Cradle to Cradle Product Design Challenge
Designing for the Circular Economy
in partnership with AutoDesk.

1.1 Contact Information

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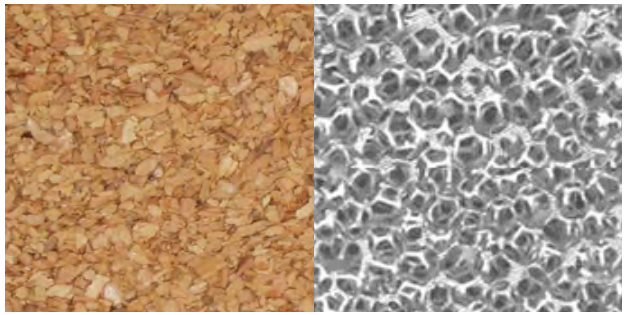
1.2 Submitting Category

Professional-Designed using AutoDesk Fusion 360

2.1 Product Title and Description

BikeShare Helmet.
A simple unisex style bike helmet designed specifically to integrate with the growing bike share community. The BikeShare Helmet uses a recycled aluminum foam shell and a sustainably grown FSC certified cork liner to provide maximum protection with minimal bulk and weight while ensuring all materials are either recycled or composted. Designed as a Product Service System the helmet can be purchased as a recommended upgrade to existing annual bike share memberships.



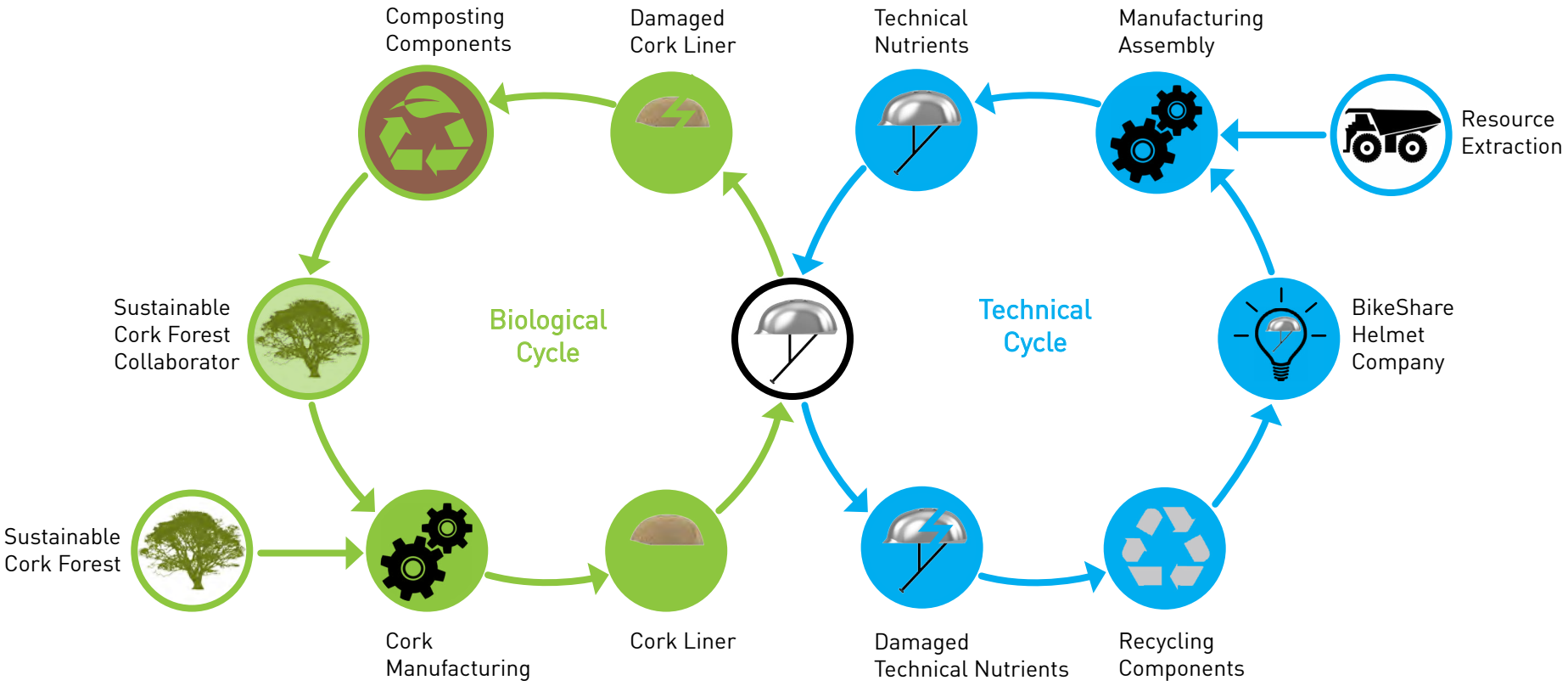
2.2 BikeShare Helmet

BikeShare Helmet Cross Section

Recycled Aluminum Foam Shell

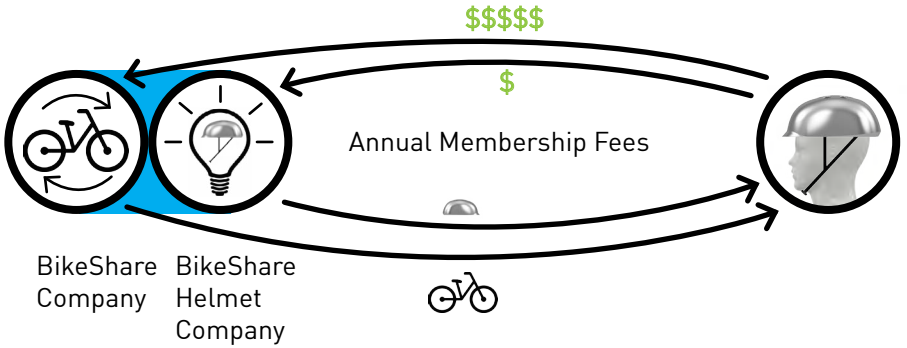
Compostable Cork Liner

2.3 BikeShare Helmet System



3. Reutilization Cycle and Business Model

BikeShare Helmet is purchased as a recommended upgrade to existing Bike Share memberships. Unlike the bikes used in the bike share systems which are returned to a docking station, the BikeShare Helmets are designed to be small, lightweight and portable so they can be kept with the member. Participants would renew their annual memberships and have the option to exchange their helmet for a reconditioned helmet.



Partnership with existing BikeShare Companies

4. Material Selection

4.1 Overview

Aluminum Foam has been in development since the middle of the 20th century but has only recently been incorporated into mass-produced public items. The ability to absorb a tremendous amount of impact energy makes it an ideal material for a bike helmet when manufactured with a surface skin. Cork is produced by removing the bark from the tree and leaving the tree healthy for regrowth. When sourced from a Forest Stewardship Council supplier, sustainably grown cork provides additional cushion and is inherently antimicrobial and antibacterial.

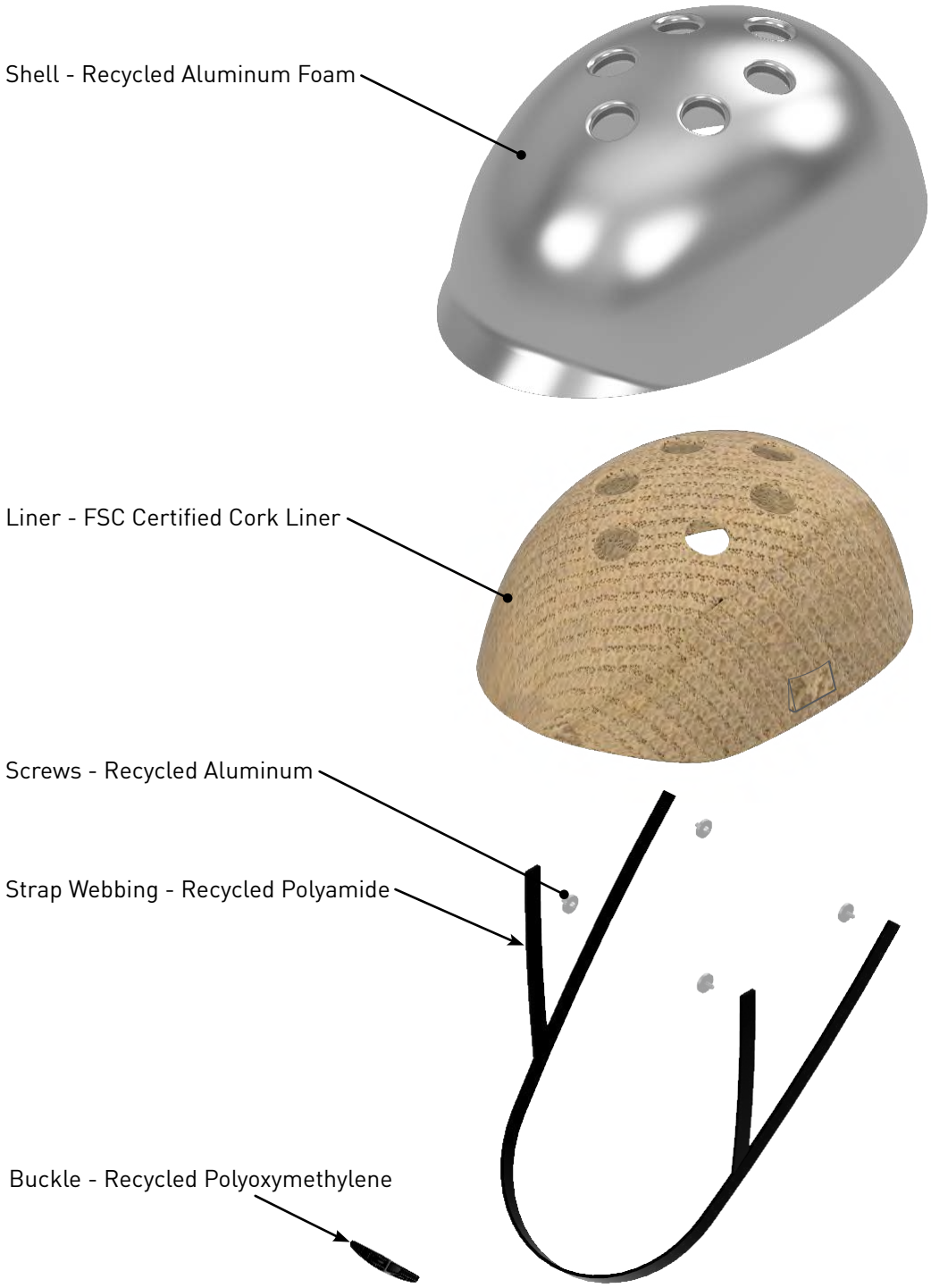
4.2 Material Reutilization

Recycled/Rapidly Renewably sourced = 100%
\+ Recycled/Compostable end of life = 100% x 2
= 300%, ÷3
= 100%

The 100% score is achieved primarily through the use of aluminum and cork. Aluminum already has a strong recycling infrastructure and cork is easily composted. Remaining screws, straps and buckle can come from recycled materials and be recycled as the BikeShare Helmet would be sold through a Product Service System (PSS). The manufacturer in a PSS has an incentive to reclaim all materials in order to produce future products with the identical composition.

4.3 Material Health

All of the materials listed above are biologically inert. Note: glue is not necessary to secure the cork liner within the aluminum foam shell because of the mechanical flanges designed into the sides of the cork liner. The liner therefore has a mechanical attachment and "snaps" into the shell.



5. Designed with Autodesk's Fusion 360

After a clay form study model was sculpted I used the Fusion 360 program to model the entire helmet.

I have been using and teaching SolidWorks and Rhino for over 15 years so I could have modeled the helmet in those programs but I wanted to continue to learn this new software in order to compare and contrast it with competitive approaches. The entire helmet was modeled using parametric modeling in the Model environment allowing for the continuous revisions I have become accustomed to while CAD modeling with a true history tree.

I particularly like how I was able to sculpt the rear detail of the helmet to match and then improve on my clay form study.

The collaborative tools I found incredibly helpful in sharing the forms and allowing me to review the design at my convenience. These tools would be a tremendous asset to any design team.

I look forward to continuing to use Fusion 360 and will be teaching it to future product designers next year.