



**NPD4CE**  
2023

New Product  
Development  
for Upcycling +  
Circular Economy

**BOOKSHELF SPEAKER**

# WHAT ARE WE DOING?

- Redesigning electronic products with an aim to find innovations in product development for both upcycling and the circular economy
- Speaker

# WHY ARE WE DOING IT?

- Poor EOL outcomes for existing products
- Very hard to disassemble, repair, upgrade, remanufacture or recycle
- Woefully short service life
- Massive ecological harm

# HOW?

## First Step - Research

- Desk research
- Reverse Engineering of an existing product
- Expert Interviews

# FINDINGS – DESK RESEARCH

- Circular business models
- Product lifecycle categories
- Product attachment and emotionally durable design

# CIRCULAR BUSINESS MODELS

## 5 Discrete Business Models:

- Classic Long-life: Products are built to last and sold at a premium
- Hybrid Model: Profits are driven by the repeat sale of consumables
- Gap Exploiter: Providing a service to fill a gap in the market (e.g: repair and maintenance)
- Access model: Provide access to the product
- Performance: Provide the service / utility

# PRODUCT LIFECYCLE CATEGORIES

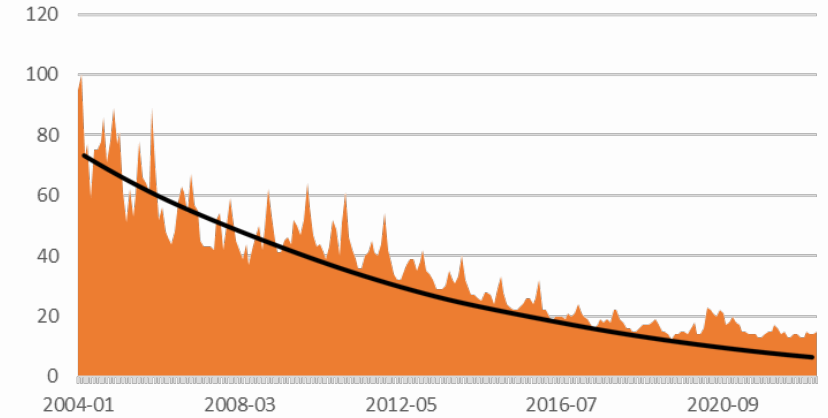
How developed a product or technology is.

Four categories:

- Introduction
- Growth
- Maturity
- Decline

Which effect design priorities.

Google Searches for Computer Speakers



Computer Speakers are identified as being in the decline phase.

Therefore, the factors are a priority:

- Durability
- Standardisation and Compatibility
  - Maintenance and Repair
    - Dis- and reassembly

# PRODUCT ATTACHMENT

- Teddy bear factor – develop a narrative history with the product
- Graceful ageing – the ageing process adds character and value
- Ritual – Developed through rich tactile experiences



# FINDINGS – EXISTING PRODUCT ANALYSIS

A grayscale photograph of a person in a white lab coat looking at a disassembled Sony SRS-XB23 speaker. The speaker is placed on a white table, and its internal components, including a circuit board and a driver, are visible. The background shows a laboratory or office setting with a window and a desk.

SONY SRS-XB23

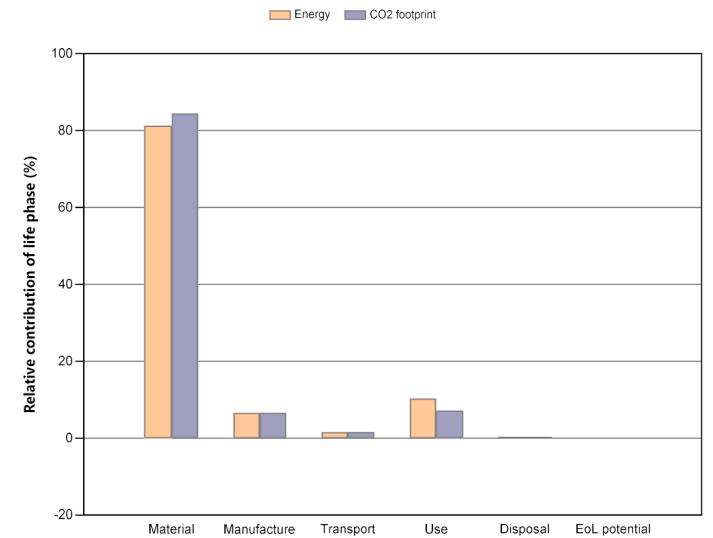
Portable Bluetooth Speaker

- Eco-audit
- Reverse Engineering

# ECO-AUDIT

## Assumptions:

- Transport from Shenzhen – Felixstowe via Ocean Freight
- 1 hour of Daily use
- Service life of 5 years



High Embodied Energy (84.5%) of CO2 Emissions

Incredibly power efficient  
>1 Watt in operation

# REVERSE ENGINEERING

Very hard to disassemble

- Small and Easily Stripped Screws
- Snap-hooks and one-way fasteners
- Over-reliance on SMD components

# FINDINGS – STAKEHOLDER INTERVIEWS

A background image showing a woman with glasses and a patterned top smiling in a meeting setting. She is holding a white folder or document. Other people are partially visible in the background, including a man's head on the left and a woman's curly hair on the right. The image is overlaid with a dark grey semi-transparent shape on the left side where the text is located.

## Three Interviews

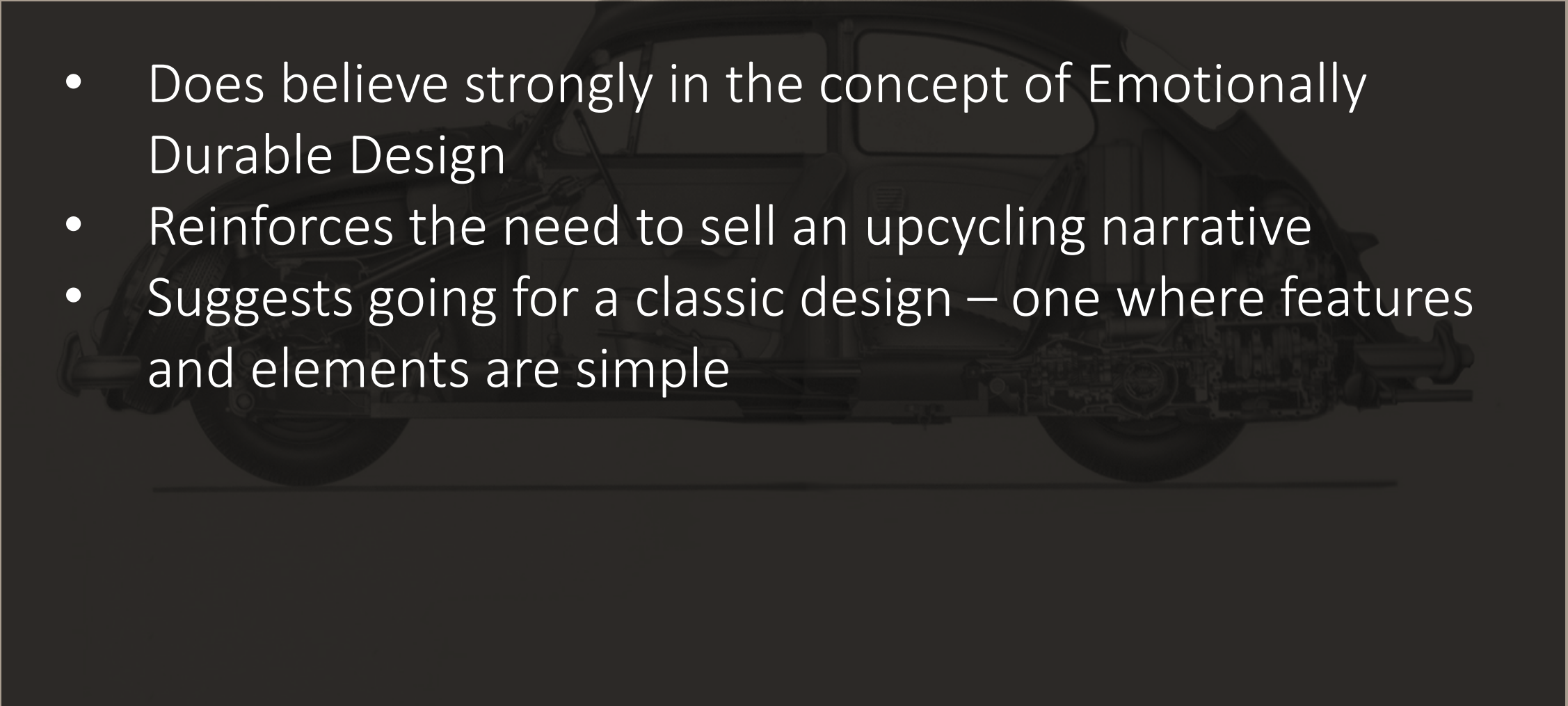
- Nick Rowan – Senior Product Design Lecturer
- Abby Hatch – Sustainable Design Engineer
- Seb Ward – Design Engineer at MIXX

# NICK ROWAN



- Don't go for the Audiophile market, upcycled designs are inherently compromised
- Sell the narrative
- Disagreed with the theory of Emotionally Durable Design
- 2 Classes of Products
  - Perpetual
  - Disposable

# ABBY HATCH

- Does believe strongly in the concept of Emotionally Durable Design
  - Reinforces the need to sell an upcycling narrative
  - Suggests going for a classic design – one where features and elements are simple
- 

# SEB WARD

A person is shown from the chest up, wearing a dark jacket, looking at a laptop. In the foreground, a 3D printer is visible, with a blue mesh-like object being printed. The background is slightly blurred, showing green foliage.

- Antiques as a source of Inspiration – Needs to be desirable
- 3D Printing as an excellent technology to utilise
- Ease of use

# KEY CHALLENGES

A photograph of a person in a red shirt and dark shorts climbing a steep, dark brown, textured rock face. The person is positioned on the right side of the image, reaching up with their right arm. The background is a bright, overcast sky. The image is partially obscured by a dark grey, semi-transparent overlay on the left side, which contains the text.

Making upcycled products desirable –  
Narrative

Prolonging Service life – Emotionally  
Durable design / Maintenance and Repair

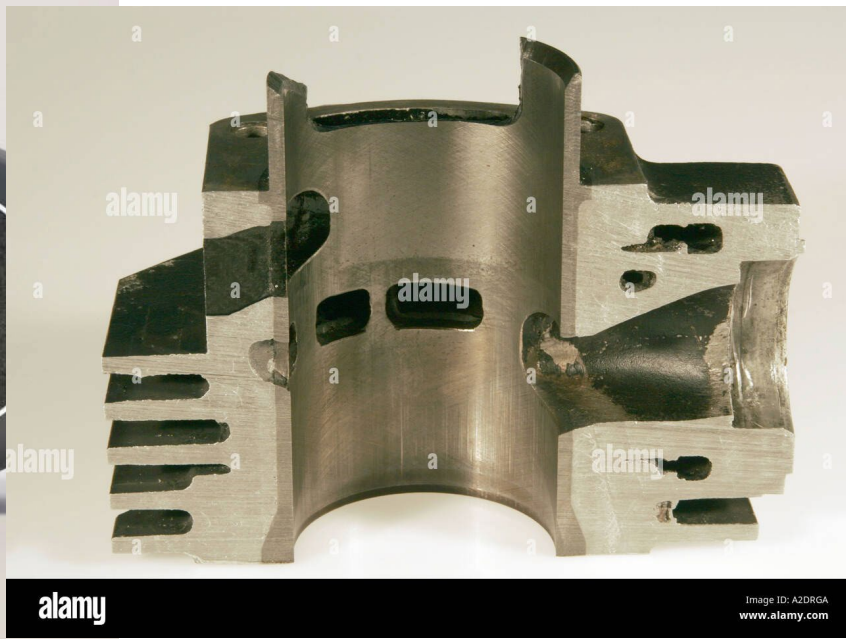
Improving EOL outcomes – Dis- and  
reassembly



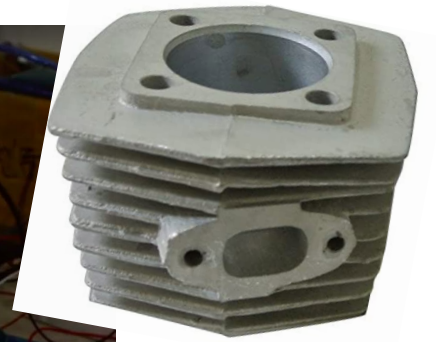
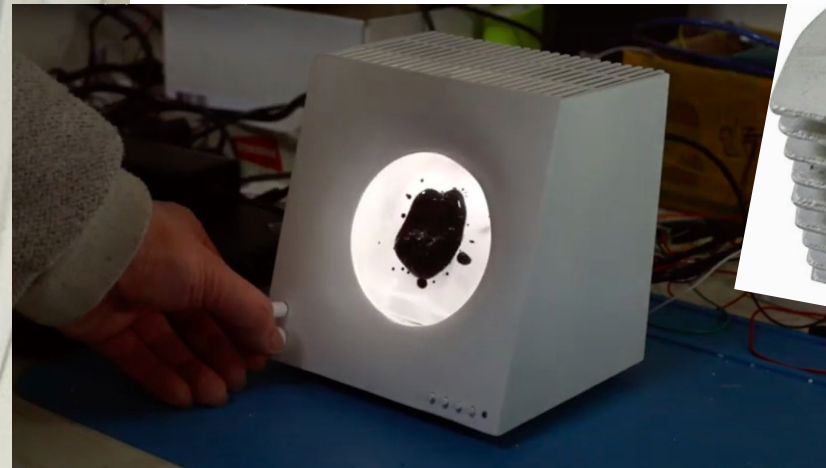
# DESIGN BRIEF



- Easy to dis- / reassemble
- Strong Narrative
- Pleasant to listen to
- Modular
- Durable
- No one way fasteners



EVICTORY



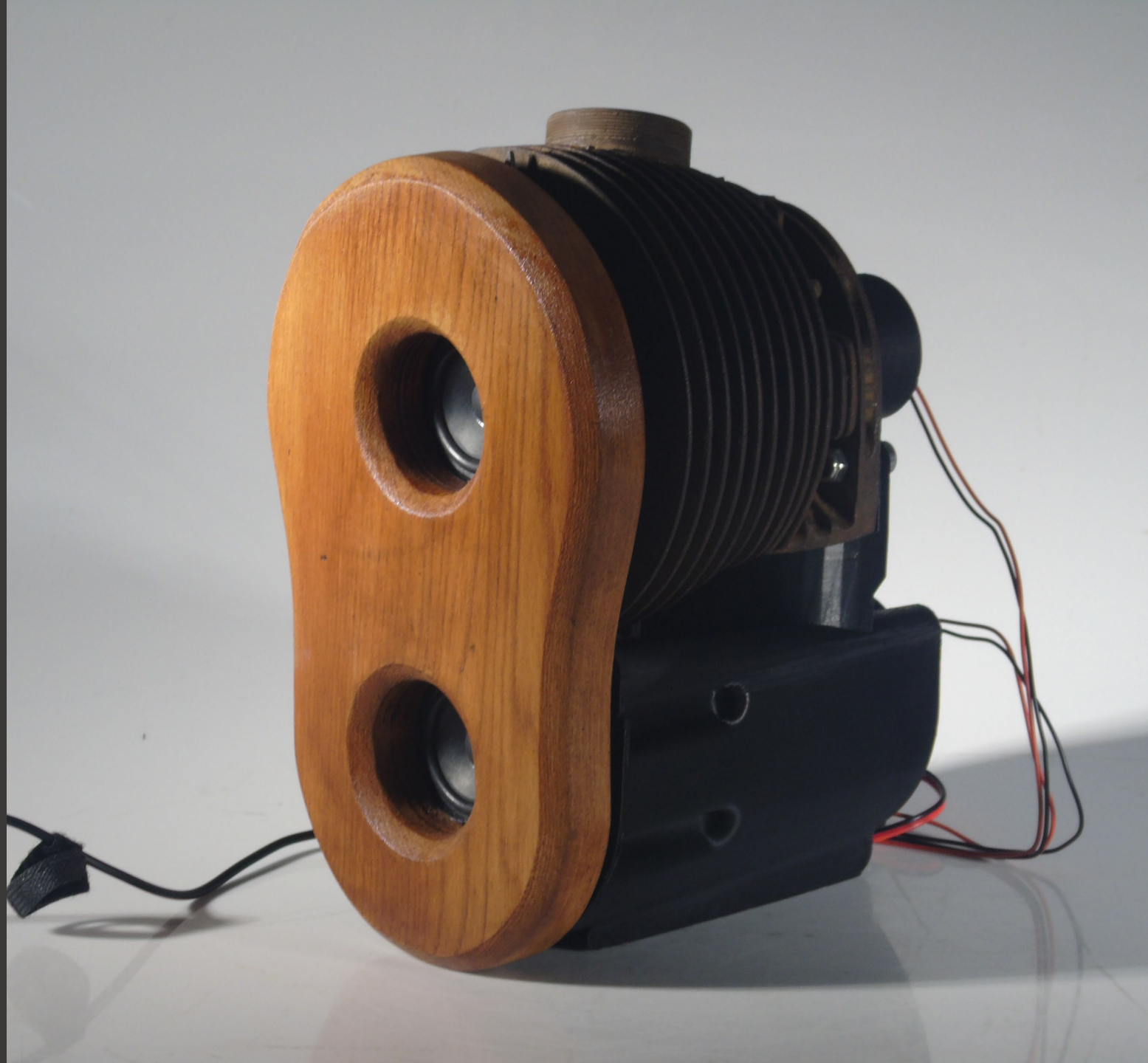


# 2-Stroke Barrel Concept

- Ferrofluid Display
- 2 Stroke Barrel
- Narrative of Reusing fluids



- Villiers 2-Stroke Barrel
- Base printed from rPLA
- No adhesives / one-way fasteners



# CONCLUSION

- Entirely possible to make a working product from reused / remanufactured parts with few compromises
- A strong narrative is vital to make upcycled products appealing
- More research needs to be done on upcycling/remanufacturing at a commercial scale

# GUIDELINES

- Focus on narrative
- Stick to industry standards and conventions, especially for input/output, controls and user-interaction
- Design for long service life with repair and maintenance in mind
- Environment as a user