieces fill with water and sink a bit then drain water when picked up), and one of the big icebergs was also weighted (to change the tumbling behavior). They all had velcro on the planes so that pieces could be arbitrarily attached. I hoped that the different icebergs would make for a better play experience.

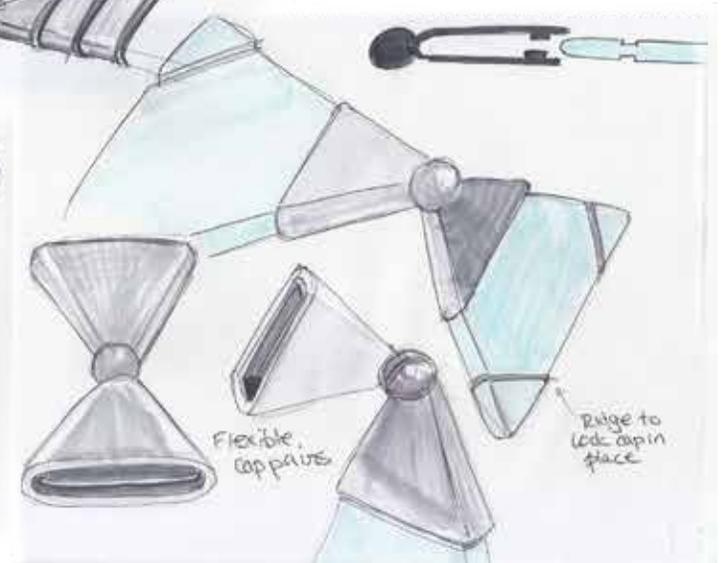
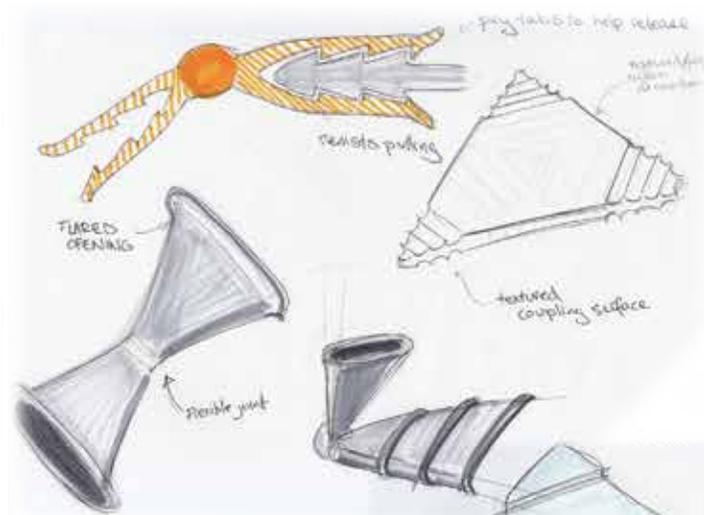
The new pieces and development proved to be successful.

First, the boys explored the behavior of the pieces in the water by chasing, tossing, catching, tumbling the icebergs. They each had their own preference for specific properties; the one with the drain hole was particularly amusing because it would be partially submerged then sprayed them when they pulled it out.

After the preliminary exploration with the pieces, they tried building things and then tried to climb on top of them, with varying degrees of success. Along the way, they also decided to challenge each other to a balancing competition of sitting on and keeping the small icebergs submerged.







After the interim design was determined, another testing session was held to gauge the response to the addition of panels and removal of some of the bigger solids.

The panels were based on the plane size of the large solids and made of the same material. Holes were created along the edges and rope was provided as a method of attachment.

The new method of connecting the panels provided a new way to interact with the parts. The desire to be on top of the panels (treated like a raft) was apparent.

The parents liked that the panels were less abstract and easier for the kids to relate to in building. The planes provided an obvious starting point for some of their explorations with the parts. Broken pieces were also repurposed into hand paddles and decorations for their assemblies.

SunWoo was also able to create a lounge with a sun shade. Jordan created a structure that he declared was a submarine. Jeorge used the smaller panels as paddles for his hands. The boys also created “tanks” and charged at one another.



Based on the feedback and play observations from the panel and solid combination testing, changes were made to the parts.

The moms were impressed at the progress and how much the parts had developed. They really appreciated the ease of storage and transport of the new set of parts.

Connectors were mocked up with a variety of plumbing fittings to achieve different angles. The ends fit the grid of holes in the panels provided.

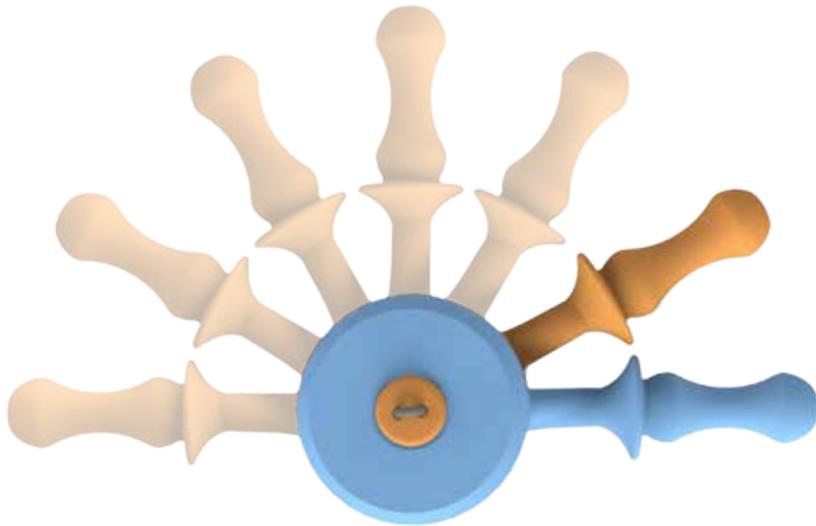
The panels were thickened for strength and additional flotation. This was tested by the children as they tried to sink the pieces as well as stand and balance on them.

The connectors intrigued the boys but they wanted a different distribution of the angles provided. Straight connectors (180 degrees) were in higher demand than the 60 and 120 degrees connectors. The fixed angles were inconvenient even if they offer better strength.

The connector also needed to be refined to fit more snugly in the holes.







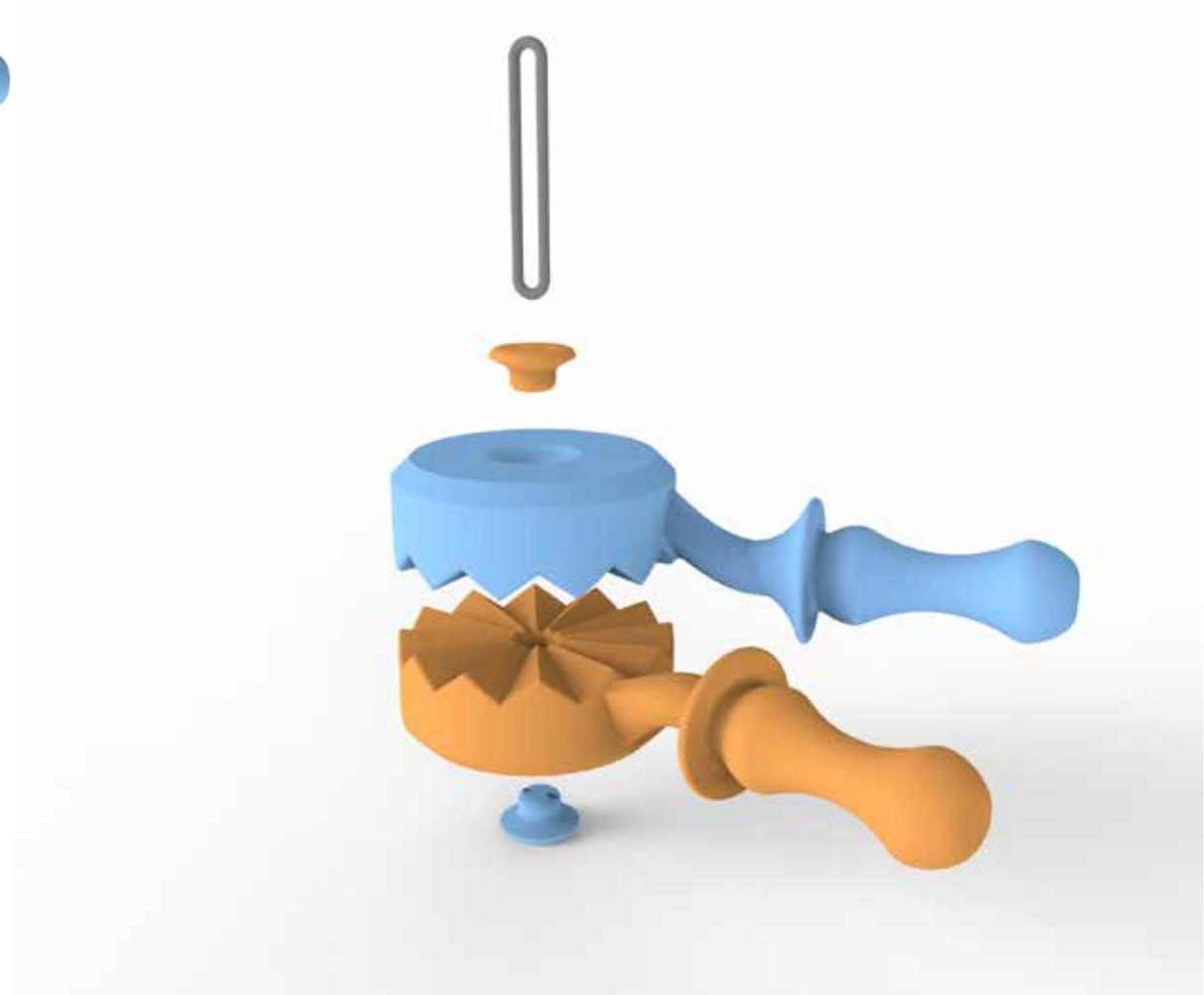
The connector is the key to the modularity of Icebergs.

Designed for easy, on-the-go adjusting, a polyurethane elastic compresses the parts together when the teeth of the hub interlock. The hubs allows the parts to self-align at specific angles as well as provide support at those angles.

Made from rotationally molded polyethylene, the two halves of the connector are identical. Therefore, they can be manufactured from the same mold which saves on tooling costs for the part.

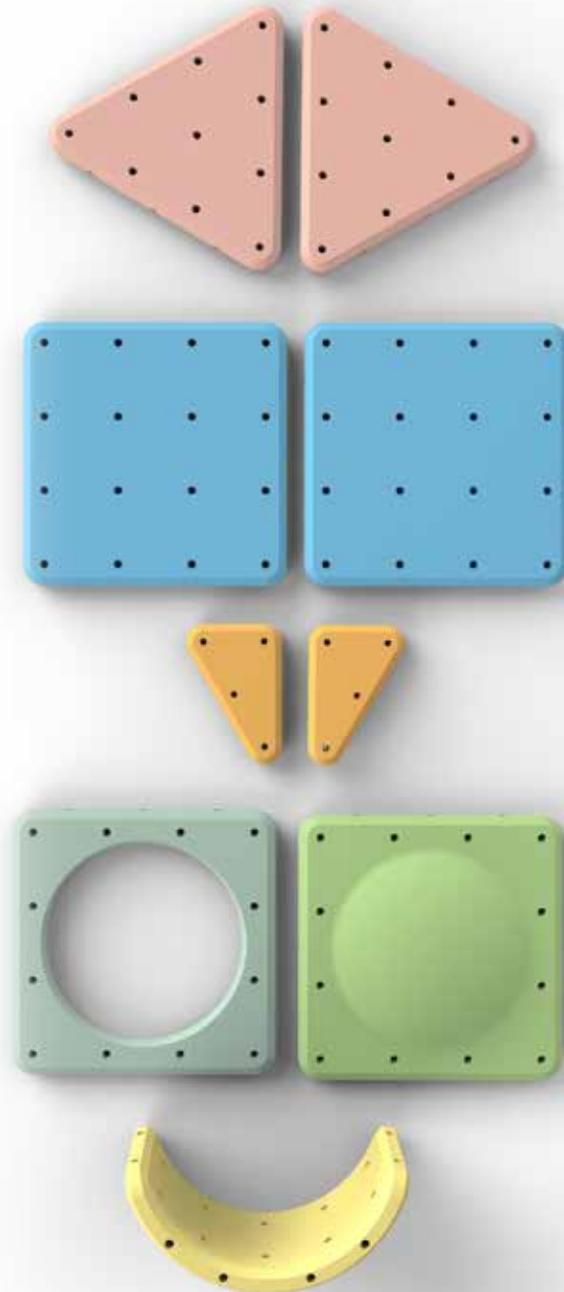
Polyethylene plastic was chosen for its relatively low cost, UV stability, and good strength to weight ratio. It also comes in a variety of colors.

Rotational molding is the ideal method of manufacturing the connector. The tooling costs are kept low because high pressure resistance is not required of the mold. The cavity created by the molding process will also provide buoyancy for the connector.



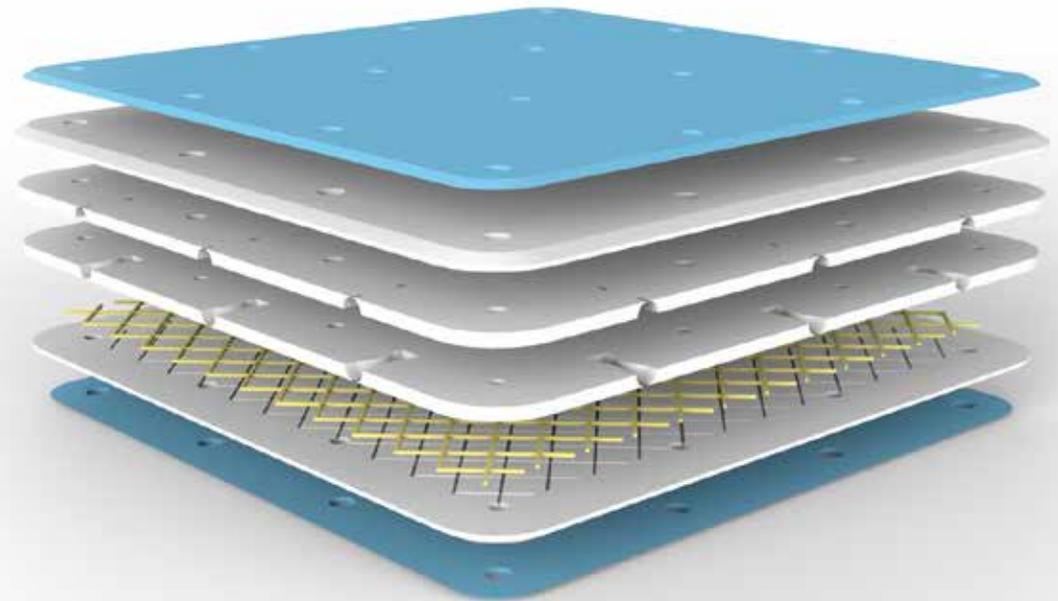
Polyethylene foam was chosen as the material for the panels because it has many favourable properties for the pool environment:

- Excellent buoyancy
- Closed cell foam
- Very lightweight
- Easy to fabricate
- Impervious to mildew, mold, rot, and bacteria
- Water resistant as well as resistant to solvents and grease, including chlorine.
- High resistance to tearing based on strength
- UV stability is appropriate for extended outdoor use
- Wide range of colors available
- Environmentally friendly by being CFC free



Fabrication of the panels was inspired by that of entry level boogie boards.

1. Notches will be cut out of the central layers of PE foam.
2. The layers are fused together with heat, along with a reinforcing mesh to provide additional strength and rigidity to the panels.
3. Details such as the chamfer will be cut away.
4. The outer skin, also PE foam, will wrap the layered block in a denser foam to protect and provide a different external finish to the panel.
5. Through holes are cut into the block with the curved hole profile.
6. Branding elements can be molded in with heated dies to finish the panel.



By using the same peg profile used in the connectors, a series of decorative accessories can be created to fit snugly into the holes of the panels.

These accent pieces have high imaginative potential; from being handles and steering wheels to facial features that can transform the panels into sea creatures.

These parts would be rotationally molded, similar to the connector.

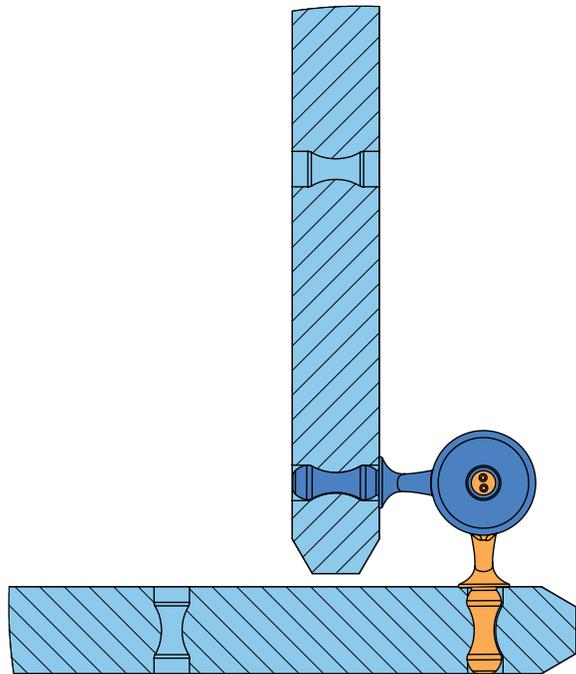
This also provides a cost effective way to expand the product line in the future.



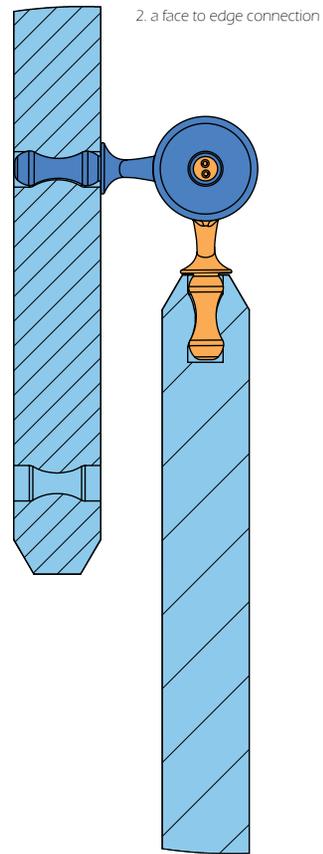
There are three ways to connect panels:

1. Face to Face
2. Face to Edge
3. Edge to Edge

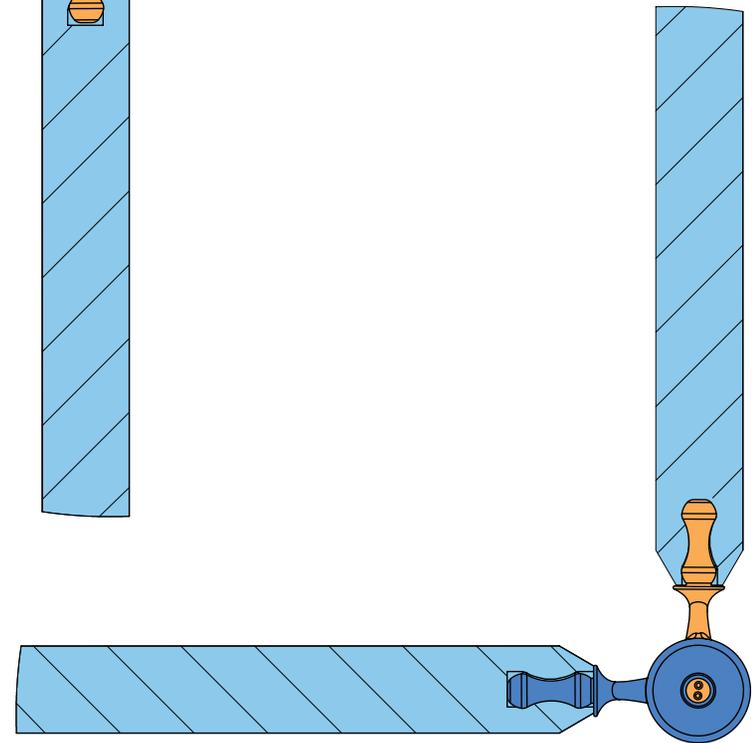
As seen from the cross sections, the interior profile of the holes match the curve of the peg to snugly hold the connectors in place laterally while allowing for rotation around the axis of the peg.



1. a face to face connection



2. a face to edge connection



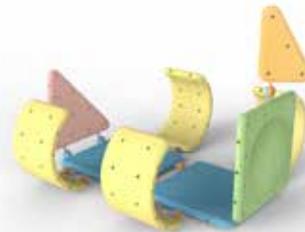
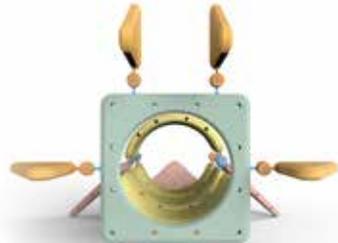
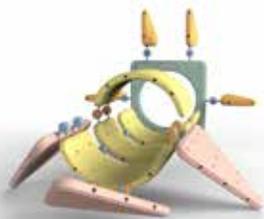
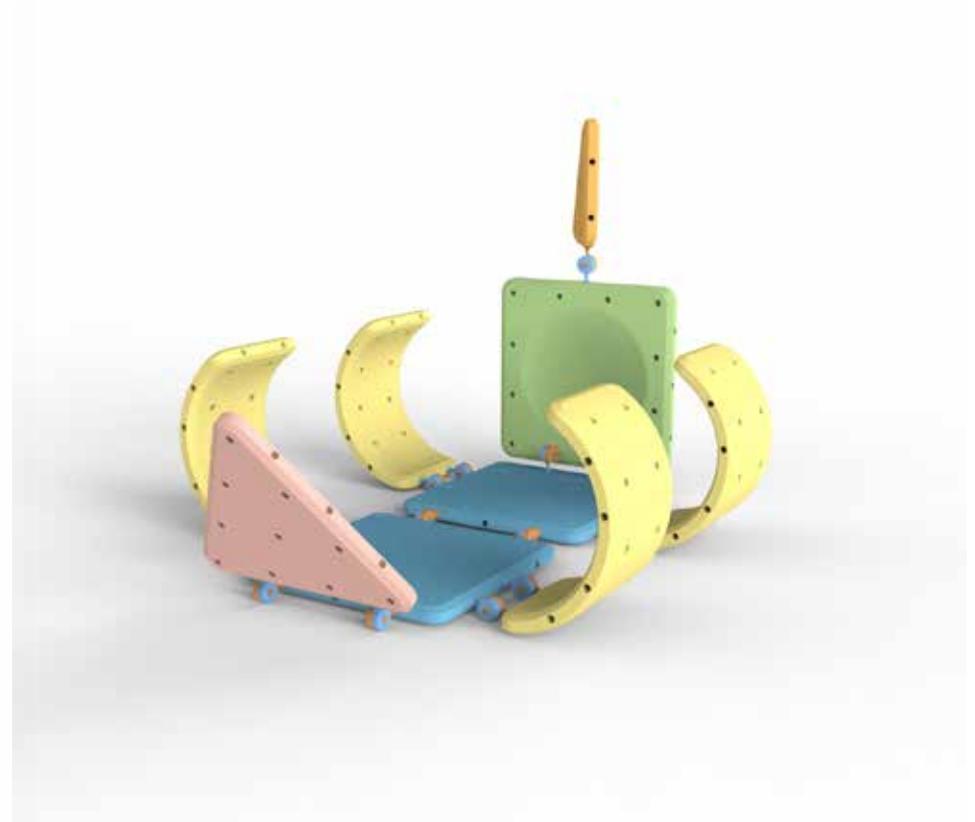
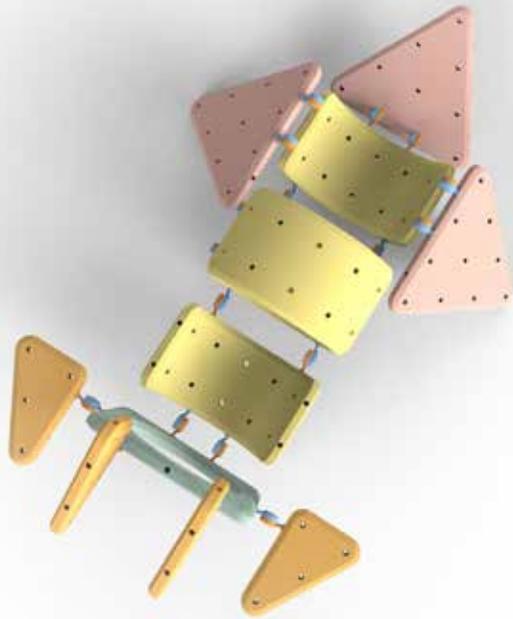
3. an edge to edge connection

While there are infinite possibilities with Icebergs, sample constructions could be provided as a source of inspiration for the aquatic builders.

From basic boxes to a floating house.



Swimmers can unleash their inner explorer with rocketships and boats.



They can challenge their friends with custom obstacle courses or just hang out on an island.

