



PD21971

# Designing for the Circular Economy with Fusion 360

Barent Roth

The New School-Parsons / [www.BarentRoth.com](http://www.BarentRoth.com)

## Learning Objectives

1. Understand the Principles of a Circular Economy
2. Share specific Circular Economy case studies
3. Follow Circular Economy principles using Fusion 360
4. Inspire others regarding Circular Economy benefits

## Description

Products have been designed as if resources are unlimited. The take, make, waste approach has valuable materials, erroneously called waste, landfilled. We need to design products so that these resources loop back into a material cycle. This closed loop approach recognizes natural limits and values materials through the end of their first product life and instead designs products for a Circular Economy. This session will contextualize the crisis our current system has created, then share case studies that illustrate both environmental and economic advantages gained by businesses with cyclical material flows. The session will conclude with a first hand account inside the Circular Economy design process, as the winner of the 2016 Cradle to Cradle Product Design Challenge for Best Professional Product shares insights into how he used AutoDesk's Fusion 360 software to develop his award winning BikeShare Helmet.

## Your AU Expert(s)

Barent is a designer and educator dedicated to creating sustainable products, practices, and services. An educator at heart, he has taught at both of his Alma Maters, the University of Illinois where he received his BFA in industrial design, and the University of the Arts where he graduated with honors for his Master's degree focusing on Sustainable Design. Co-founder of the award winning sustainable to restorative design firm grow-design, and the creator of the LA Green Drinks network, Barent started teaching a Green Living Workshop with Sustainable Works and eventually rose to Executive Director of the organization. He now teaches courses on sustainability and/or design at The New School-Parsons in New York City while designing sustainable solutions and constantly trying to improve his Ecological Footprint (currently 1.34 planets). Barent used Fusion 360 to design a BikeShare Helmet that won the 2016 Cradle to Cradle Product Design Challenge for Best Professional Project.



## **Principles of a Circular Economy**

The Circular Economy has successfully provided an umbrella term for our urgent need to transition to a more sustainable society. By incorporating the design strategies of Cradle to Cradle, Natural Capitalism, Biomimicry, and other innovative whole systems thinking approaches the Circular Economy aims to create closed loop cycles of materials that continuously recapture the embodied energy and resources for a return to future products.

## **Design Away Waste**

As much as it helps reduce waste and the end of the materials stream, it is more important to design out waste upstream at the beginning of the objects very inception. We should strive to “Eliminate the Concept of Waste” as Cradle to Cradle co author William McDonough has stated. Cradle to Cradle design advocates for designing all products so that they can separated into either Biological Cycles for compost into soil or Technical Cycles for true recycling back into products.

## **Product Service Systems**

Selling the service the object provides, rather than the object itself, successfully incentives manufacturers to design objects that are longer lasting, repairable, upgradable and designed for disassembly. Shifting the system in this way increases customer relationships and creates an established path for the component materials to return back to the manufacturer for easy refurbishment and reassembly.

## **Biomimicry**

Learning from Nature’s 3.8 billion years of evolution has proved to be valuable design inspiration. In Nature there is no waste, as John Todd stated, in Nature “Waste Equals Food”. One organisms waste is always food for other organisms. We need to design our industries with this same system condition.

## **Renewable Energy**

Greening our electrical grid with renewable forms of energy such as solar, wind, geothermal, or tidal power, as quickly as we can, will be essential in our efforts to escape the catastrophic effects of climate change. Only renewable forms of energy where we can safely account for all the waste streams and green house gas emissions fit within a Circular Economy approach. “Externalities” of our current system, such as increase in carbon emissions, toxic waste, pollution of ecosystems, contamination of soils are now instead included, reduced and progressively eliminated in a Circular Economy transition.



## Circular Economy Case Studies

Innovative Companies have been employing Circular Economy strategies long before the term became widely used. The following case studies range from existing, proven solutions from large companies to developing, contemporary, experimental start ups.

### Caterpillar

Remanufacturing Components since 1973

<http://www.caterpillar.com/en/company/sustainability/remanufacturing.html>

### FairPhone

Social enterprise company which aims to develop smartphones that are designed and produced with minimal harm to people and the planet.

[www.fairphone.com/en](http://www.fairphone.com/en)

### Net-Works

An innovative business that empowers people in coastal communities in the developing world to collect and sell discarded nylon fishing nets, thereby removing these nets from the ocean where they wreak havoc with marine life. The nets are then sold into a global supply chain and recycled into yarn to make carpet tile.

[www.net-works.com](http://www.net-works.com)

### Citibike

Bike Share System in New York City

<https://www.citibikenyc.com/>

### BikeShare Helmet

Unisex helmet designed specifically for bike share community

<http://www.barentroth.com/#/bikeshare-helmet/>

### Isla Bikes

Imagine Bikes sells the service of child's bike

<http://www.islabikes.com/info-hub/imagine-project/>

### Sono Motors

Self Charging Solar Powered Electric Car

<https://www.fastcoexist.com/3063594/this-solar-car-charges-itself-while-its-parked-on-the-street>



## Additional Case Studies

### Phillips

Selling Light as a Service

<https://www.ellenmacarthurfoundation.org/case-studies/selling-light-as-a-service>

### Rype Office

Circular Economy options for Office Contract Furniture

<http://www.rypeoffice.com>

### Google

Recycled Glass in Concrete

<https://www.ellenmacarthurfoundation.org/case-studies/the-circular-economy-and-the-promise-of-glass-in-concrete>

## Additional Resources

### St Matthew Island

Ecology Example of running a Linear Economy in a Finite World

[https://en.wikipedia.org/wiki/St.\\_Matthew\\_Island](https://en.wikipedia.org/wiki/St._Matthew_Island)

### Climate Central

Science and News Non Profit Organization

[www.climatecentral.org](http://www.climatecentral.org)

### Ellen MacArthur Foundation

Foundations Mission is to Accelerate the Transition to a Circular Economy

[www.ellenmacarthurfoundation.org](http://www.ellenmacarthurfoundation.org)

### 5 Gyres

Non Profit Organization empowering action against the global health crisis of plastic pollution through science, art, education, and adventure.

[www.5gyres.org](http://www.5gyres.org)

## Textbooks

[Cradle to Cradle](#)

[Natural Capitalism](#)

[Biomimicry](#)

[Products That Last](#)