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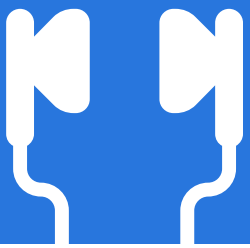
DESIGN FOR SUSTAINABILITY
VISUAL REPORT

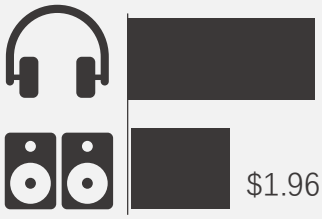
ASSIGNMENT 3

CHOSEN PRODUCT AREA:
AUDIO PRODUCTS

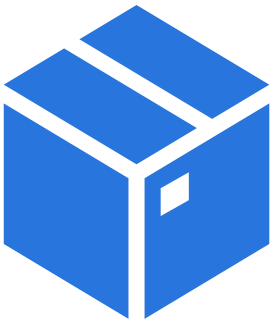
Speakers and headphones are amongst the most popular consumer products of today, yet the majority are designed unsustainability, contributing to the growing e-waste crisis.



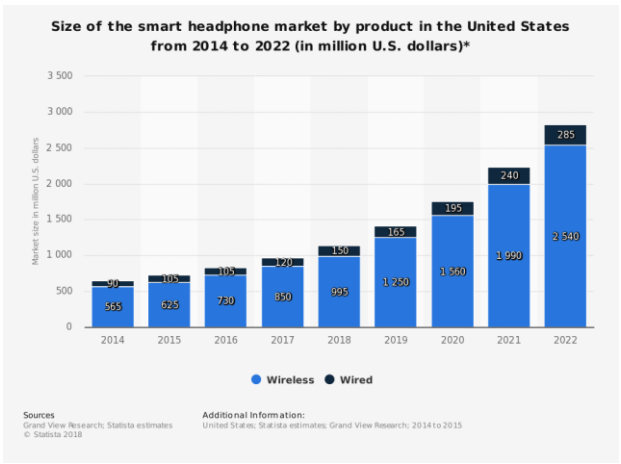
FACTS AND FIGURES



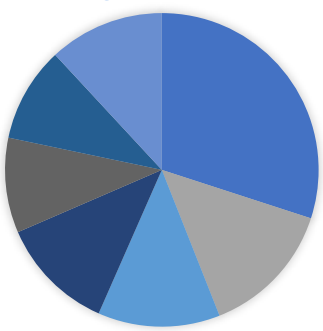
Total U.S. Revenue of the Headphone and Bluetooth Speaker sectors in 2018.
(Statista, 2013)



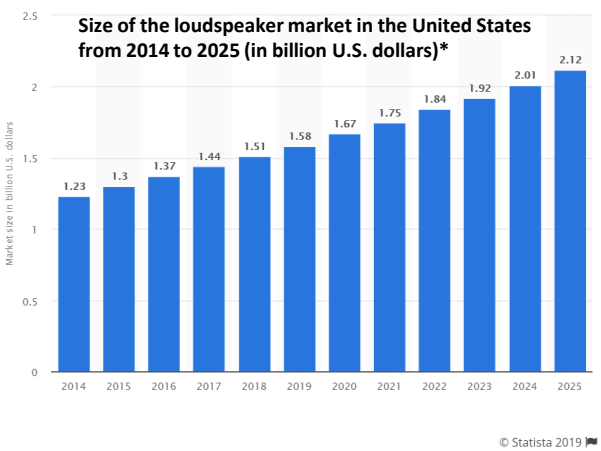
In 2016, there was **86.7 million tons of packaging waste** in the EU. (Europa.eu, 2019)



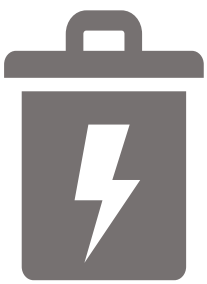
BIGGEST HEAPHONES BRANDS



- Sony
- Bose
- Beats by Dr. Dre
- Skullcandy
- Pansonic
- Philips



Electronic waste, or e-waste, is the fastest-growing solid waste stream, with **between 20 and 50 million tons of electronic devices being disposed of worldwide each year,** according to Electronics Recyclers International (ERI) . (LeBlanc, 2014)



CASE STUDY: APPLE AIRPODS

Released in December 2016, the Apple AirPods are one of today's most popular audio products . Analysts estimate AirPods make up 60% of the global wireless headphone market, and yet this product has been hugely criticized for its shamefully unsustainable design. Apple has become the first American company to reach a networth of US$1 trillion, making it one of the biggest influencers and leaders of the consumer market. Given this immense power, there is certainly an onus on them to establish positive change.

Lifecycle – Apple are known for the planned obsolescence of their products, and the AirPods are no exception. The Bluetooth earphones' small batteries have a 1 Year Warranty but only last a few years at most, with some users reporting that they stopped working only 18 months after purchase (Washington Post, 2019)
. The temporality of these products encourages an incredibly detrimental consumer mentality.

Materials – AirPods are made up of the following raw materials: Neodymium magnet, electrolysis copper, paper, wool, felt, aluminum coil, ABS plastic, Silicone plastic, nickel plated jack and ABS+ paper foam packaging (Design Life-Cycle, 2014). While some of these materials may be recyclable, the shear variety of materials alone increases emissions and waste at the extraction, manufacturing and waste levels.

Disassembly and Repair– As can be seen in the IFIXIT teardown below, the AirPods were not designed to be disassembled, making them virtually impossible to repair or properly recycle. Should one of the components fail, the entire Pod must be replaced.

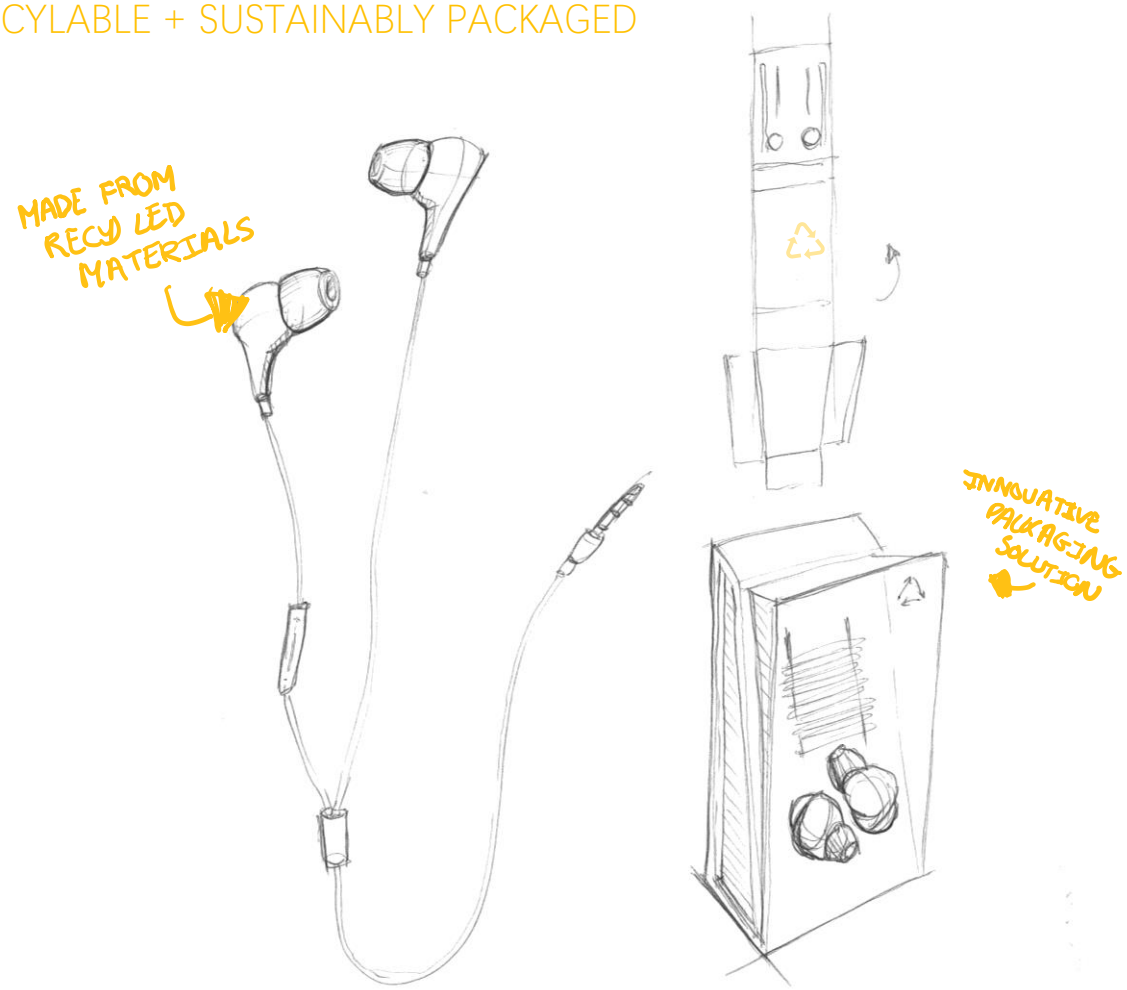
Cost – The regular AirPods (with Charging Case) currently cost €179.00 in Ireland, while the AirPod Pros cost €279.00. The cost of replacing any of the 3 components of the AirPod Pro (both earbuds and the charging pod) is €99.00.

Recycling Program – While many AirPods undoubtedly end up in landfill, Apple have introduced a recycling program allowing the user to return the faulty product free of charge to be recycled (Apple, 2019).

IFIXIT TEARDOWN
(ifixit, 2016)

RE-DESIGN A

RECYLABLE + SUSTAINABLY PACKAGED



DESIGN
The aim of this re-design was to create an accessible and sustainable audio solution with a focus on eco-friendly packaging. This strategy simply uses all recyclable materials to create a pair of standard earphones . These are then sold in innovative cardboard packaging to minimize plastic waste.

MANUFACTURING
The earphones' components are made from repurposed materials (ABS, metal, PVC, silicone and magnets). The efficient packaging is created from a single folded and scored sheet of sturdy cardboard.

USE
This re-design chooses to acknowledge and embrace the short lifecycle of certain products. It achieves this by using a subscription-based business model, ensuring a circular system. Every 8 months the customer is sent a new pair earphones to use.

DISPOSAL
To dispose of their earphones, customers return them (re-using the package that their new earphones were sent in) to the seller who recycles them into new earphones.

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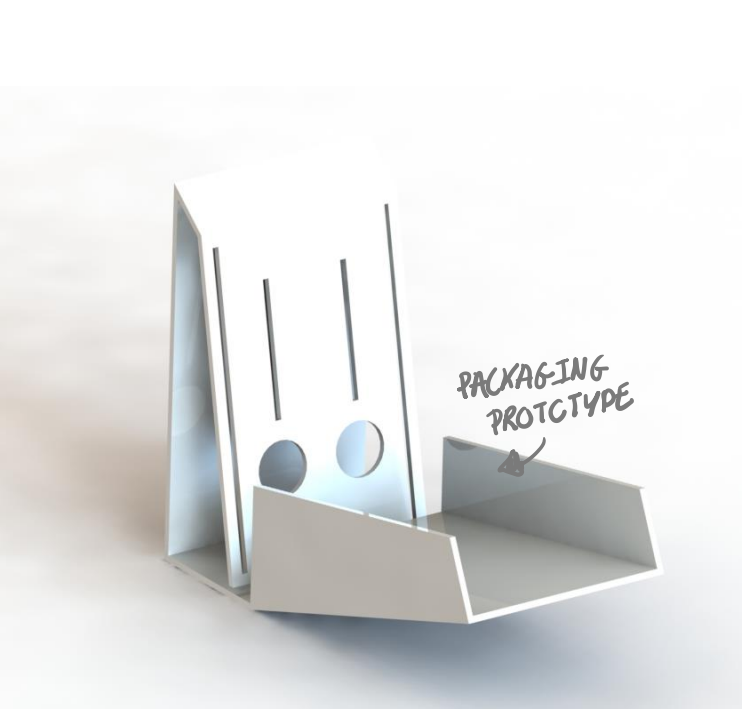
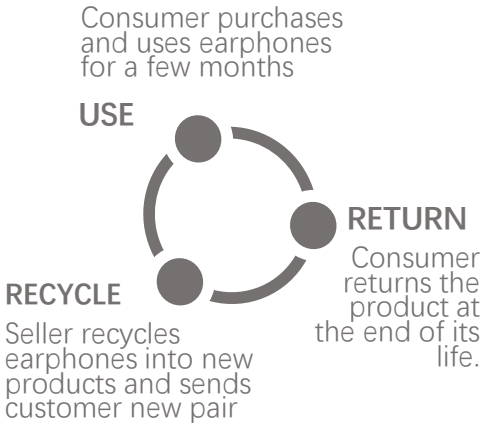
RE-DESIGN A

EASY TO RECYCLE + REUSE



CRADLE-TO-CRADLE SYSTEM



ENVIRONMENT

According to the Center for International Environmental Law, emissions from plastic production and incineration could account to 56 gigatons of carbon between now and 2050. (Npr.org, 2019)

The first step that this circular strategy takes in reducing their carbon footprint is addressing one of the most detrimental byproducts of consumer electronics – packaging waste (Hall, 2018). Most earphones come in a plastic container that uses the same amount of plastic as the earphones themselves. By creating a recyclable cardboard solution using very little material, plastic waste could be reduced in a big way.

The closed loop use-return-recycle system also ensures minimal waste throughout the product's Lifecyle. However, this strategy still relies strongly on plastic-based production, as well as regular shipping between the seller and user which would admittedly increase transport emissions ..

SOCIETY

I think if well implemented, this strategy could shift consumers' current disposal habits in a really beneficial way. By offering a responsible and easy way to dispose of these earphones, customers are far less likely to dump their electronics in a general waste bin that will end up in landfill.

While embracing a sustainable design mindset may come with its challenges, it's also an opportunity for innovation – as can be seen with this re-design's packaging solution.

That being said, this system does involve working with very short product lifecycles which for some users may encourage a throwaway mindset with all their products.

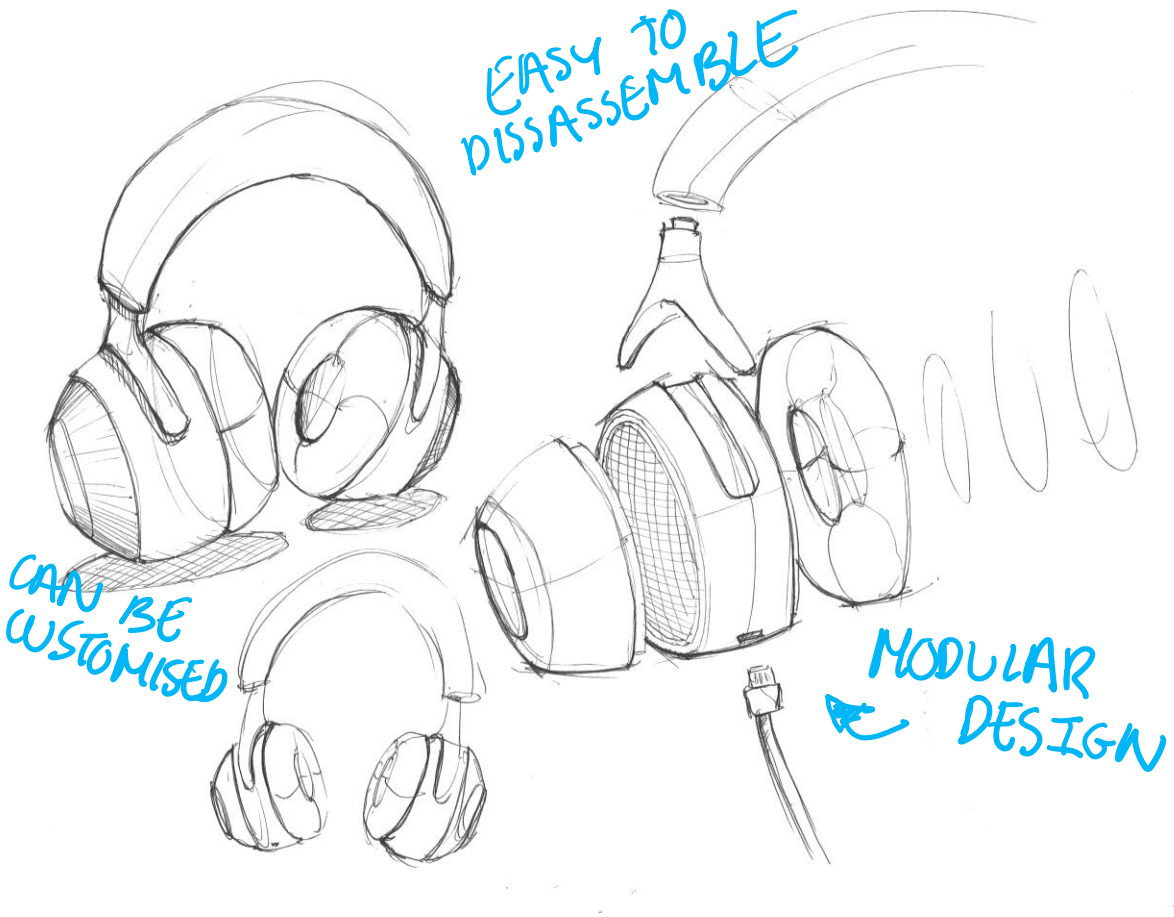
ECONOMY

In terms of how economically equitable this strategy is, running an environmentally conscious business will always make it slightly difficult to compete with less ethical competitors. However, a subscription- based business model does ensure return customers and recurring revenue, while an eco-friendly ethos will give the company a positive public image.

The cost of recycling and using recyclable materials will inevitably increase the cost of production and hence the price of product, however this will be, at least partly, offset by the reduction in raw materials needed overtime and the use of cheaper packaging.

RE-DESIGN B

MODULAR + CUSTOMISABLE



DESIGN
The ingenuity of this second strategy lies in the modular design of this product. Split into 8 modules, these Bluetooth headphones can be easily disassembled by both the manufacturer and the user themselves.

MANUFACTURING
These headphones are made from recyclable materials, with every module outside of the central speaker containing only one raw material for easy recycling.

USE
These headphones are made to last the user through life. As their size and aesthetics evolve, they can order new modules online to swap out their old parts.

DISPOSAL
If a module becomes damaged or worn over time, it can be individually removed and replaced, without having to purchase a new headset. The faulty part can be recycled and the wireless design means that even the standard micro-USB charging cable can be individually replaced if faulty.

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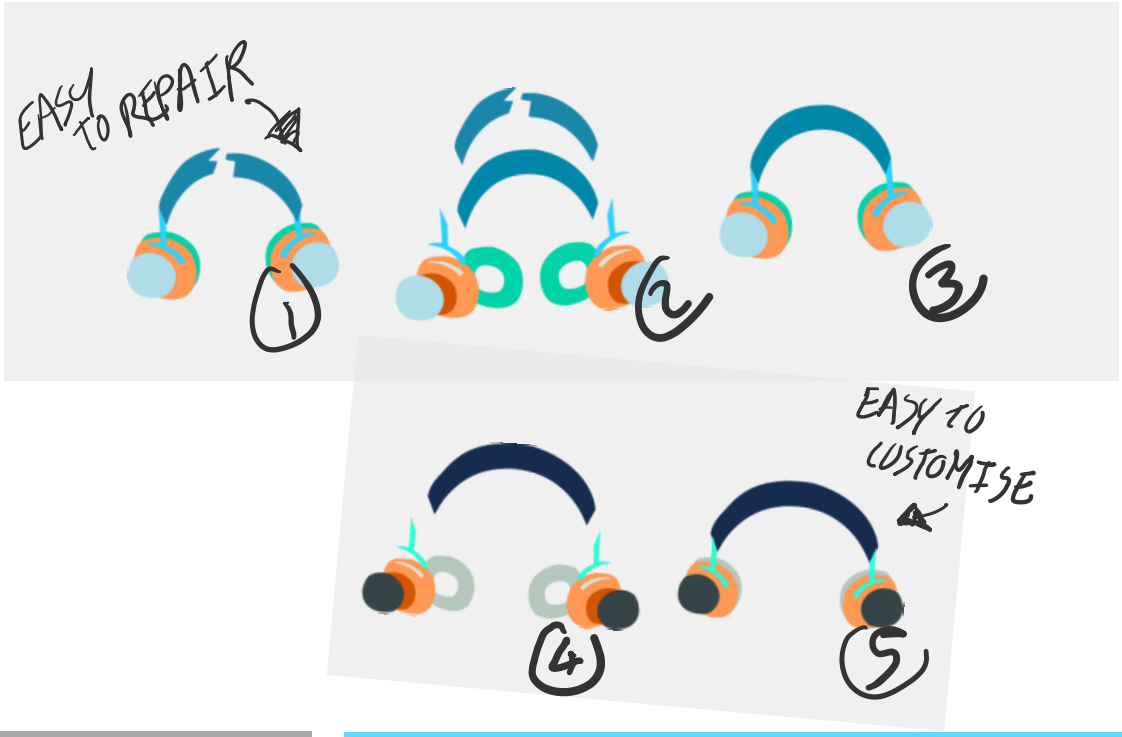
RE-DESIGN B

MODULAR + CUSTOMISABLE

WHY USE A MODULAR DESIGN?



ENVIRONMENT

A huge barrier to properly recycling electronics lies in the difficult dismantling process. Easy disassembly and a wireless design means that these headphones are far easier to recycle, hence reducing the growing amount of toxic, methane-emitting e-waste after disposal.

Modular design also allows the product to be customized and repaired one part at a time, rather than having to buy a whole new product that requires significantly more plastic production. Ultimately plastic waste will still be created however the headphone's longer product life ensures less waste than the traditional model.

SOCIETY

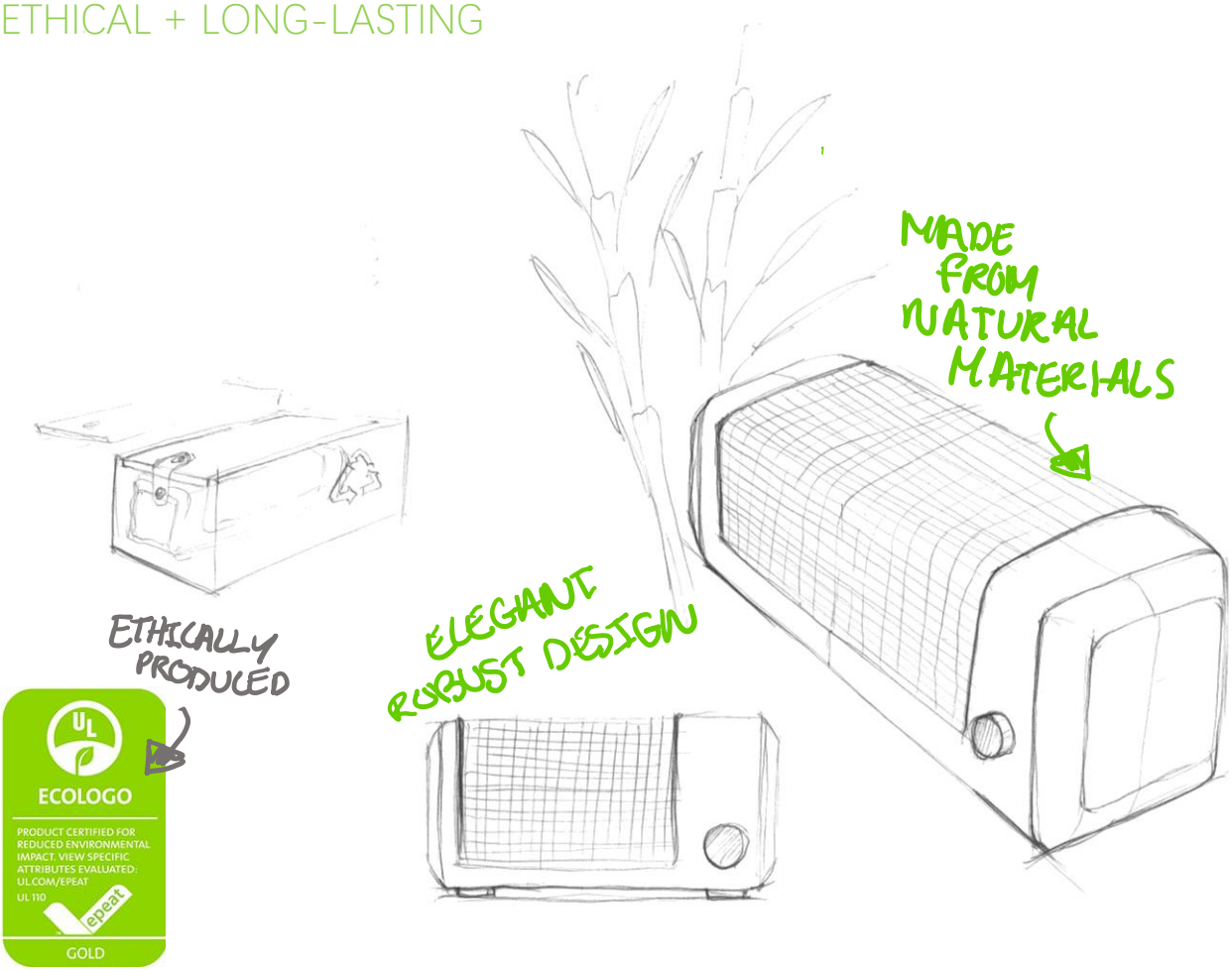
The customization possibilities that come with this re-design would hopefully give the user an emotional connection to the product, encouraging them to take care of it in the long term. It also is a chance to breakaway from the identical, streamlined nature of a lot of consumer goods today and revive a DIY, home-repair attitude amongst consumers.
A possible downside however is that this customization leads to a demand for more and more extravagant and unnecessary modules.

ECONOMY

While these headphones may require some extra investment at the research and design stage, ultimately the simplicity of the design should actually speed up manufacturing and reduce production prices. Providing customers with replaceable and customizable parts will also incentivize them to stay with the company. While creating devices that are meant to last does make it difficult to introduce new models and compete with obsolescence-driven companies, this strategy does open the possibility of expanding the company's range of modules indefinitely over time.

RE-DESIGN C

ETHICAL + LONG-LASTING



DESIGN

Re-design C is the most high end sustainable option of all three strategies. It relies on natural and recycled materials that are ethically sourced and manufactured. The high quality and robust design creates an elegant and timeless product that will be treasured and taken care of for many years.

The product would also need to hold a reputable sustainability certification such as ECOLOGO®, an International Organization for Standardization (ISO) Type 1 ecolabel that ensures that the product's entire lifecycle is ethical and eco-friendly (UL, 2019).

MANUFACTURING

This speaker is not only made from responsible materials, but it is also manufactured in an ethical way. It is made in green factories with fair pay and working conditions.

USE

This speaker is designed to last for life, in fact the seller offeres a 3 year warranty on each product. Hopefully, the beautiful design and craftsmanship will ensure that the product is treasured and passed down through generations.

DISPOSAL

Because of this speaker's long life expectancy, it does fall short on easy disposal. However, the eco-friendly materials can all be recycled or biodegrade.

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RE-DESIGN C

ETHICAL + LONG-LASTING

RESPONSIBLE MATERIALS 2

ENVIRONMENT

This re-design's first focus is on sourcing eco-friendly materials. It uses natural materials like bamboo (one of the world's fastest growing plants) and organic cotton, as well as recycled materials for the housing and hardware components.
It also strives to use green energy throughout the manufacturing process to reduce greenhouse gas emissions.

SOCIETY

This strategy's second focus is ensuring an ethical supply chain, from extraction through to distribution. This entails fair salaries and working conditions for their employees, as well as responsible waste management.
A high end, sustainable company creates awareness of environmental issues and revives a respect for craft, over cheaply made plastic goods.
It also provides opportunities for innovation in bio-design, creating a platform for new, bio-degradable materials that may be too expensive to incorporate into everyday products just yet.

ECONOMY

The most expensive solution of my three proposed strategies, this re-design does require a large initial investment. However, as seen in the Apple AirPods case study, a large percentage of customers are willing to spend a lot of money on audio products – and this speaker will last for years longer than a lot of its unsustainable, branded counterparts.
The only downside is that the higher price will exclude those who truly cannot afford this higher price range.

BIBLIOGRAPHY

1. Europa.eu. (2019). *Packaging waste statistics - Statistics Explained*. [online] Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php/Packaging_waste_statistics

2. Statista. (2013). *Bluetooth speaker US unit sales 2013-2018 | Statista*. [online] Available at: https://static1.statista.com/statistics/642608/us-bluetooth-speakers-sales/ [Accessed 1 Dec. 2019].

3. LeBlanc, R. (2014). *E-Waste Recycling Facts and Figures*. [online] The Balance Small Business. Available at: https://www.thebalancesmb.com/e-waste-recycling-facts-and-figures-2878189.

4. Design Life-Cycle. (2014). *Design Life-Cycle*. [online] Available at: http://www.designlife-cycle.com/apple-earpods.

5. Apple. (2019). *Apple Trade In*. [online] Available at: https://www.apple.com/shop/trade-in.

6. https://www.ifixit.com/User/1101176/Evan+Noronha (2016). *AirPods Teardown*. [online] iFixit. Available at: https://www.ifixit.com/Teardown/AirPods+Teardown/75578 [Accessed 1 Dec. 2019].

7. Everyone's AirPods will die. We've got the trick to replacing them. (2019). *The Washington Post*. [online] 8 Oct. Available at: https://www.washingtonpost.com/technology/2019/10/08/everyones-airpods-will-die-weve-got-trick-replacing-them/

8. Hall, D. (2018). *Throwaway culture has spread packaging waste worldwide | Waste packaging*. [online] the Guardian. Available at: https://www.theguardian.com/environment/2017/mar/13/waste-plastic-food-packaging-recycling-throwaway-culture-dave-hall.

9. Npr.org. (2019). *NPR Choice page*. [online] Available at: https://www.npr.org/2019/07/09/735848489/plastic-has-a-big-carbon-footprint-but-that-isnt-the-whole-story.

10. UL. (2019). *ECOLOGO® Certification*. [online] Available at: https://www.ul.com/offerings/ecologor-certification [Accessed 2 Dec. 2019].