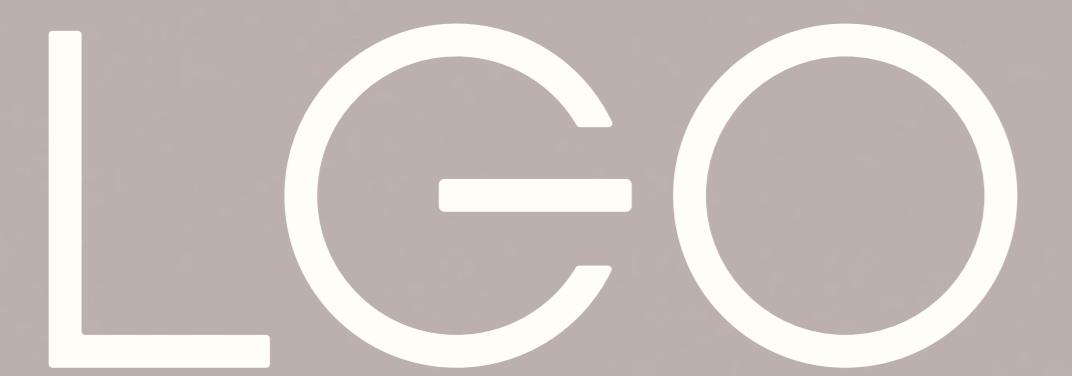


IDN3002 Industrial Design Project



Effortless smart living  
for aging in place



# Contents

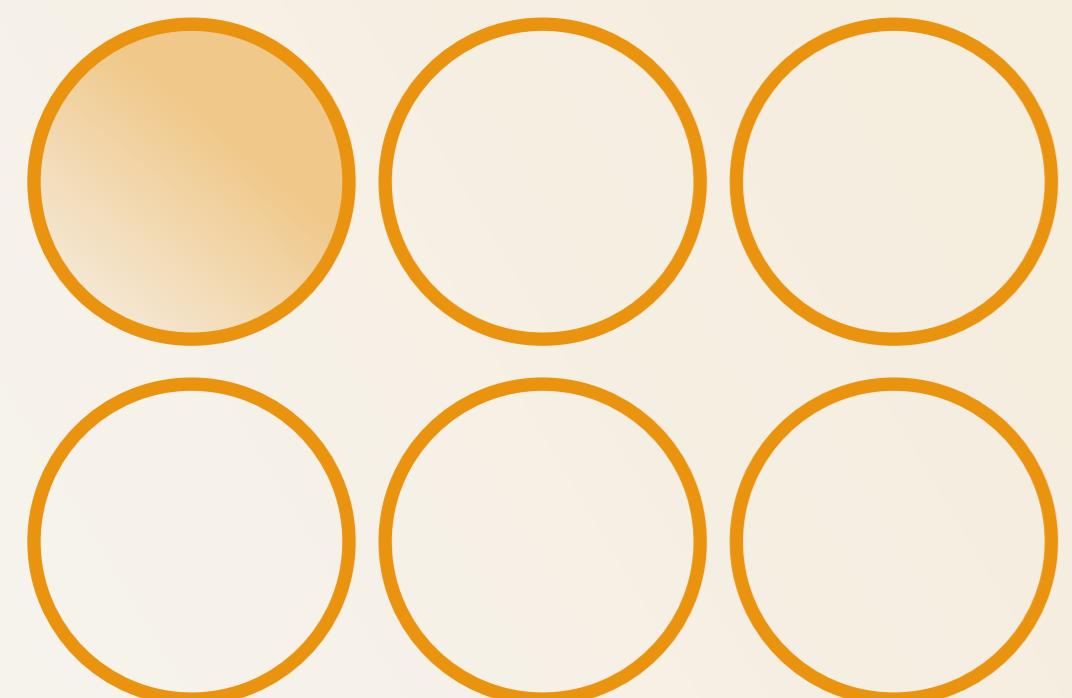
Discover .....	3
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Deliver .....	17
Product Visualisation .....	28



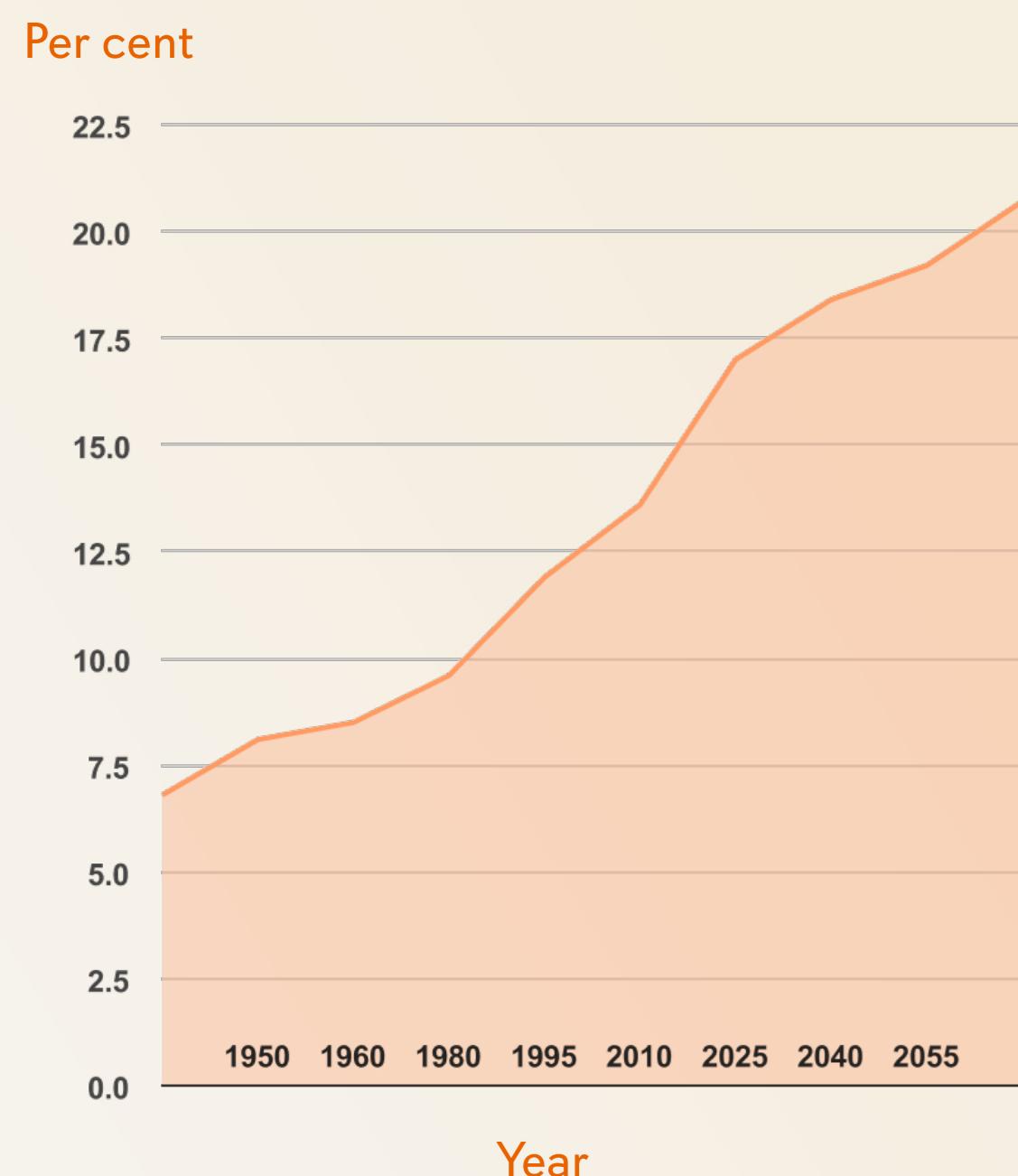
# Elderly Overview

## Demography of Elderly

**1 in 6** Australians are aged 65 and over (16%) (ABS 2018, 2019)



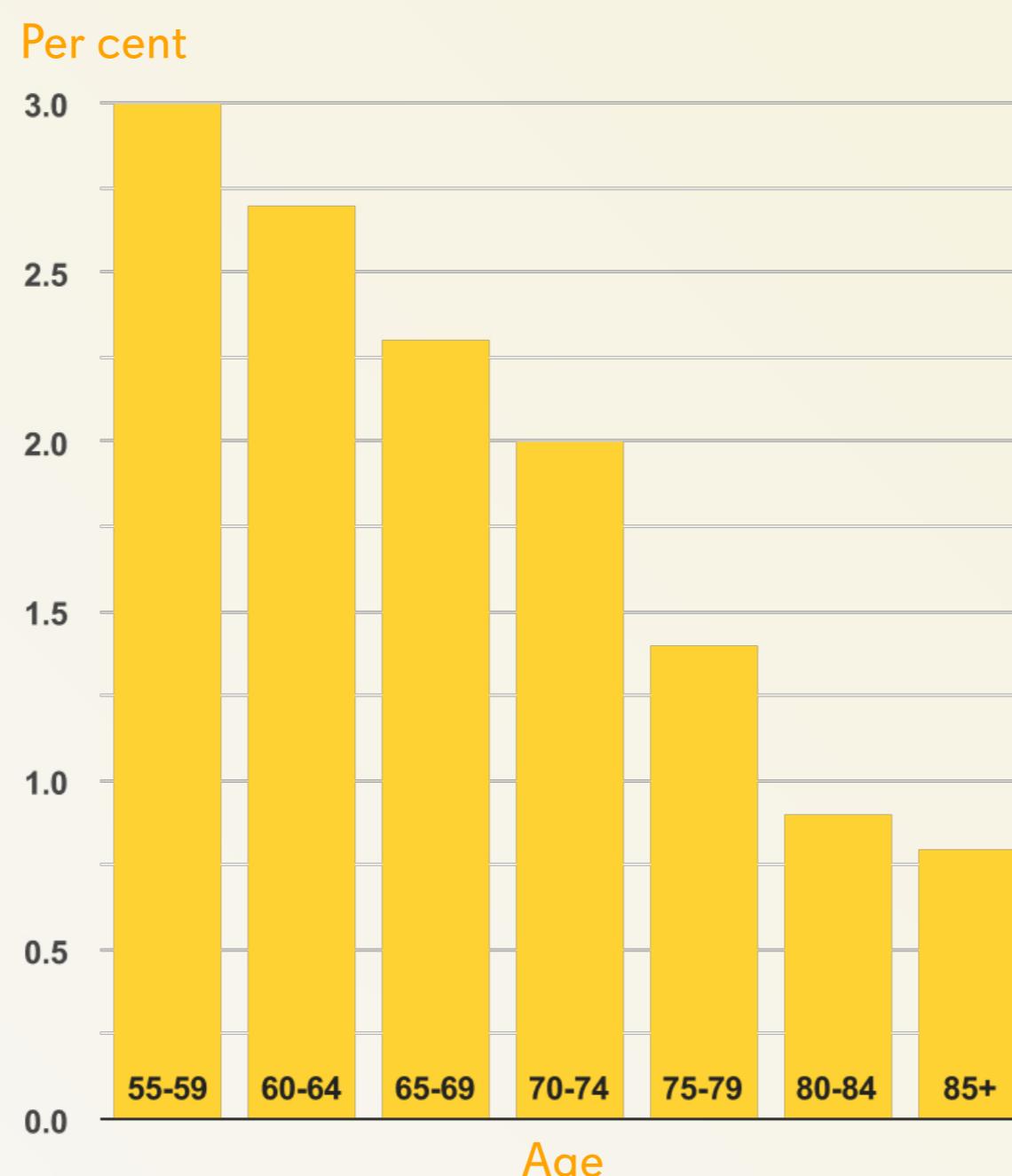
Percentage of **Australians aged 65 and over**, at 30 June, over time (ABS 2018, 2019)



## Age Group Breakdown

**More than half of older people were aged 65–74** (56%, 2.4 million people)

Population change by age group in 2019 (ABS 2018, 2019)

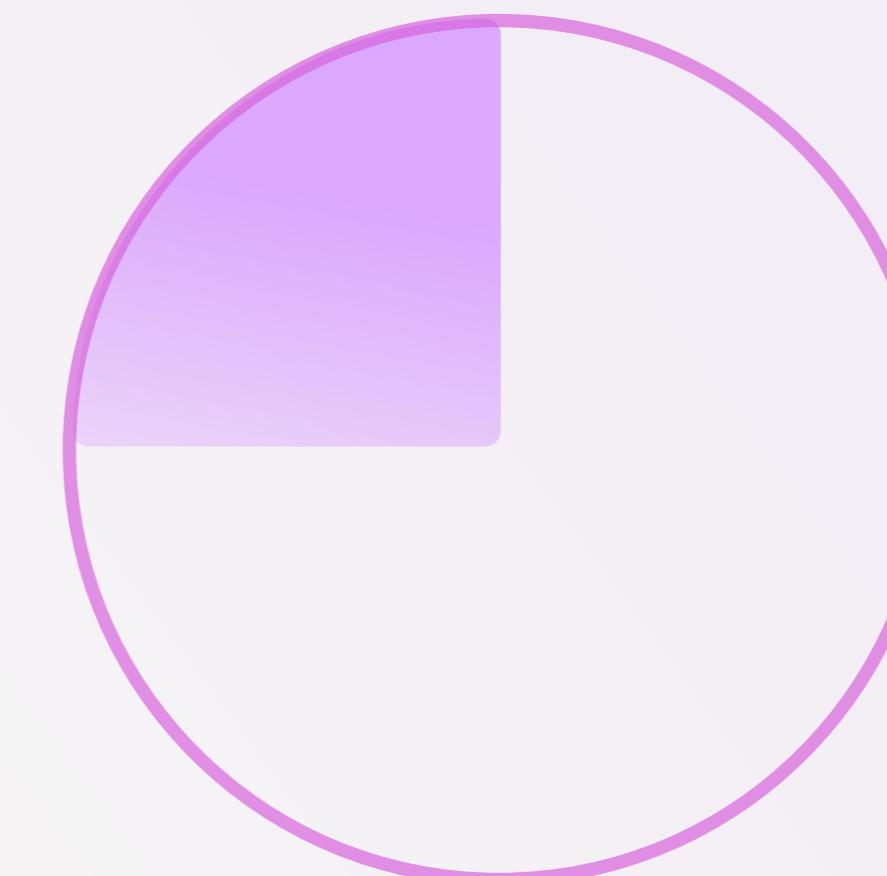


Around **1 in 8** were aged 85 and over (13%, 528,000) (ABS 2020)

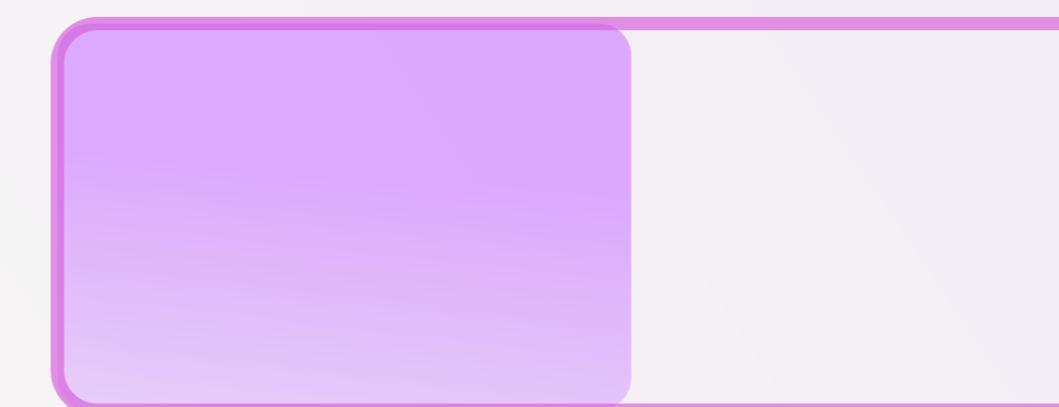


## Living at Home

In 2016, **1 in 4** older people (aged 65 and over) living in private dwellings lived alone. (AIHW 2020)



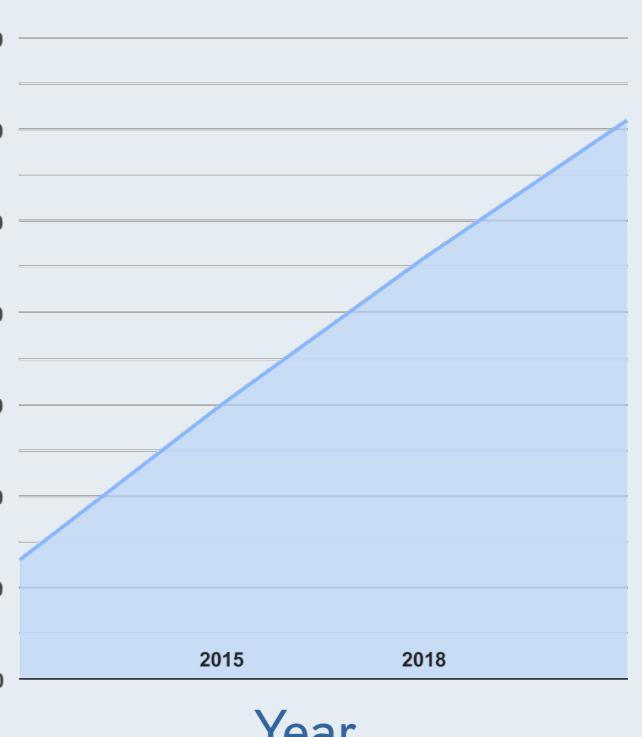
In 2016, **48%** of all older people who live with a partner, live without children in the home and **7.7%** with children (ABS 2017)



## Use of Technology

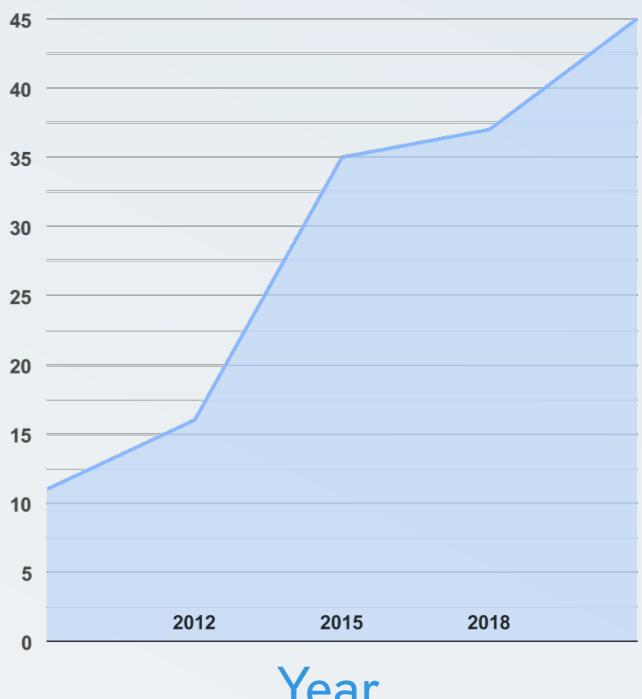
Elderly who own a smartphone

Per cent



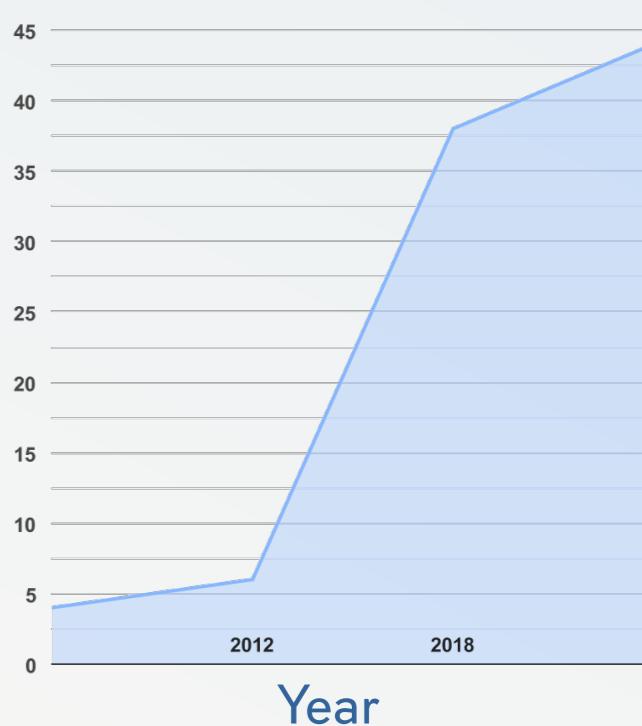
Elderly who use social media

Per cent



Elderly who own a tablet

Per cent



PEW Research, 2021

^Elderly Indigenous Australians (Who are defined by an AIHW article as aged 50-64) are not included in the information presented

\*Older people refers to people aged 65 and over

# Influences on Elderly Adoption of Technology

## Personal

- Functional capacity
- Previous experience with technology
- The level of self-confidence, shame or embarrassment for using specialised devices
- Attitudes and motivation
- Physical safety
- Privacy and confidentiality

## Technical

- Device related design
- Website and application design
- Complexity/usability

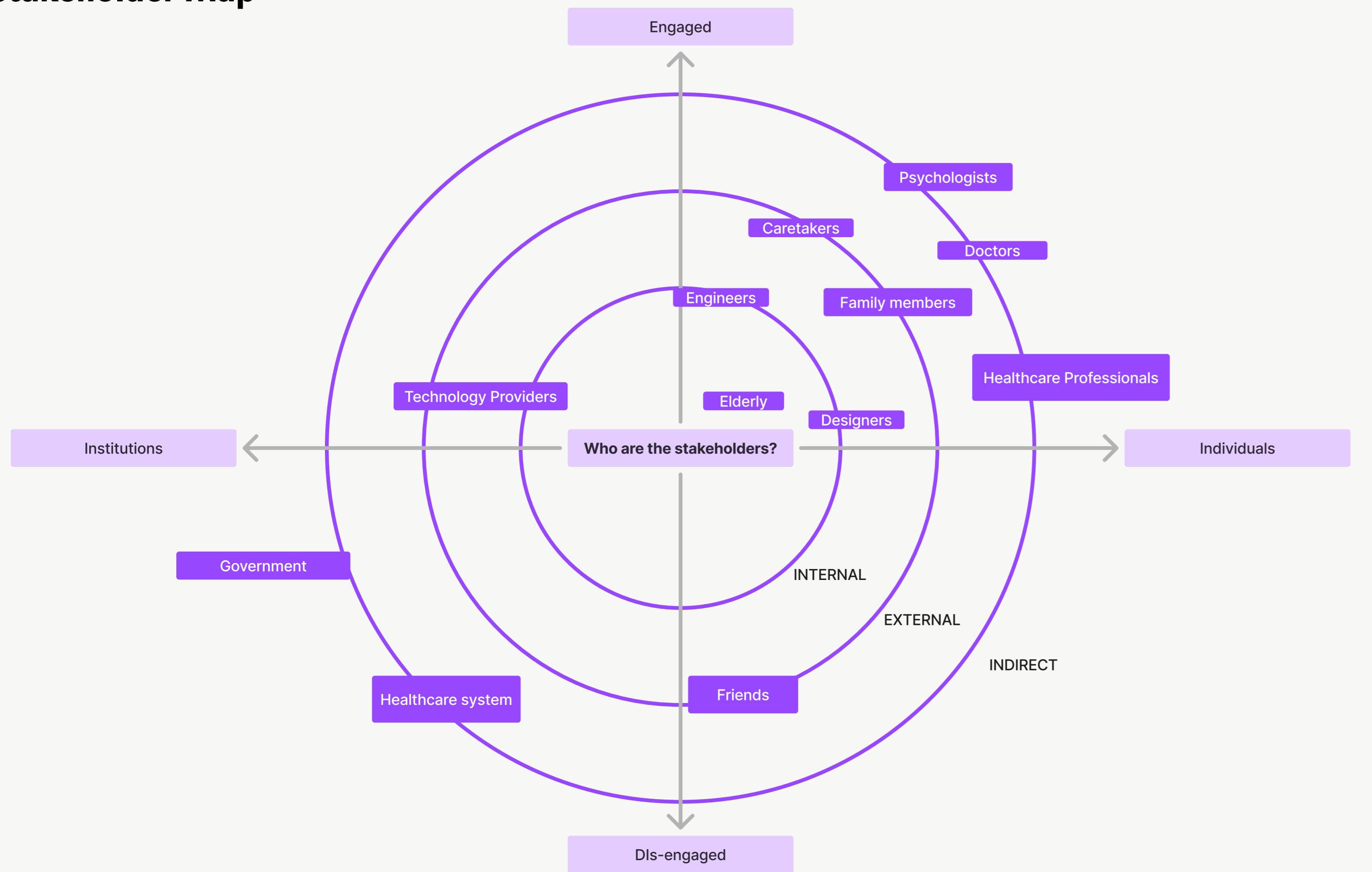
## Environmental

- Costs
- Social Influences
- Learning to use technology

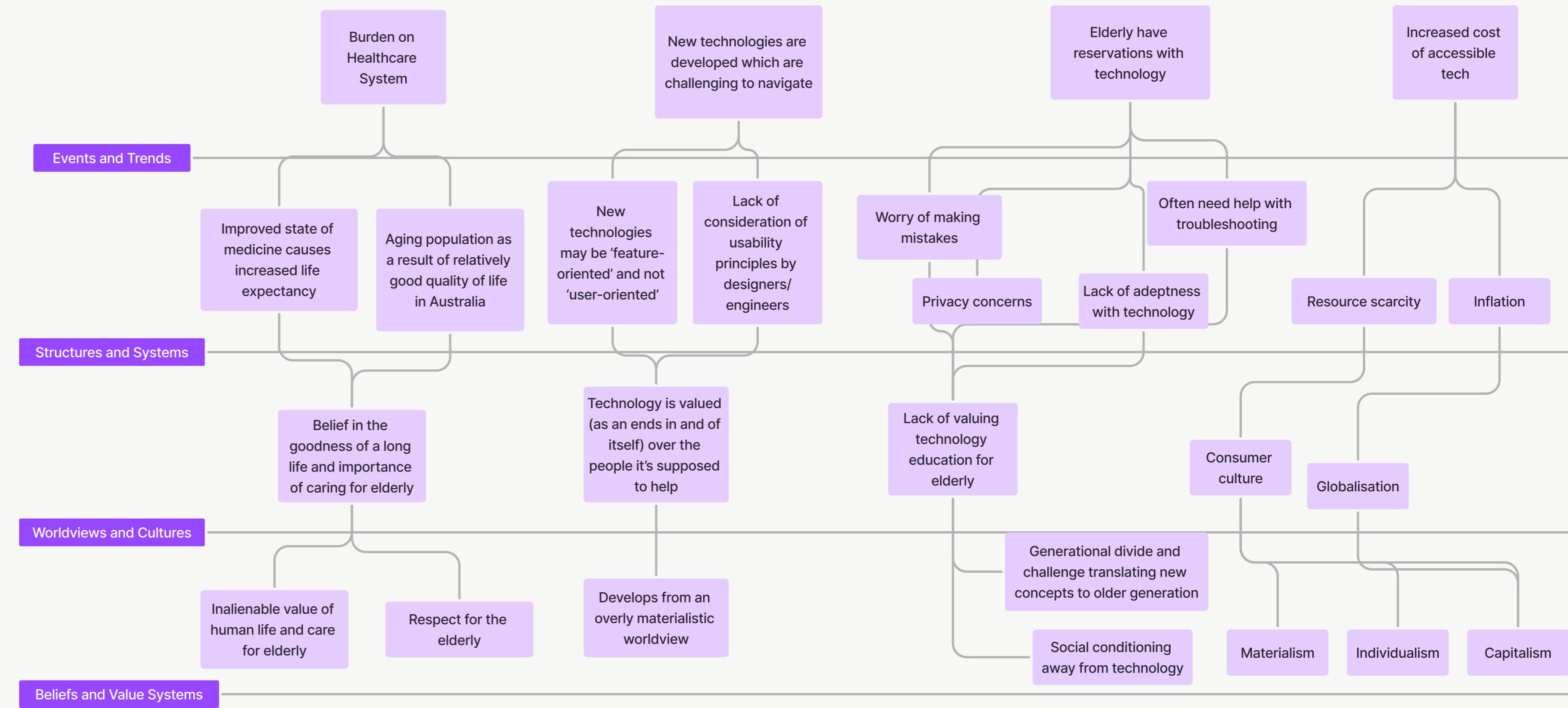


# Data Analysis

## Stakeholder Map



## Iceberg Map



# Research Insights

1

Societal perceptions and external factors significantly influence technology adoption

2

Elderly are a heterogenous group and require a solution which appeals to their diverse needs

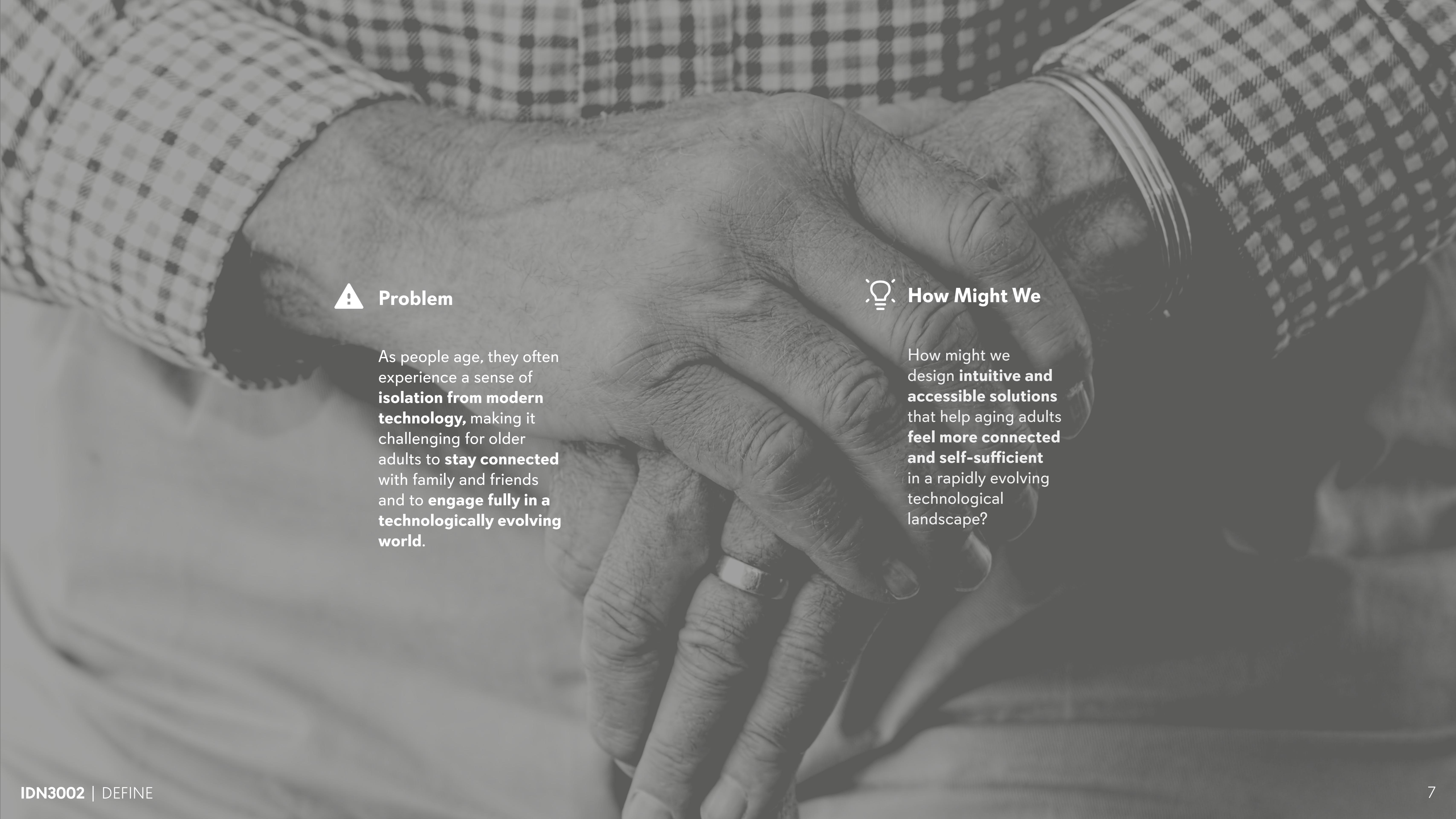
3

AI interfaces and interactions may not be as fulfilling as physical interaction

4

Designs must focus on simplicity and ease of use





## Problem

As people age, they often experience a sense of **isolation from modern technology**, making it challenging for older adults to **stay connected** with family and friends and to **engage fully in a technologically evolving world**.



## How Might We

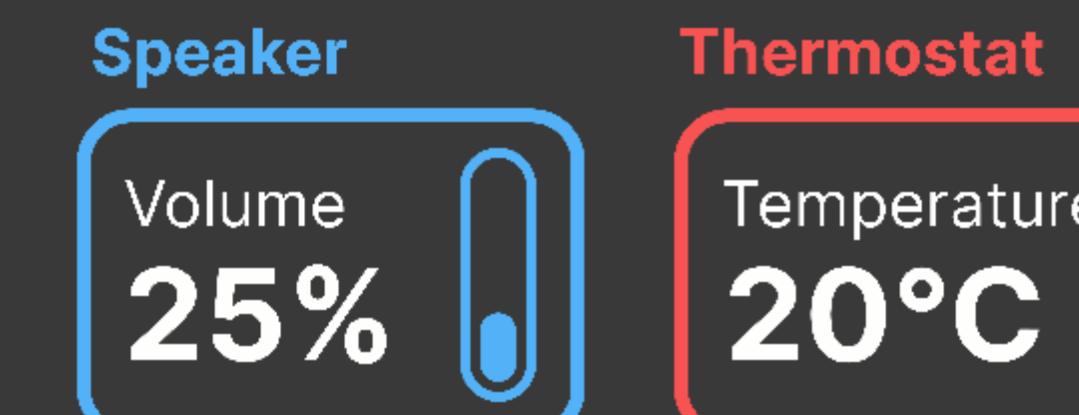
How might we design **intuitive and accessible solutions** that help aging adults **feel more connected and self-sufficient** in a rapidly evolving technological landscape?

# Initial Concepts

Tactile Smart Modules

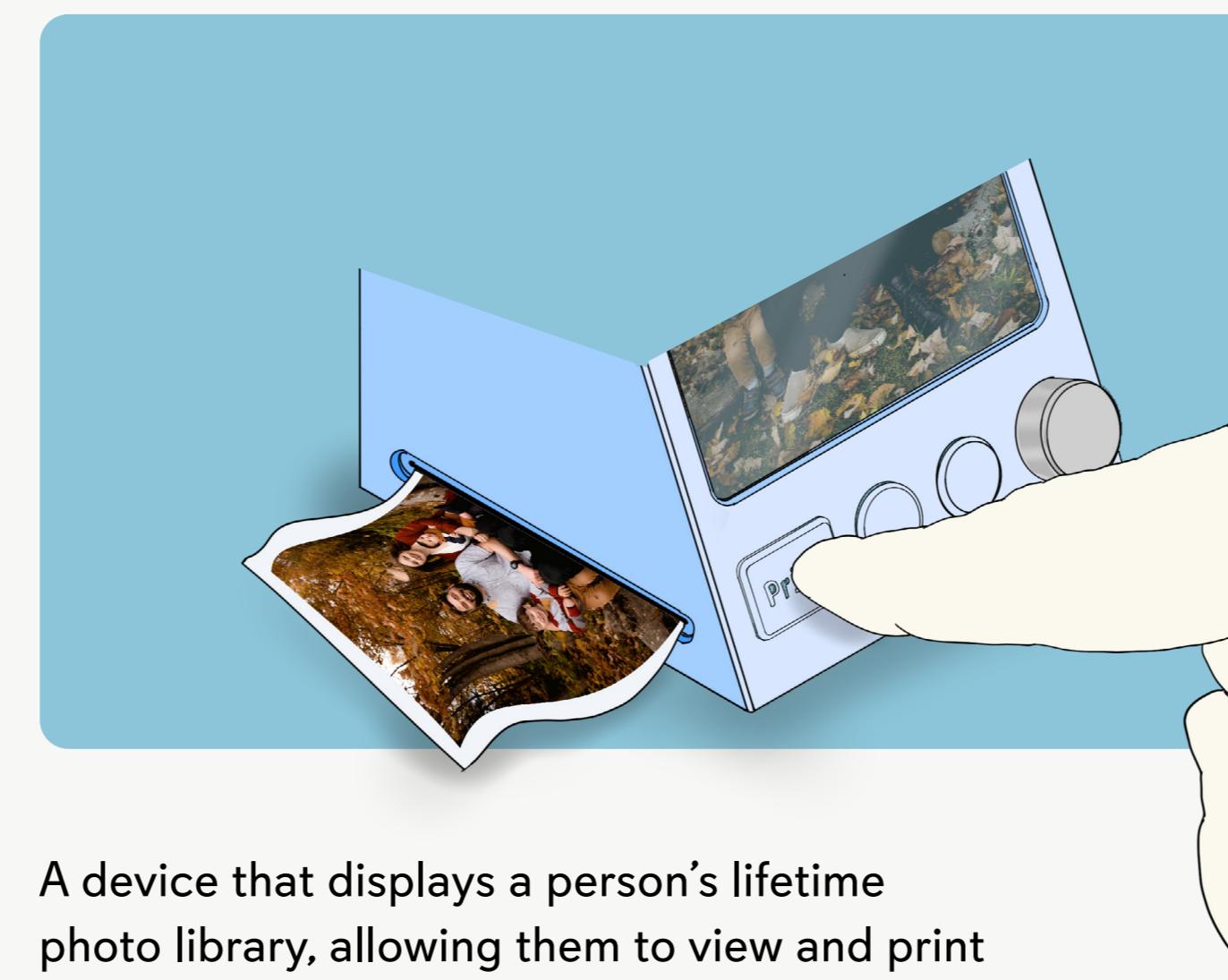


Dining Room



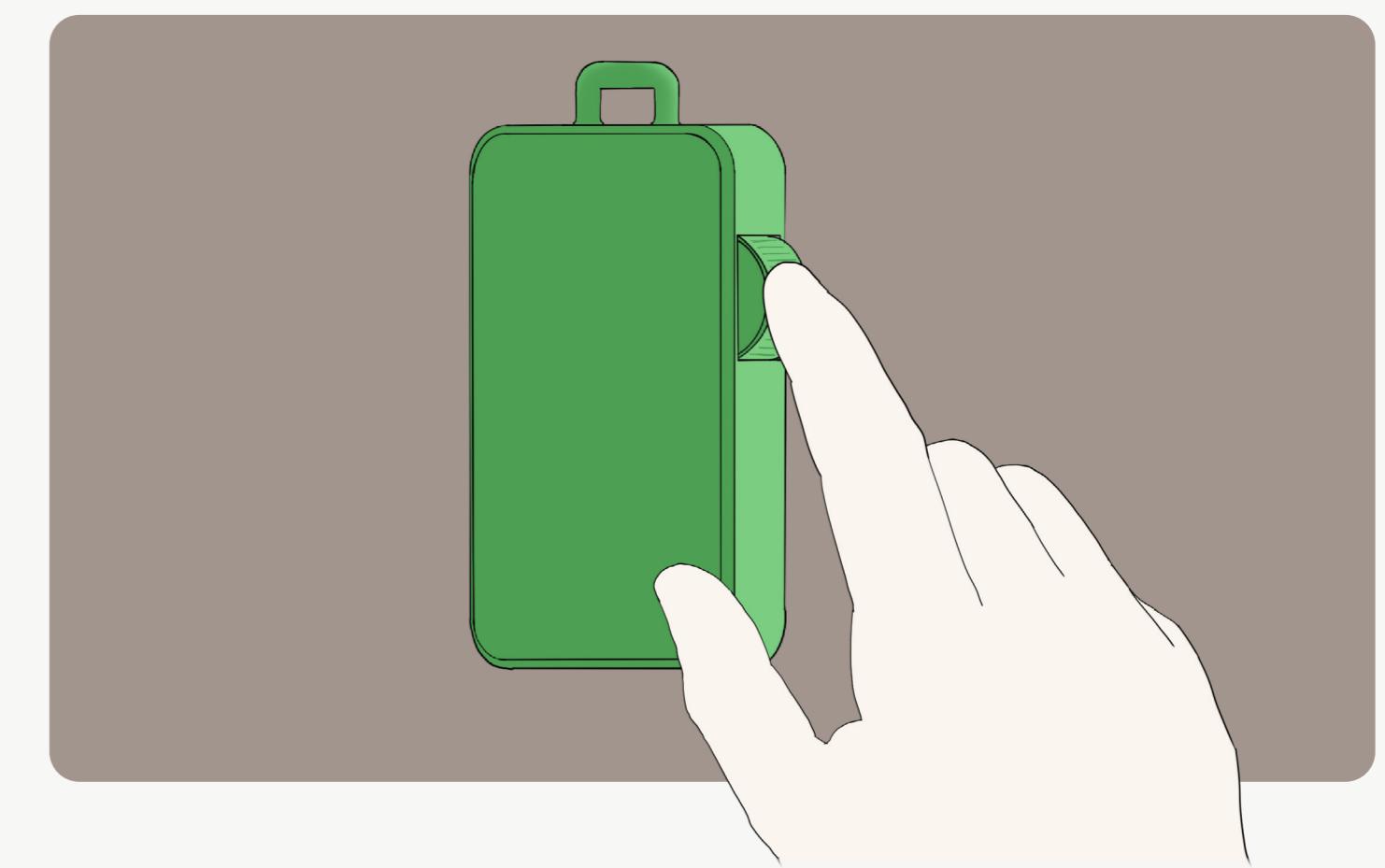
A series of analogue-style modules with a physical interface that let users engage with a smart home system. These modules connect to form customizable systems, designed for simplicity, ease of use, and adaptability.

Memory Experience Devices



A device that displays a person's lifetime photo library, allowing them to view and print photos. Designed to engage the elderly with modern technology through nostalgia and fond memories of family.

SimpliPhone



SimpliPhone is a pocket-sized device for elderly users to send and receive voice notes. With large, high-contrast text and physical buttons, it offers a simple, frustration-free alternative to standard smartphones.

# Chosen Concept



## Tactile Smart Modules

I've chosen to develop the Smart Module system as it addresses the challenge of diverse needs amongst the elderly most successfully. This modular and expandable smart home system adapts to individual requirements. Additionally, it includes training and support services to ensure effective use, which is essential for elderly-focused products.

## Design Considerations

### Affordances & Signifiers

- Usability is key, so affordances and signifiers must be immediately clear.
- Text and symbols will make interactions straightforward.
- Color-matching modules with their UI function will enhance recognition and ease of use.

### Ergonomics

- User testing revealed that the modules need an upward-angled face for ease of use.
- A 90° angle causes discomfort and dexterity issues, especially for elderly users.

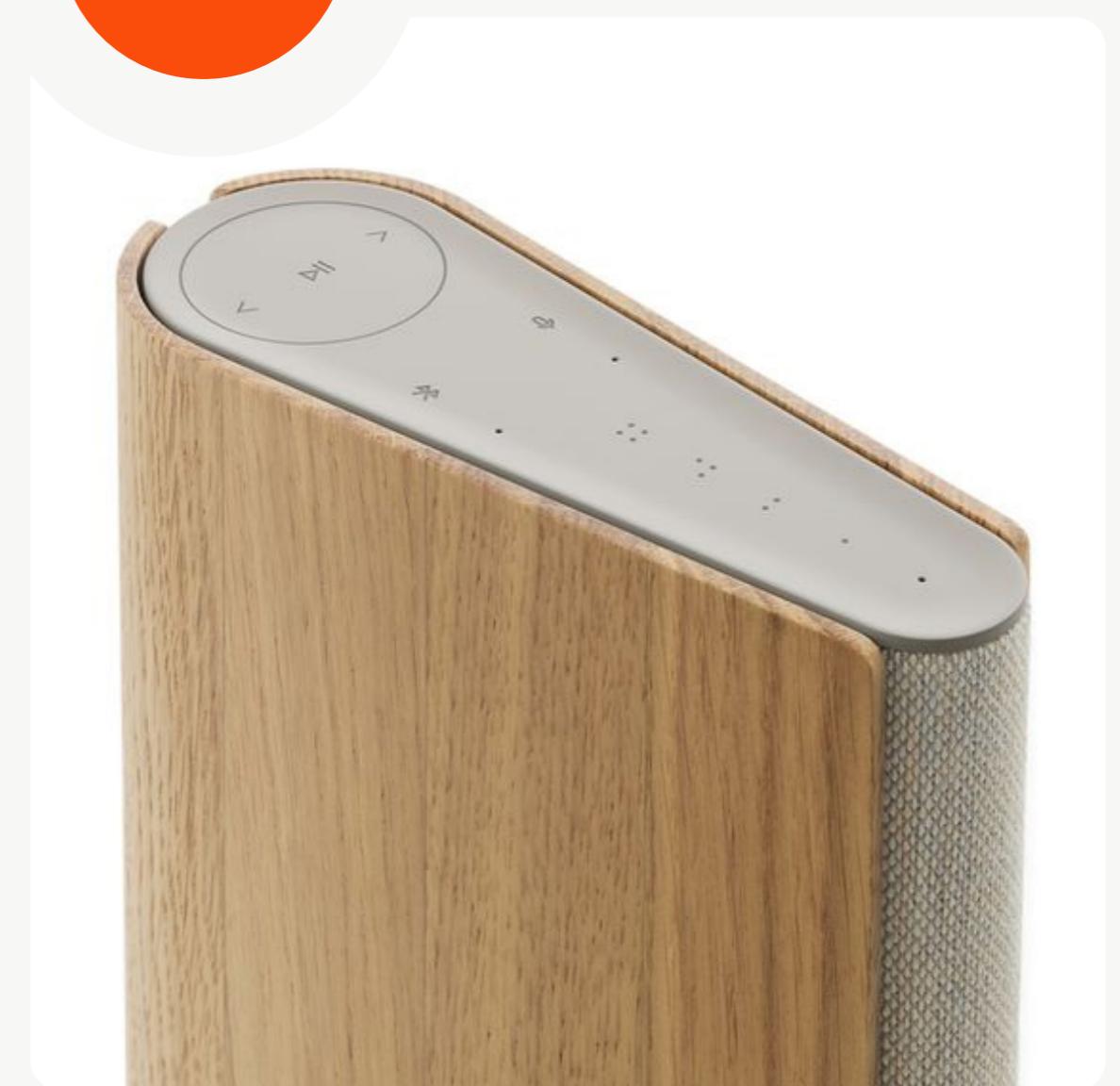
### UX/UI

- User testing is needed to find the most comfortable and intuitive sizes and layouts for dials and knobs for elderly users.
- Knobs, dials, buttons, and switches will follow a clean, consistent design system, similar to a UI style guide.

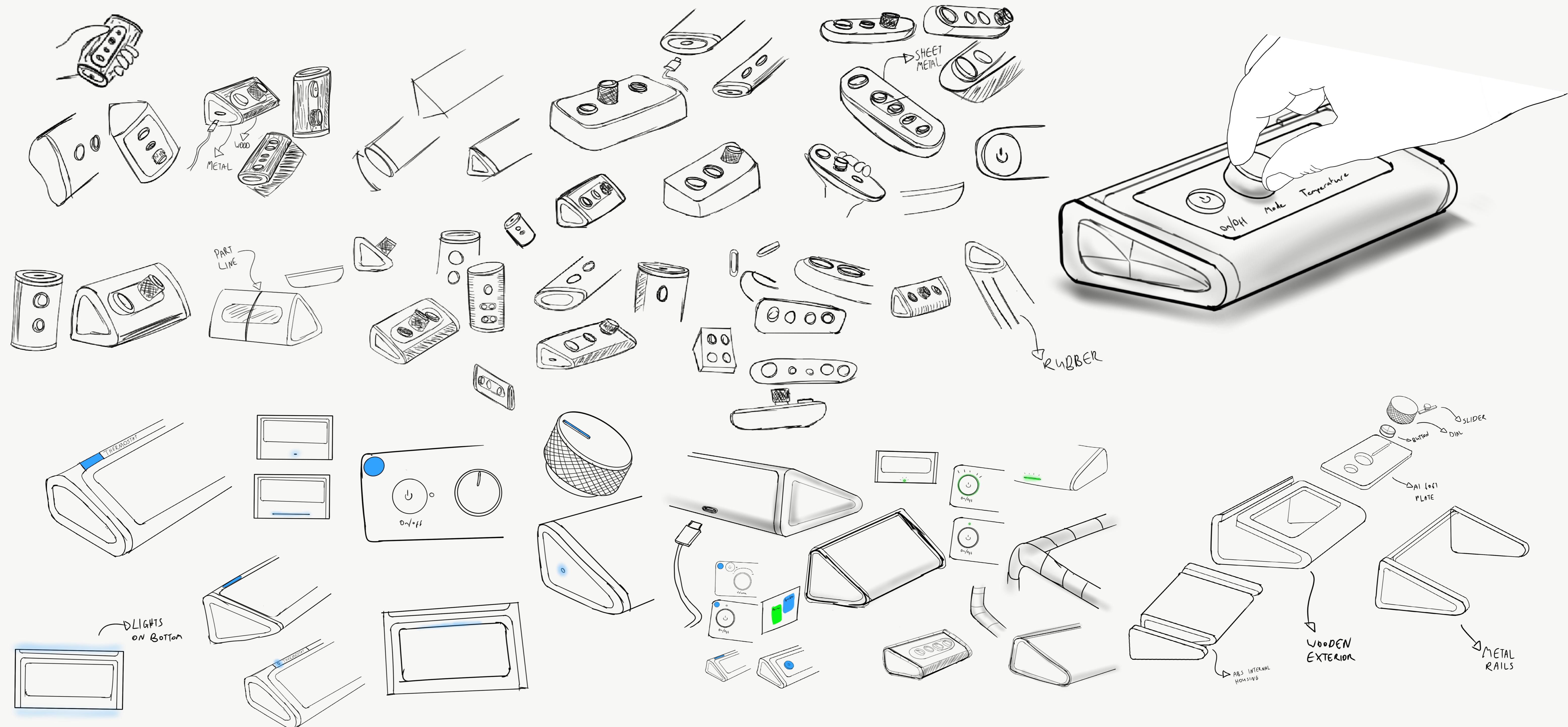
### CMF

- CMF will blend modern industrial design trends with a retro aesthetic for familiarity.
- Materials likely to include:
  - **ABS plastic** for the internal casing, for durability and cost-effectiveness.
  - **Aluminum 6061** for metallic details and dial face, offering a timeless look.
  - **Bamboo or oak** for a retro wooden casing.
  - (Alternative) **Textile fabric exterior** for a soft, comfortable feel.

# Moodboard



# Form Development



I developed the LEO module to have an 'analogue' form language so that it can be familiar and nostalgic for elderly users. I experimented with a variety of forms, and decided that the module should have a physically interactable interface which sits at a slight angle from 180°. This would ensure the least strain is used when manipulating dials or pressing buttons.

# Market Pain Points

The market offers a range of great smart home solutions which can be used by the elderly. That being said, Many of these designs don't deeply consider how they would be operated by someone with lower technological literacy. In my research, I've found that clear affordances and signifiers play a key role in facilitating an intuitive user experience.\*

Which elements may an elderly individual find unintuitive with these devices?



**Apple HomePod Mini**

**Google Nest Hub Max**

**Amazon Echo Dot**

# UX Testing

**Prototype 1**



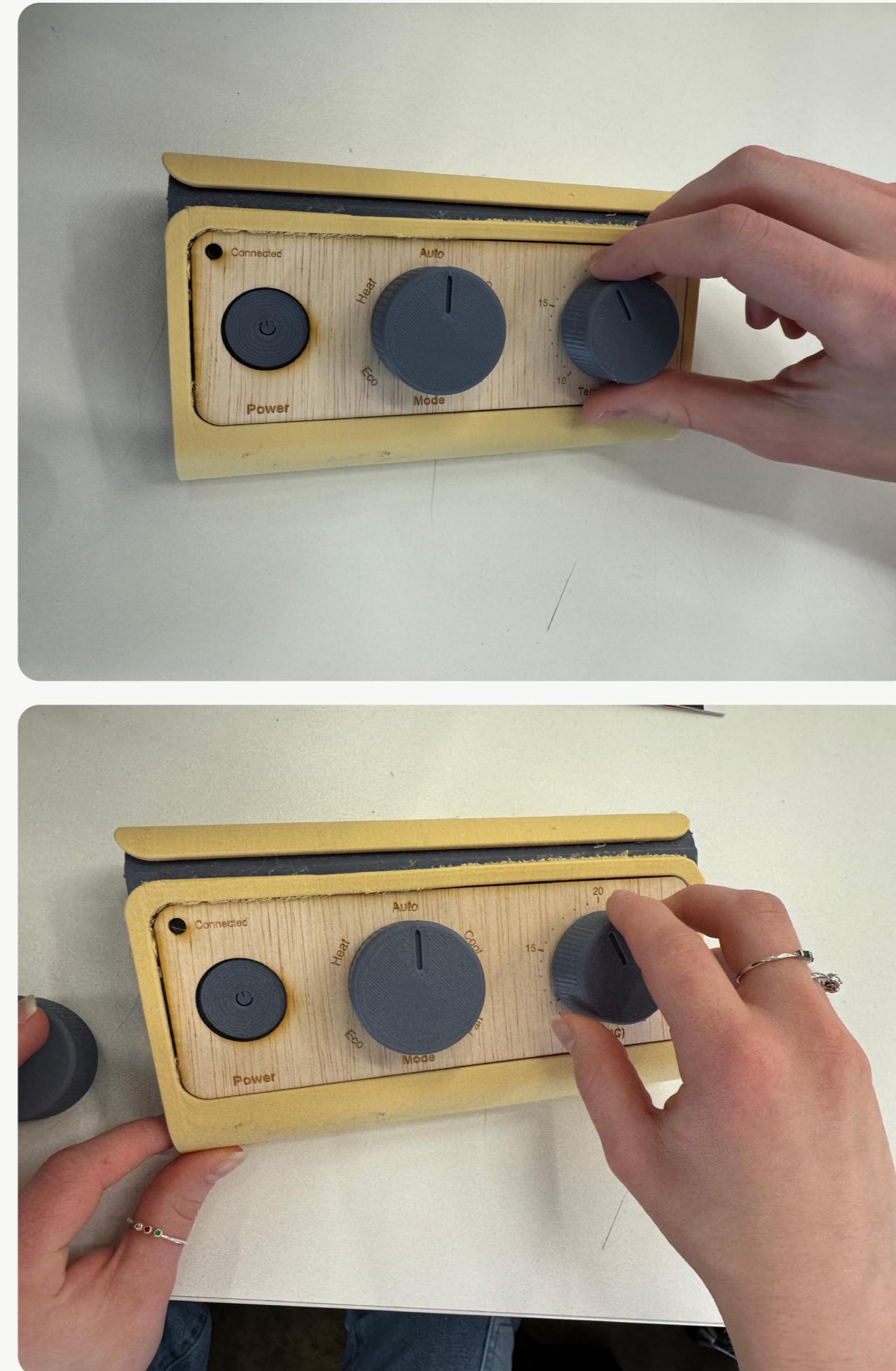
**Prototype 2**



**Prototype 3**



**Prototype 4**



**Final Prototype**



“Sounds very helpful”

“We all need help as we get older”

“Make life much easier”

“icons are clear”

“[Text is] very visible”

“Might be a bit too big”

“Visual similarity of modules could cause confusion”

“Comfortable to use”

“Very easy [to use]”

“Don’t have to strain to turn [knobs]”

*Sometimes confused buttons with knobs*

“Needs clearer feedback on modules (don’t just rely on dashboard)”

*Distinguish between discrete and continuous states*

*A knob which tapers slightly from bottom to top was preferred in user testing*

UX testing has been crucial in developing the LEO Modules. In order to ensure ease-of-use for the module design I conducted user journey mapping, UX, and ergonomics testing with a diverse group of users with a focus on older aged individuals. These iterative tests aimed to make the modules as intuitive as possible for an elderly audience.

# UI Development

Bold colours make different modules more identifiable

On/Off Indicator

High contrast text and background colour

More consistent 'cards' layout

Fillet 40pt

Icon 40x40pt

Power 28x28pt

Medium Text 35pt

Large Text 52pt

Phone ON

Samantha Call ended

Volume 10%

I have developed the dashboard UI to be simple and easily intelligible. The various module have been 'chunked' into their own cards and show a few important pieces of data associated with that module. In my development, the colours have been adjusted using the contrast checker to maximise contrast between text and background, increasing visibility.

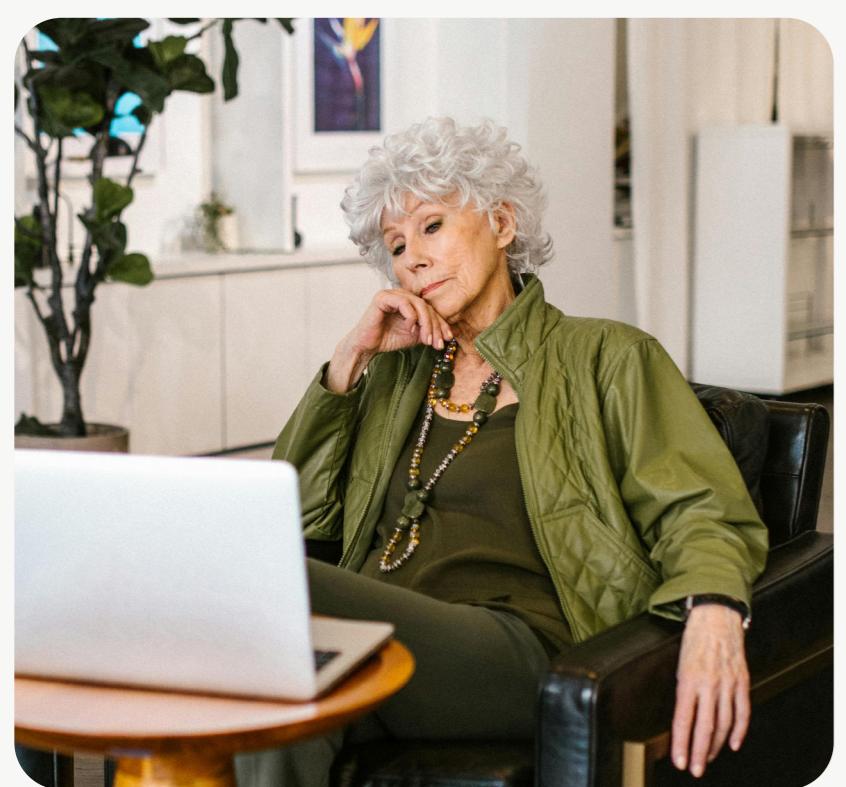
I've added more detail to the interface to make it more reflective of a realistic UI including signifiers for which modules are on and a reminders section.

# Mockups



I have developed the form language developed significantly since the first mockup. These developments have been tested and refined extensively to arrive at the final design.

# User Journey



**Maggie Stewart**

## Persona

**Age:** 76

**Occupation:** Retired

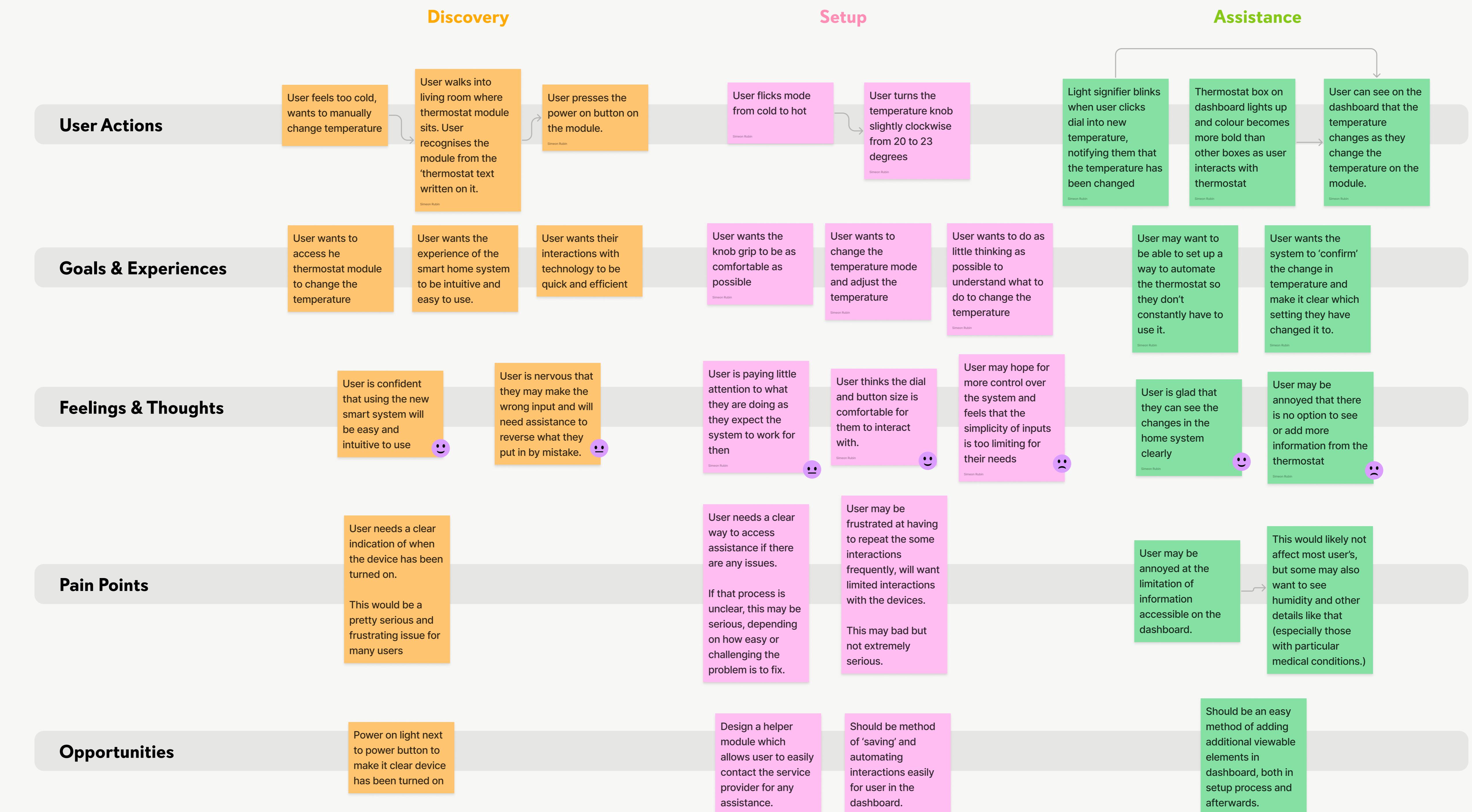
**Location:** Caulfield South, Melbourne

## User Needs

- Wants her home devices to be easy to use and finds they cause frustration when they have small buttons and confusing instructions.
- Finds touch screen interactions to be non-intuitive.

## User Mindset

- Unsure if this new home system will make the technology interfaces more accessible, but hopeful that it may help give her easier control over her smart home system.



User journey mapping helped me locate potential pain points in the service experience for the user and service provider when setting up and being integrated into the Leo Home System.

Through identifying these, I have suggested opportunities for areas of improvement to polish the overall user experience of the service.



# LGO

Effortless smart living  
for aging in place



Friendly

Familiar

Intuitive

# Product Overview

Leo is a smart home system and service, designed to be intuitive and user friendly for elderly people. The product consists of 3 main components:

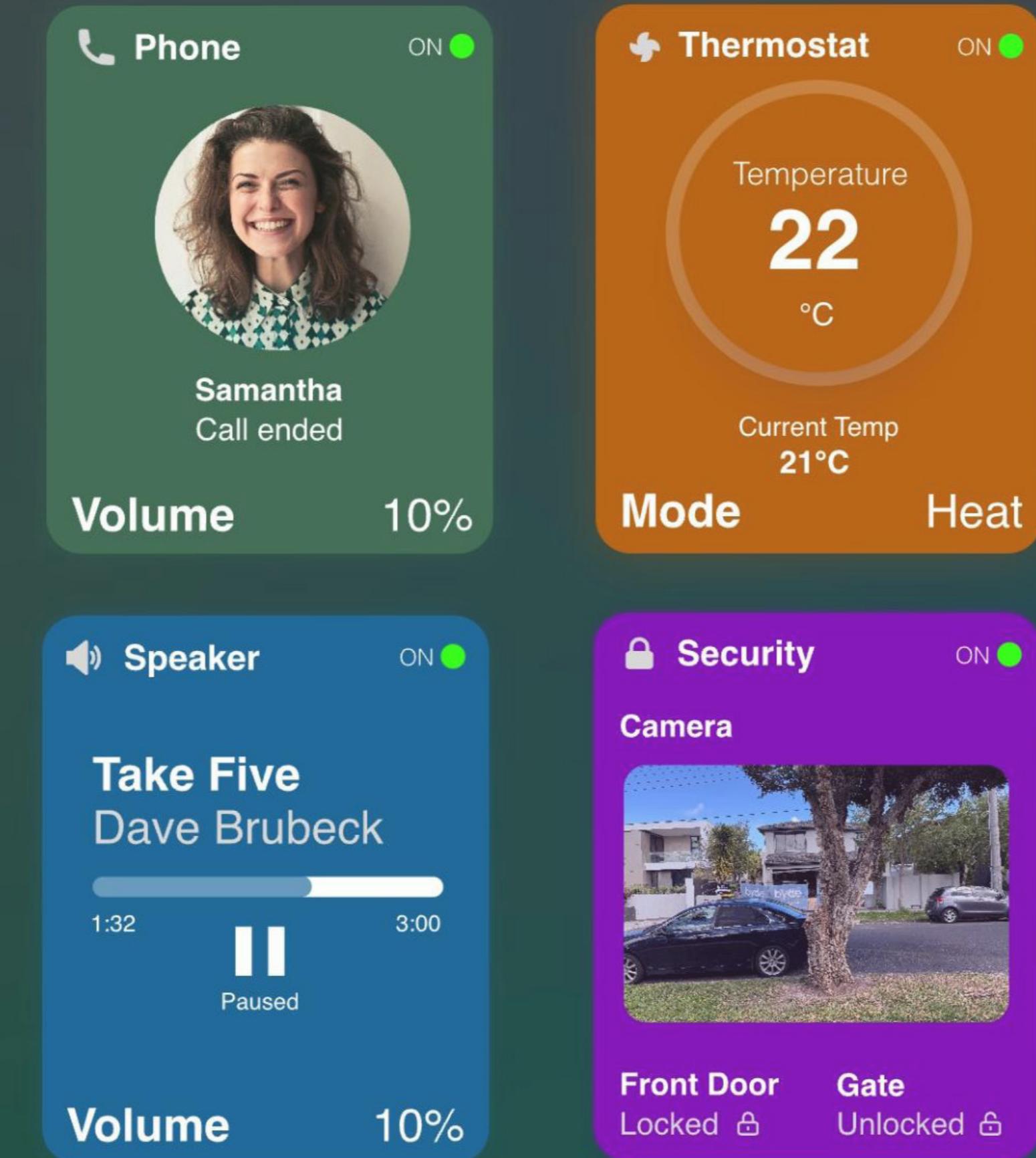
## Modules

A series of simple, tactile interfaces for engaging with a range of home needs, including a thermostat, speaker and phone. These modules are inspired by traditional radios with a focus on intuitive and familiar interactions for the elderly, as well as accessibility, ergonomics, readability and ease of use.



## Dashboard

This presents the smart home information in an accessible and readable format. It is integrated with the modules to reflect any changes from user inputs.



## Service

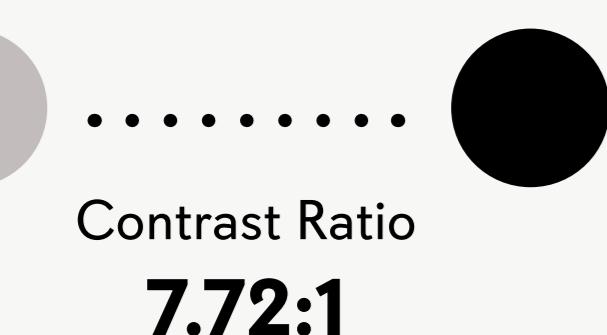
The modules and dashboard are complemented by an integration and 24/7 assistance service. The integration and training ensure the user is taught how to operate the modules so they can be confident to use them on their own. When needed, an assistance service relieves the stress of any unwanted problems.



# Accessibility Considerations

## Readability

Using WebAIM, I have checked the contrast for each of the module and UI elements, ensuring there is sufficient contrast between buttons and icons, text and background to maximise legibility.



## Signifiers

I have incorporated a mix of icons and text for each button to allow for ease of understanding.



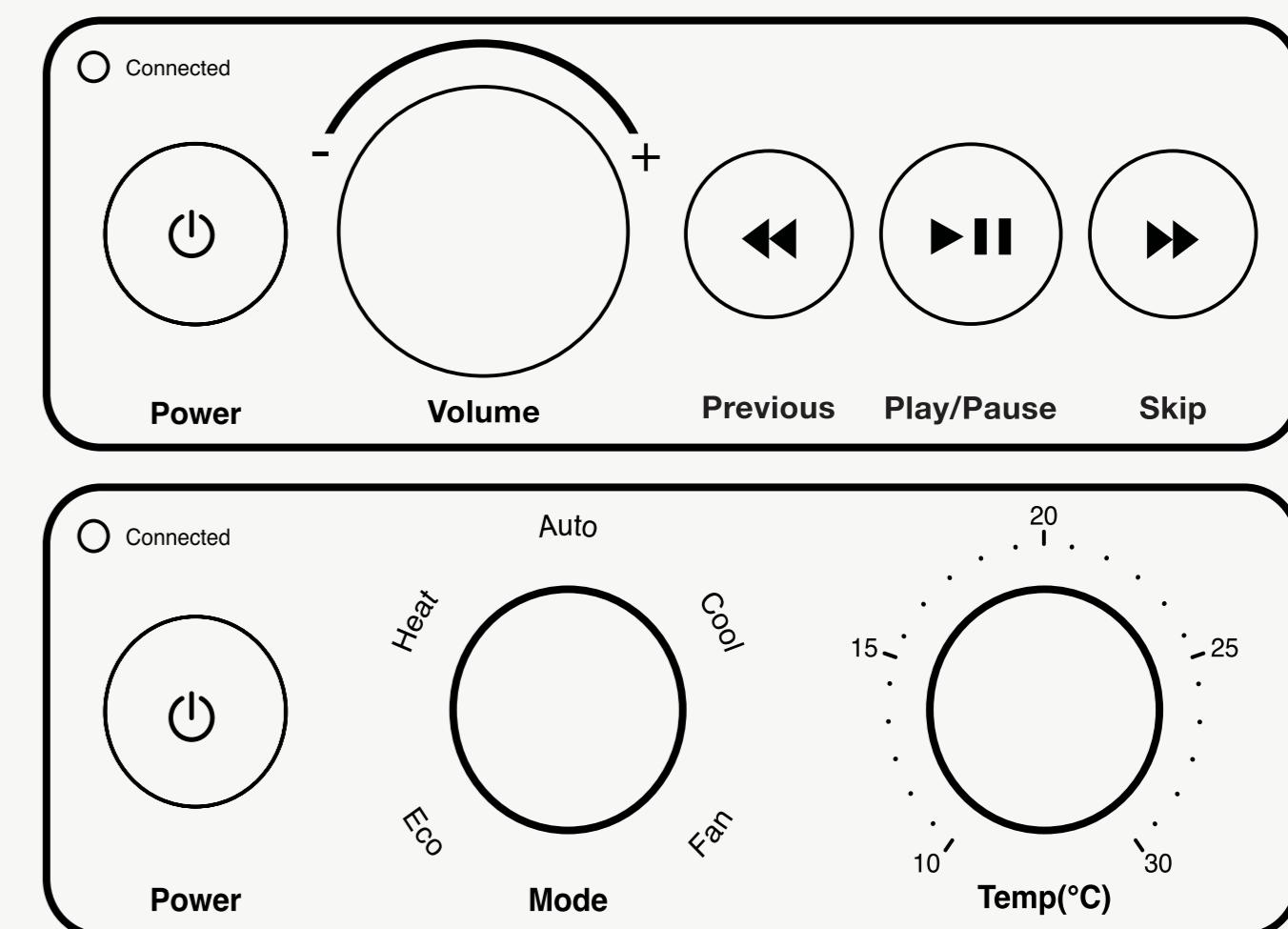
## Ergonomics

All buttons and dials are designed with key ergonomic considerations in mind. The sizes and shapes were achieved from a mix of ergonomics research\* and user testing. The modules are designed to sit on a table, ensuring the least amount of physical exertion to interact with.



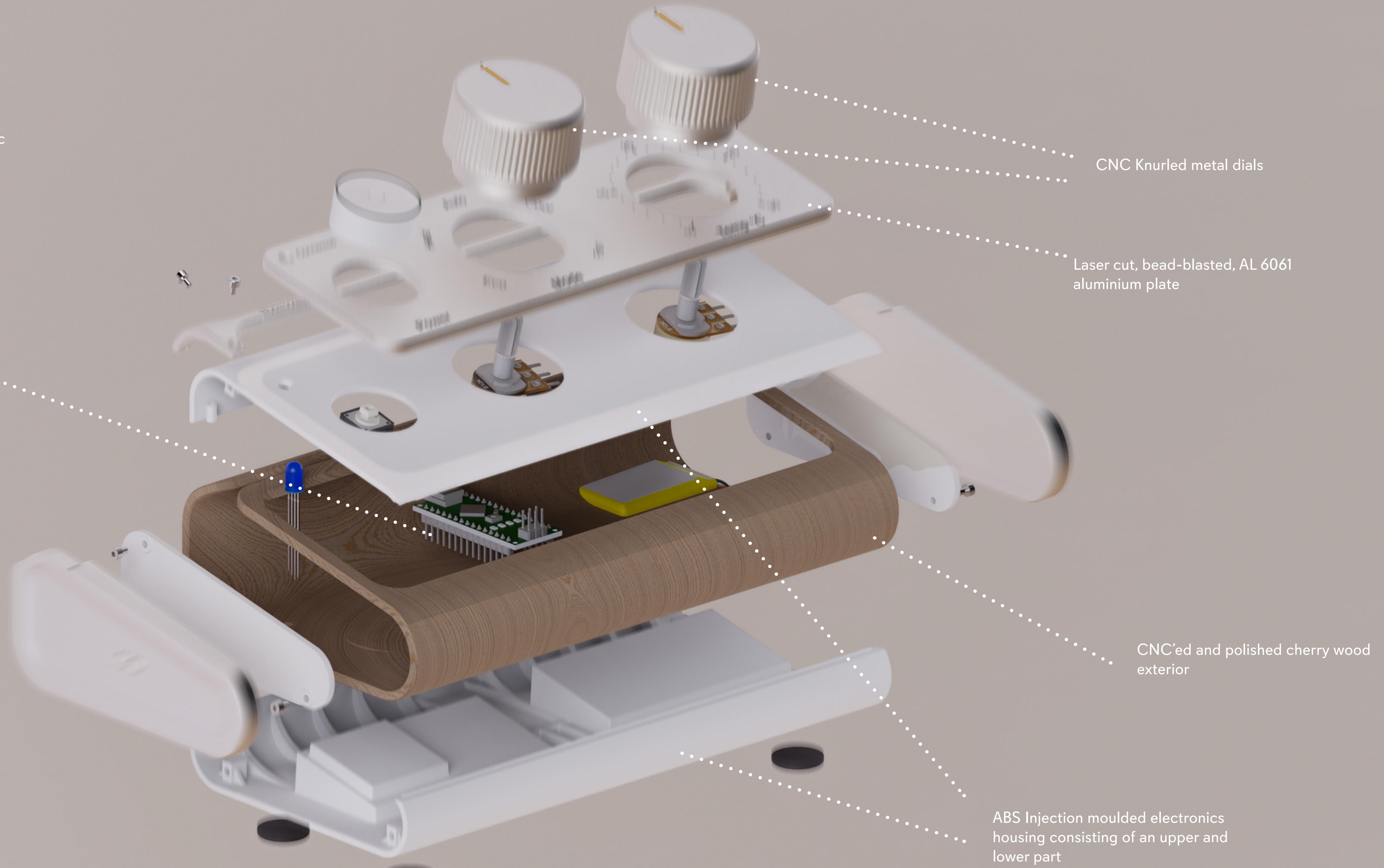
## Cognitive Load

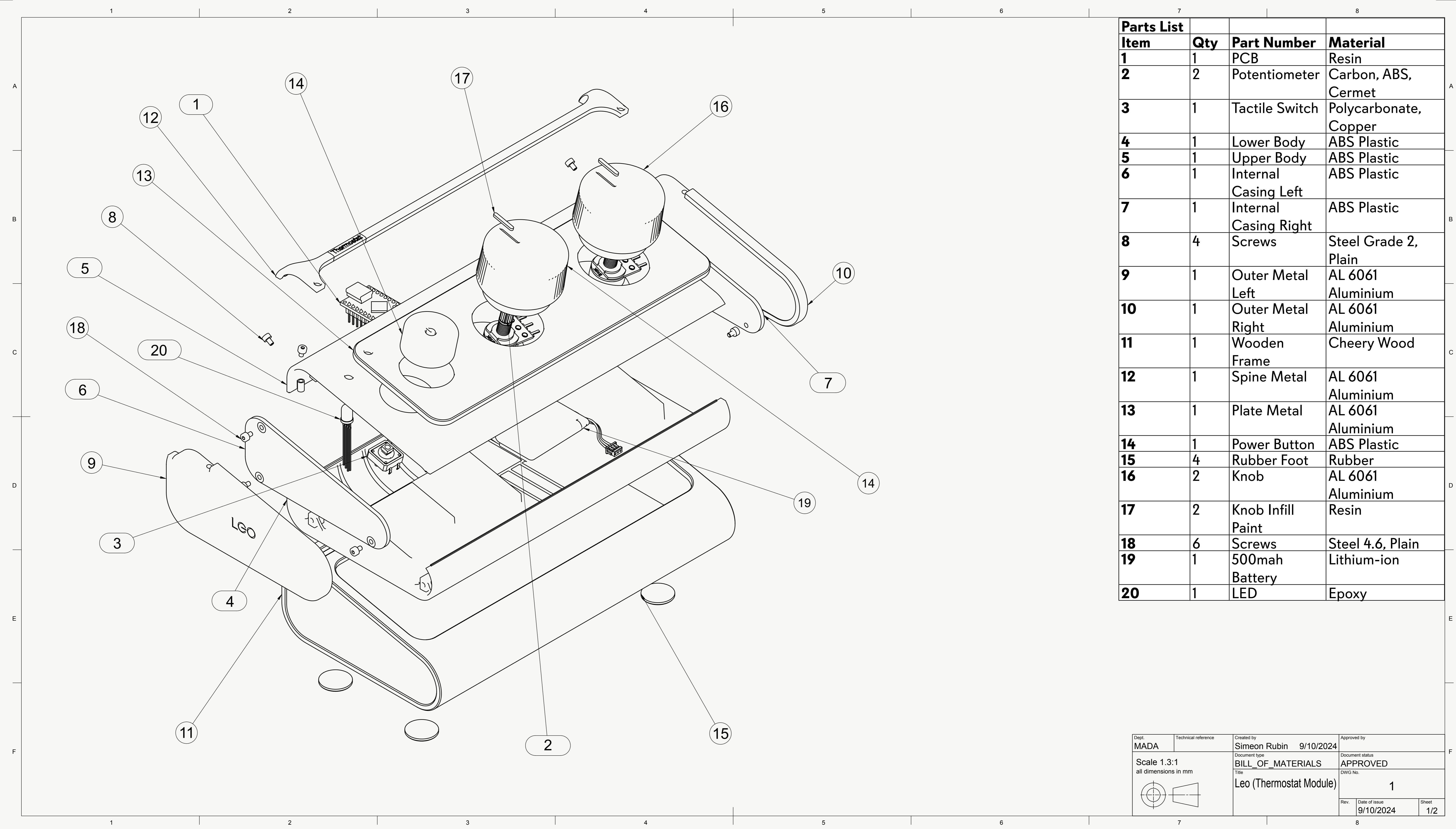
The modules are designed and tested to ensure that they maximise ease-of-use. The user should have to do minimal thinking to understand how to navigate these interfaces.

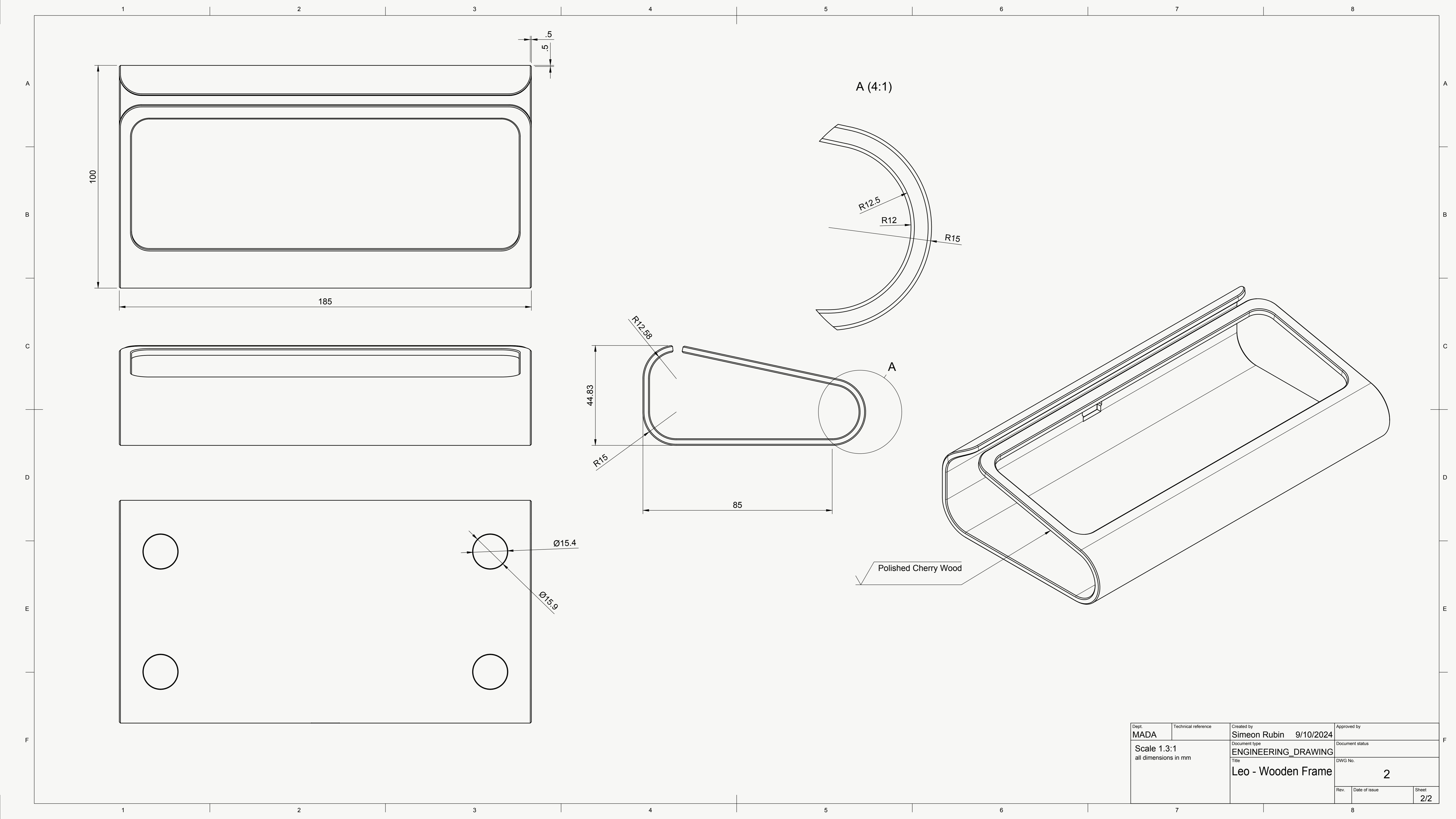


# DFM

Ease of manufacturability plays an important role in the LEO module design. The design consists of a consistent base form which can be easily customised to fabricate modules for a variety user-specific home needs.









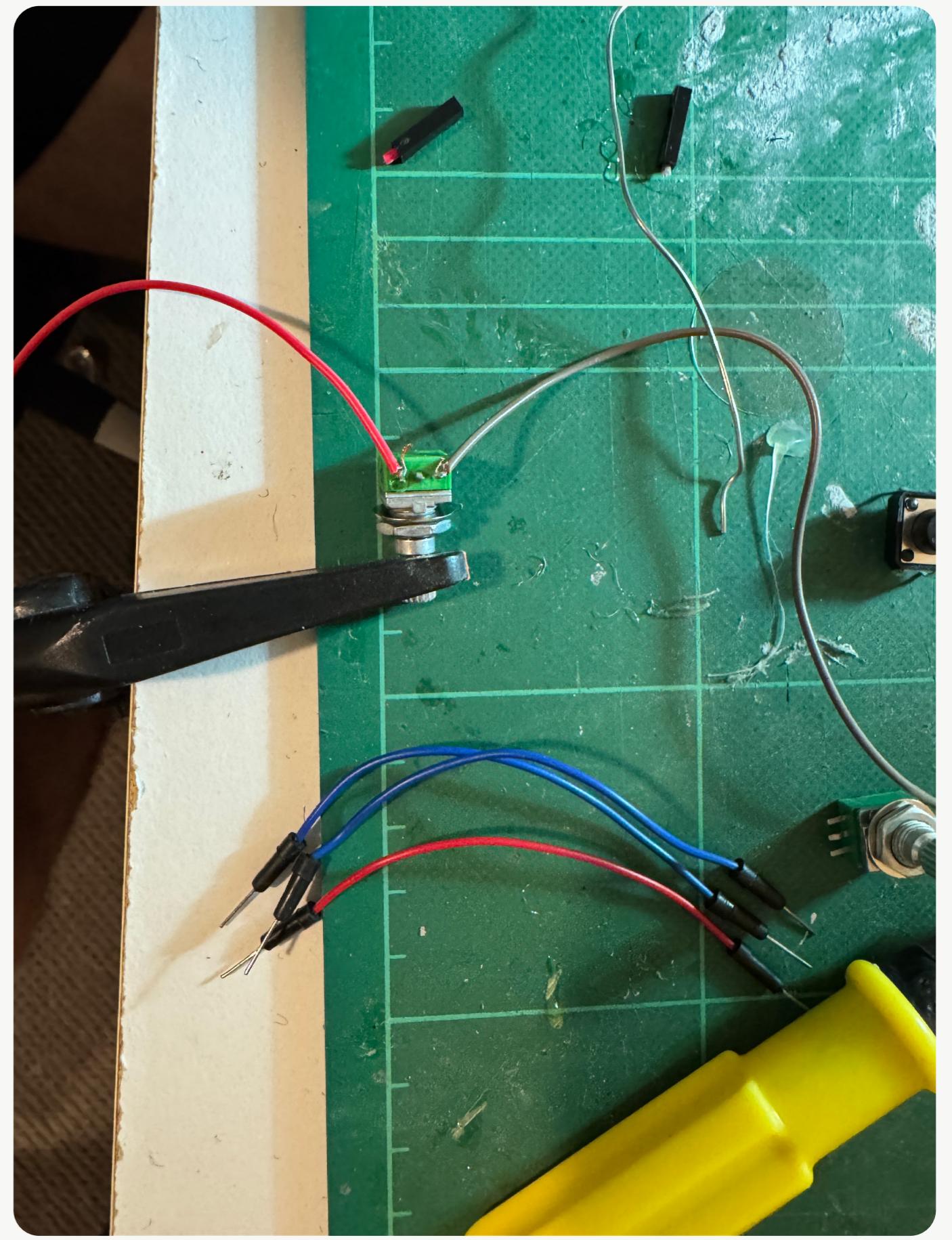
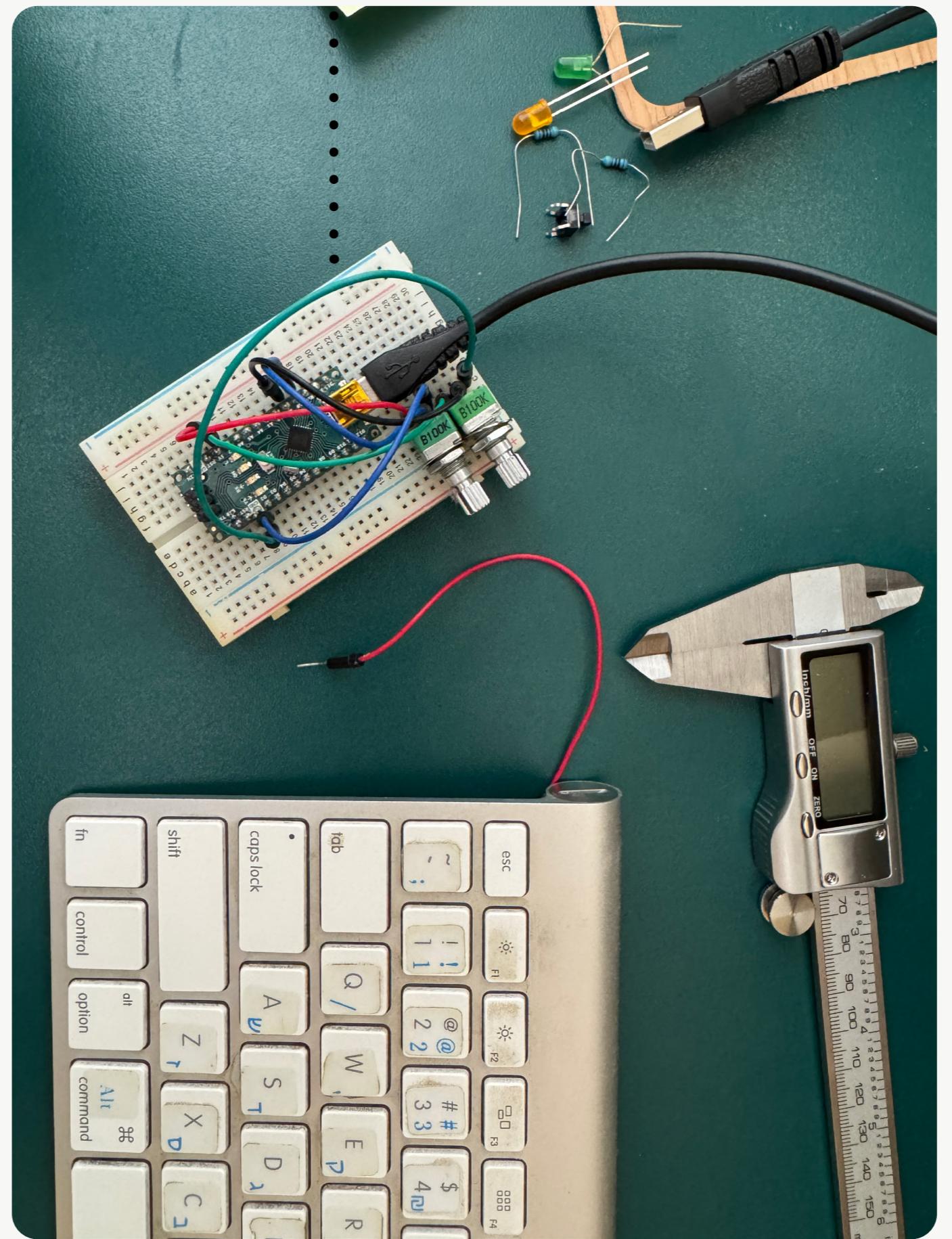
# Prototype Making & Electronics

3mm  
laser cut  
aluminium

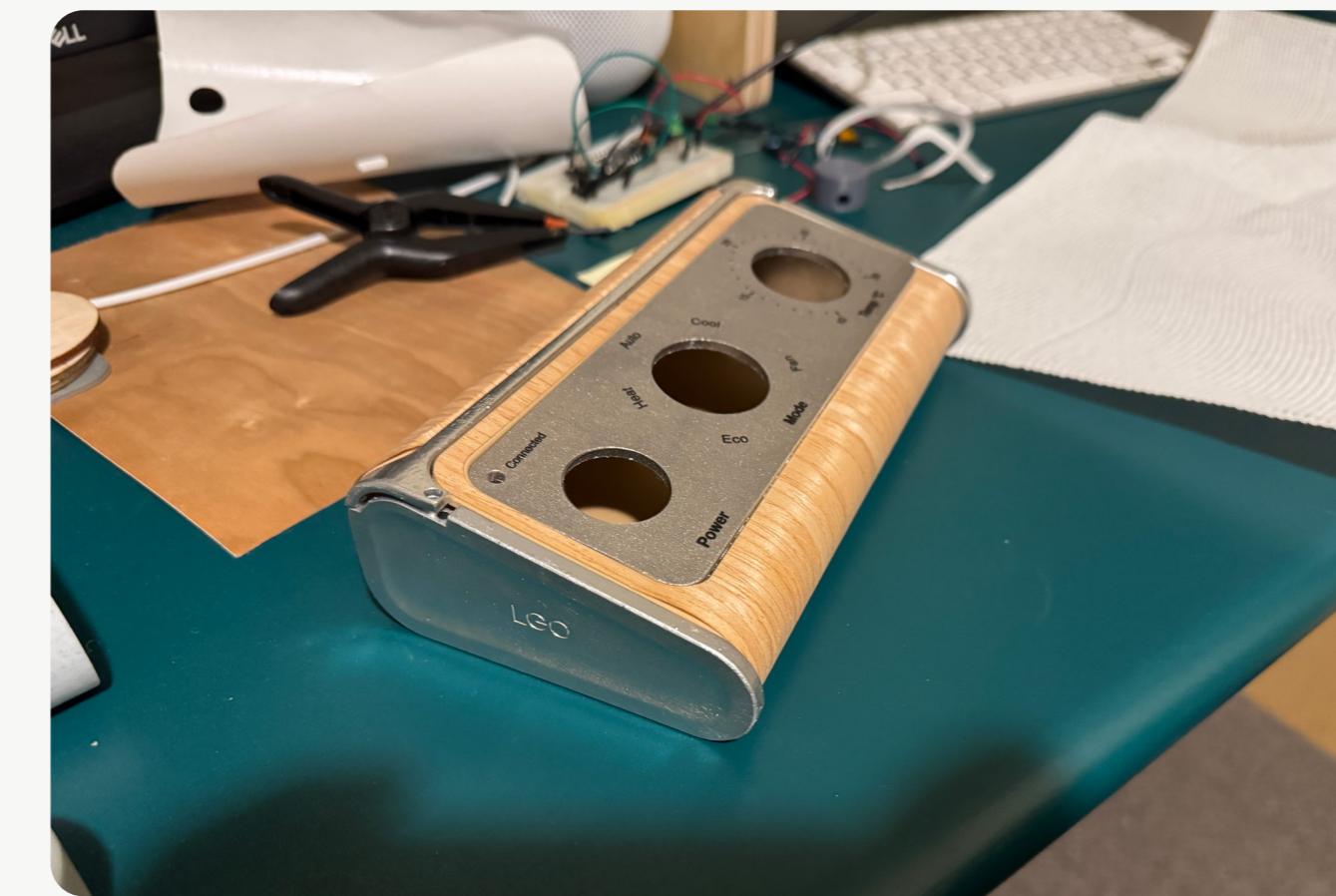


Vinyl sticker with  
decals applied to  
metal plate

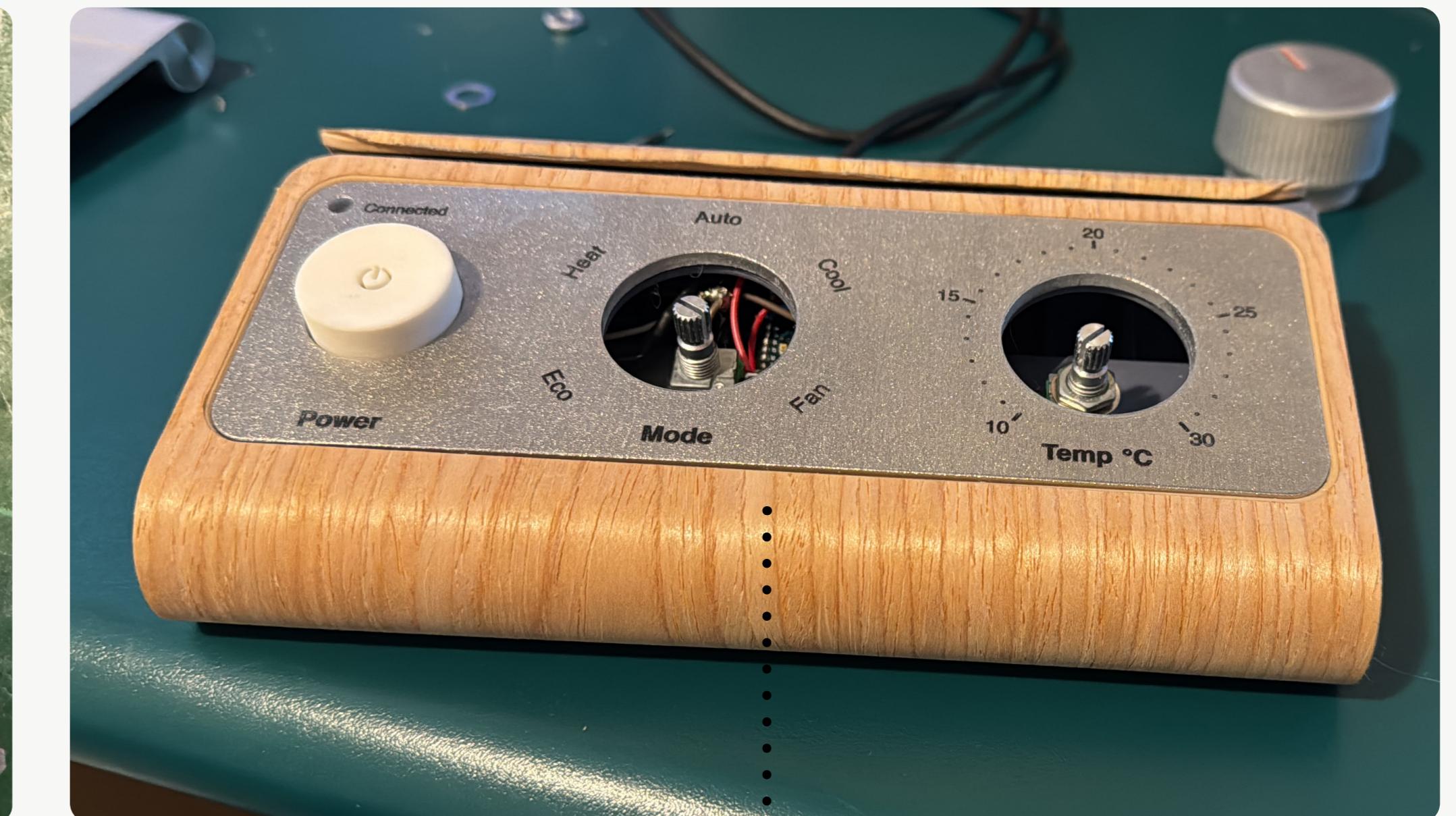
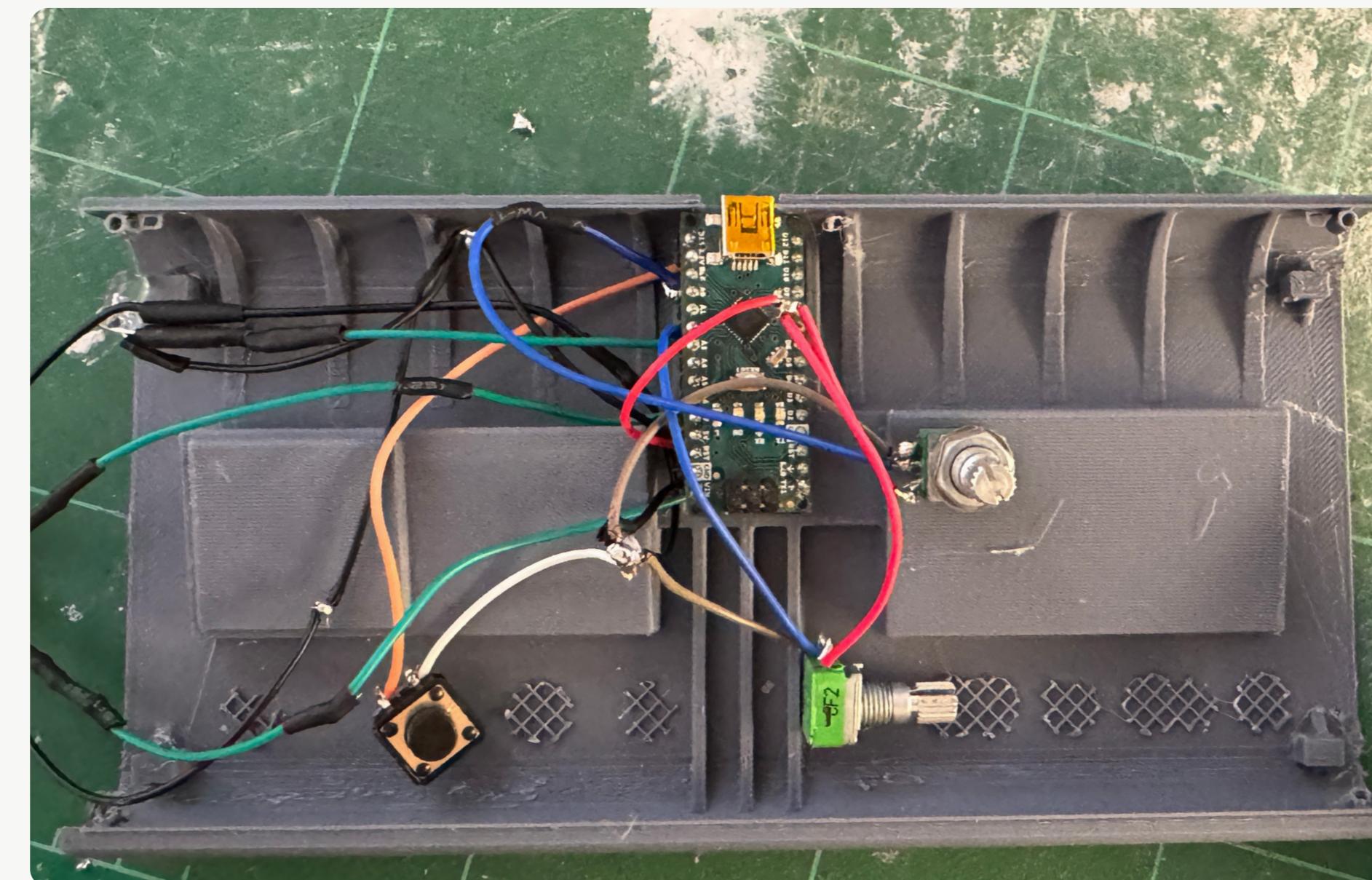
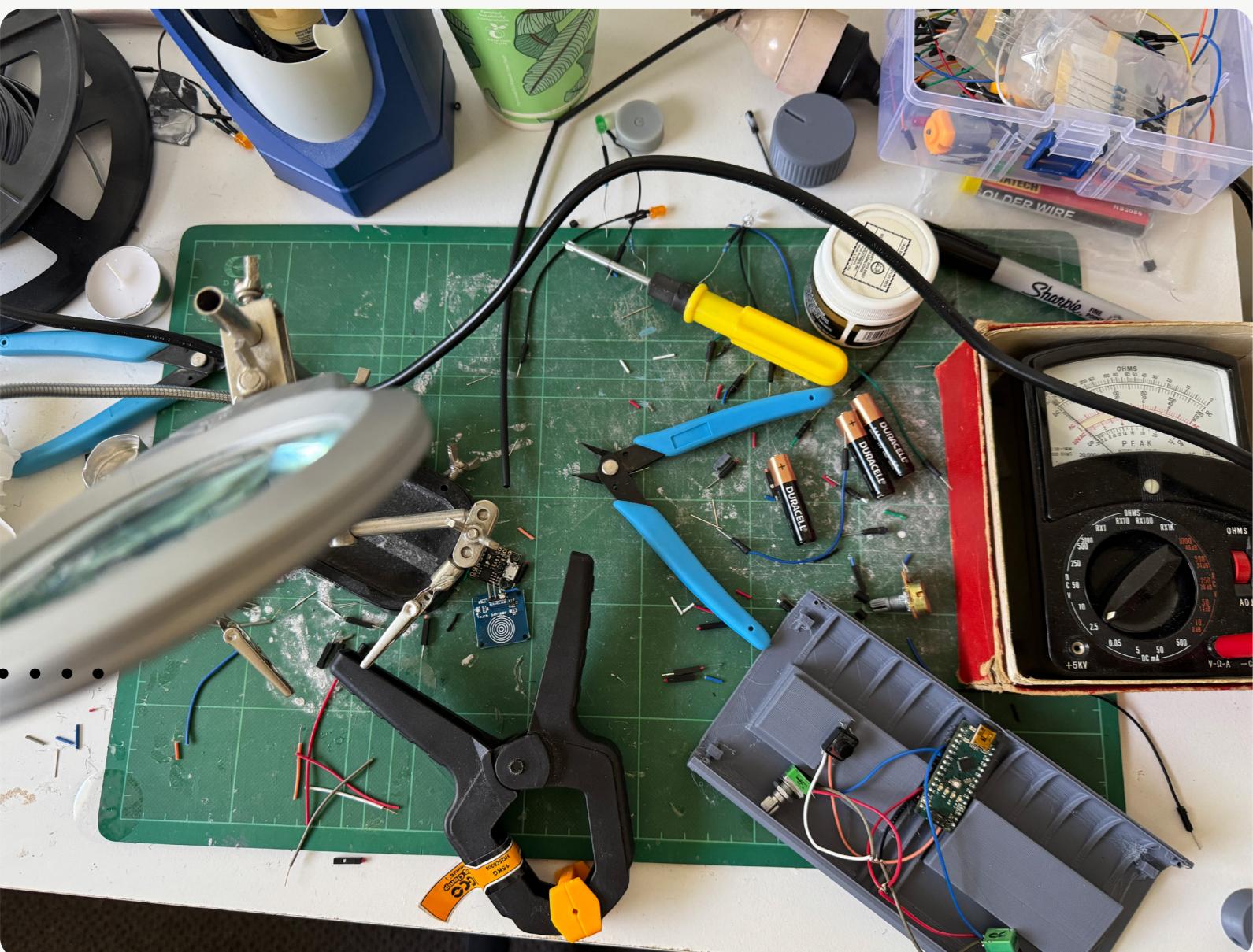
Testing electronics  
with Arduino Nano



Wood  
veneer  
applied  
to PLA 3D  
Print



Setup for  
soldering  
cables to  
Arduino



Electronics  
inside model

# Product Benefits



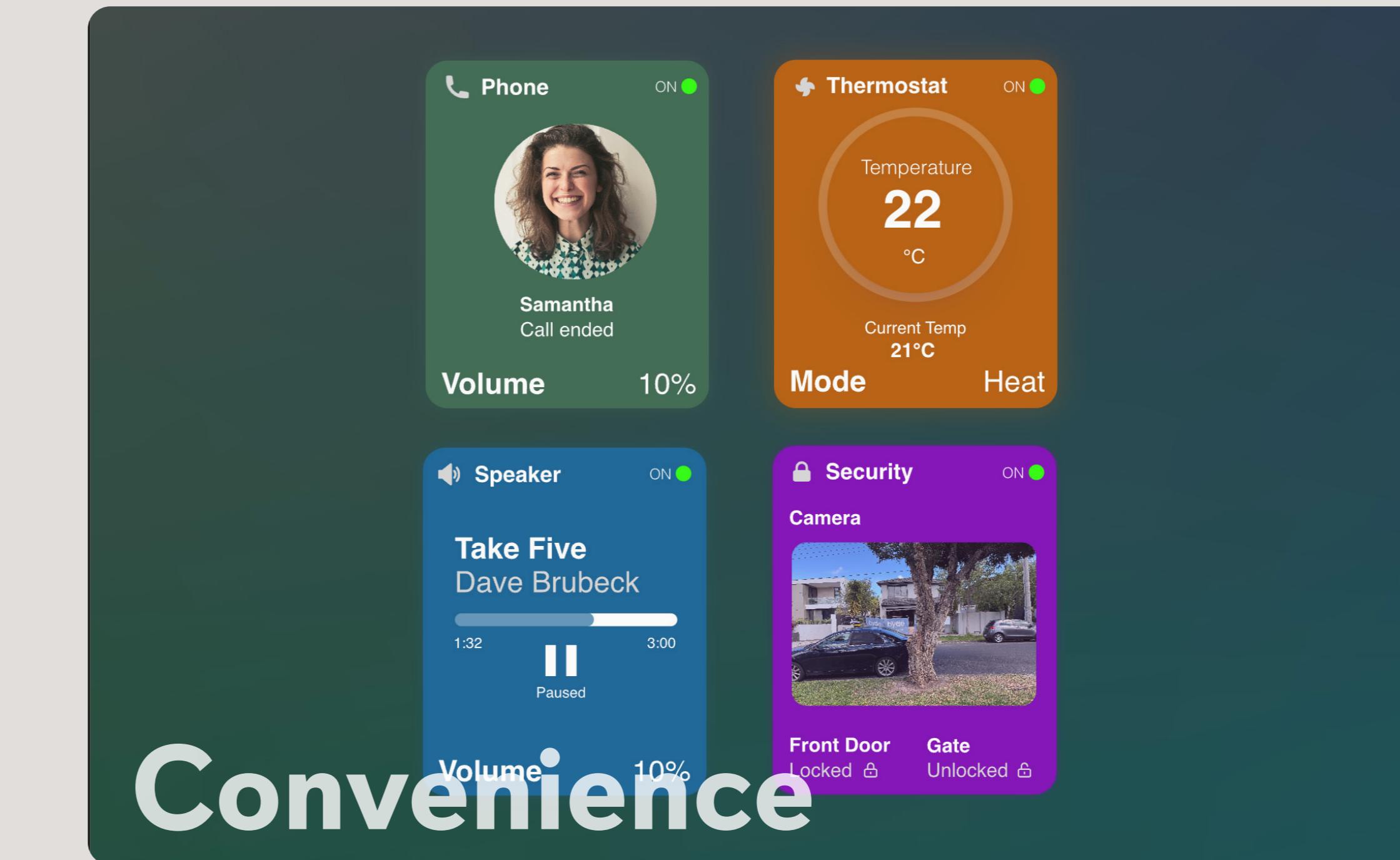
LEO takes inspiration from traditional devices, incorporating familiar interactions, large text, clear iconography and customer training. This allows for ease of use for the elderly.



LEO is focused on accessibility with considerations such as high contrast text, an ergonomically considered interface and a user assistance service.



With a range of different modules and functions, LEO can be customised to meet each user's needs.



LEO Home Centre provides feedback and reminders to add convenience and elevate stress, making aging in place a comfortable experience.

# Product Impact

## Environmental

- Smart homes optimise energy use amongst the elderly population, contributing to a lowered carbon footprint.
- Use of renewable materials such as cherry wood minimises environmental impact.
- Manufacturing with materials such as aluminium can have a negative environmental impact.

## Cultural

- Modularity of the system allows it to be adapted to various cultural and contextual needs for elderly across the world.



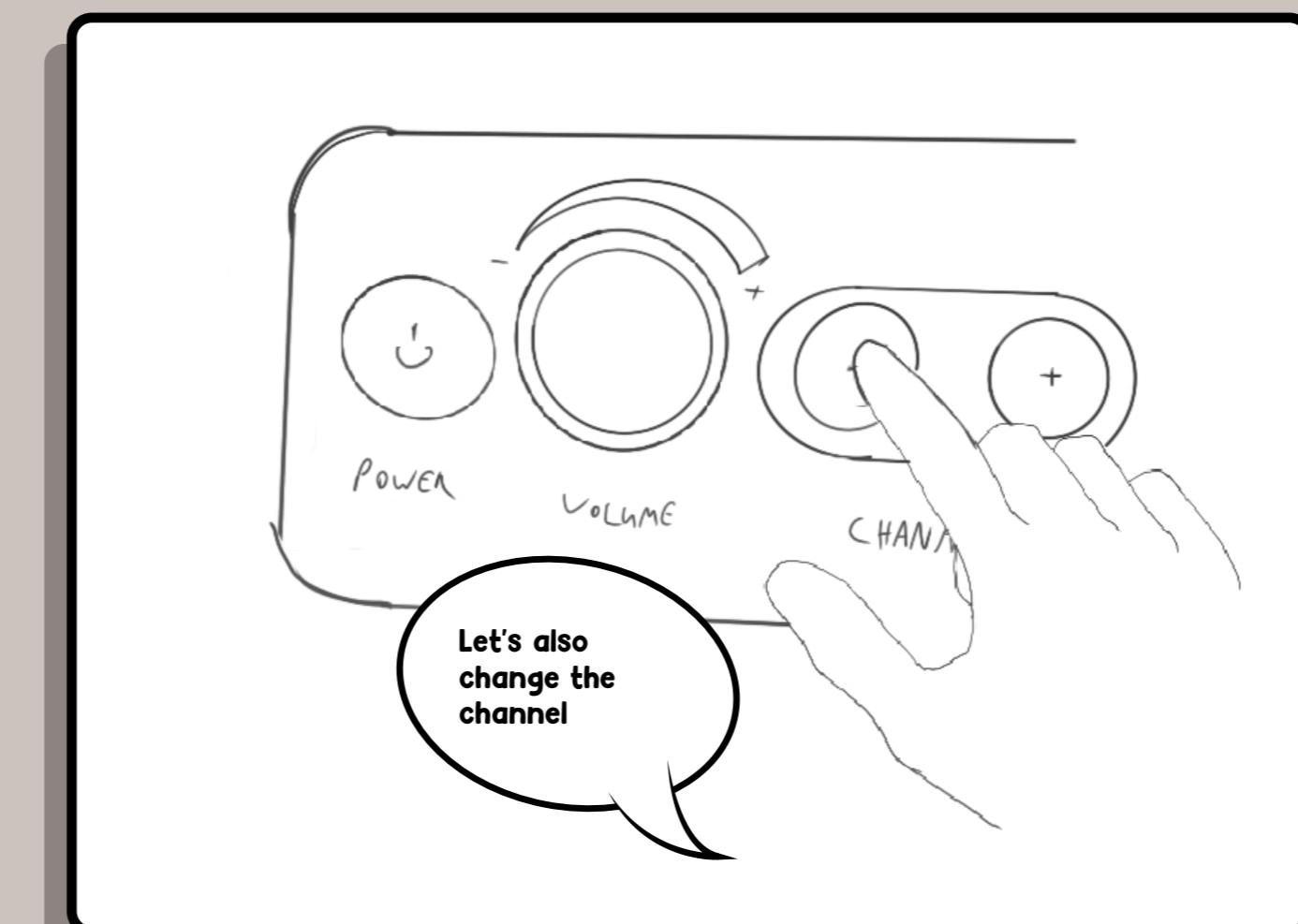
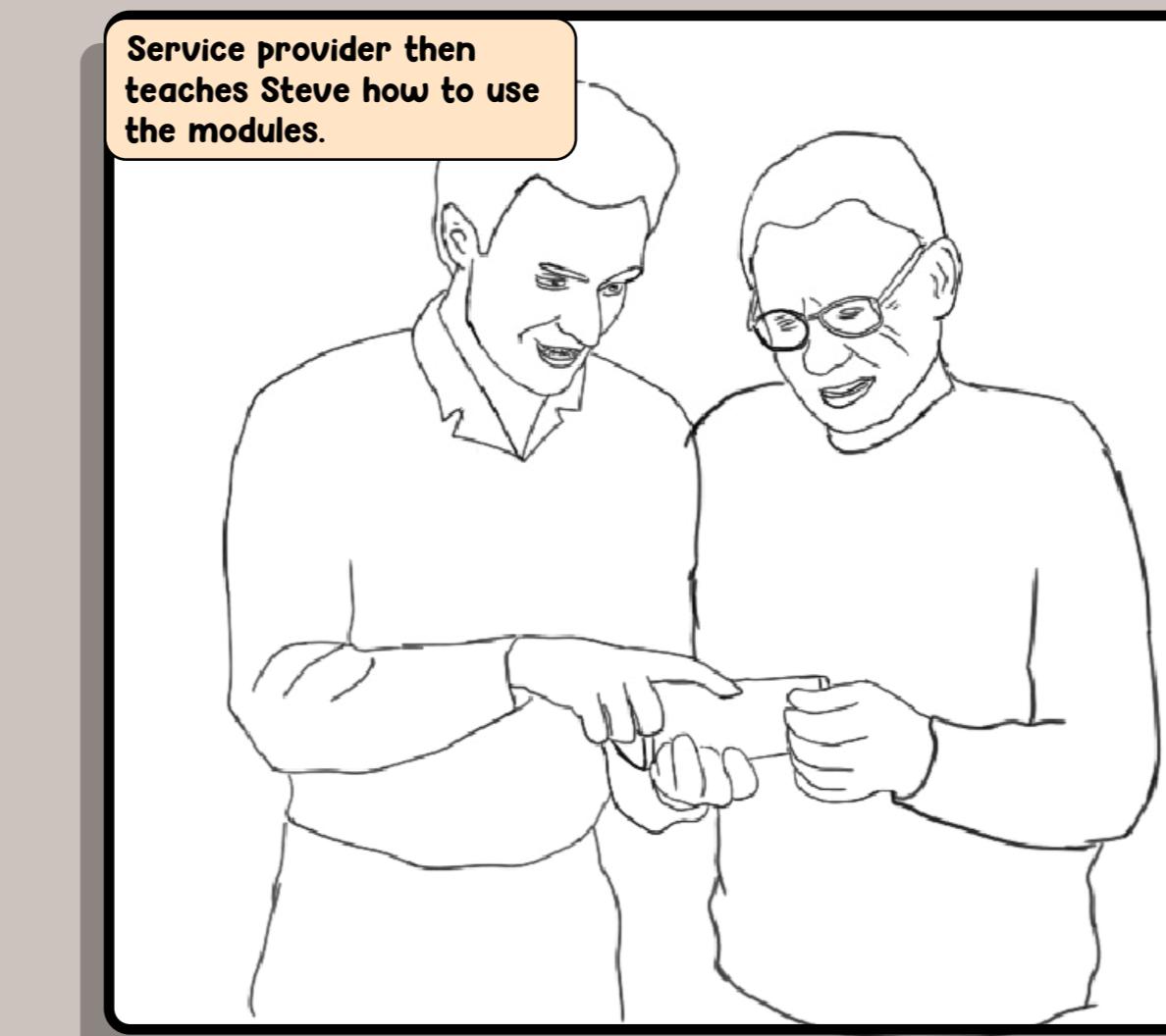
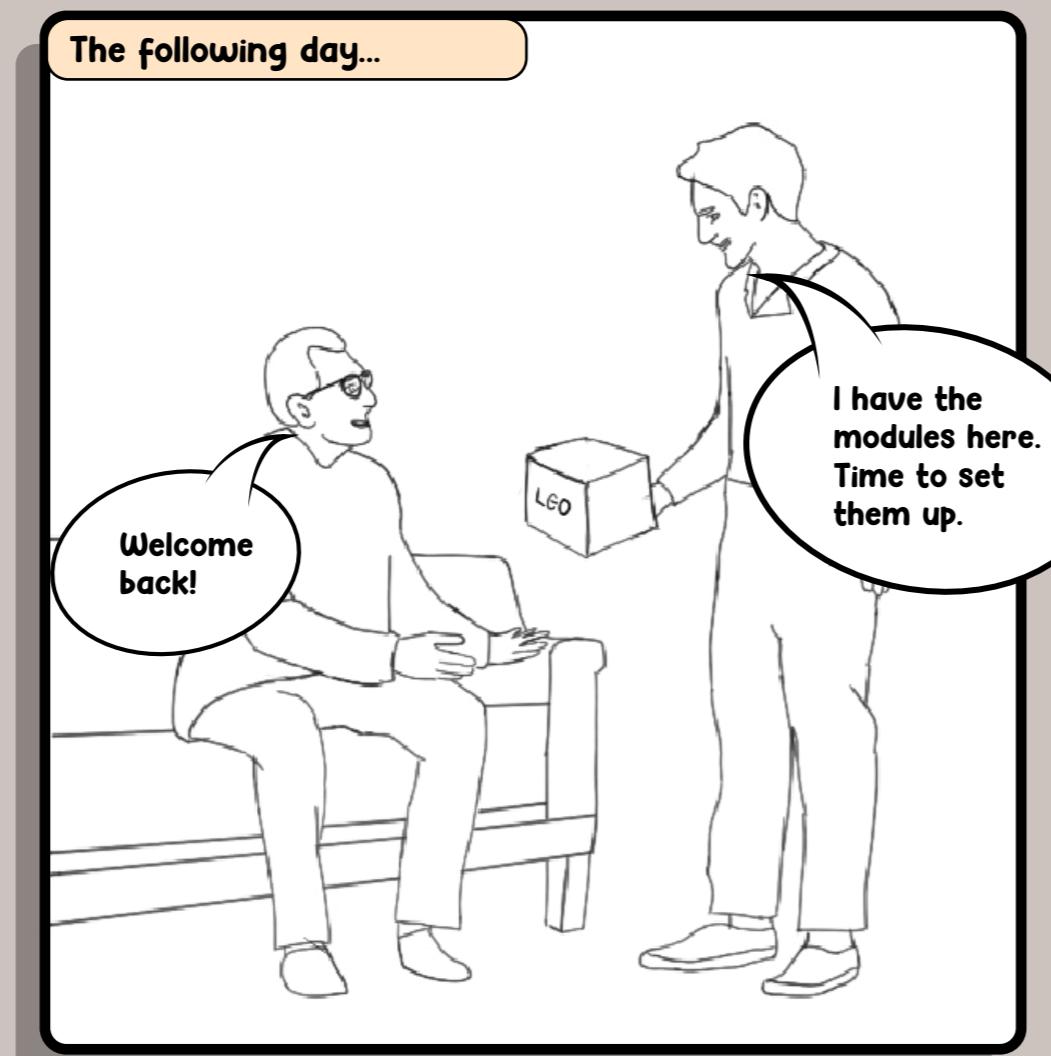
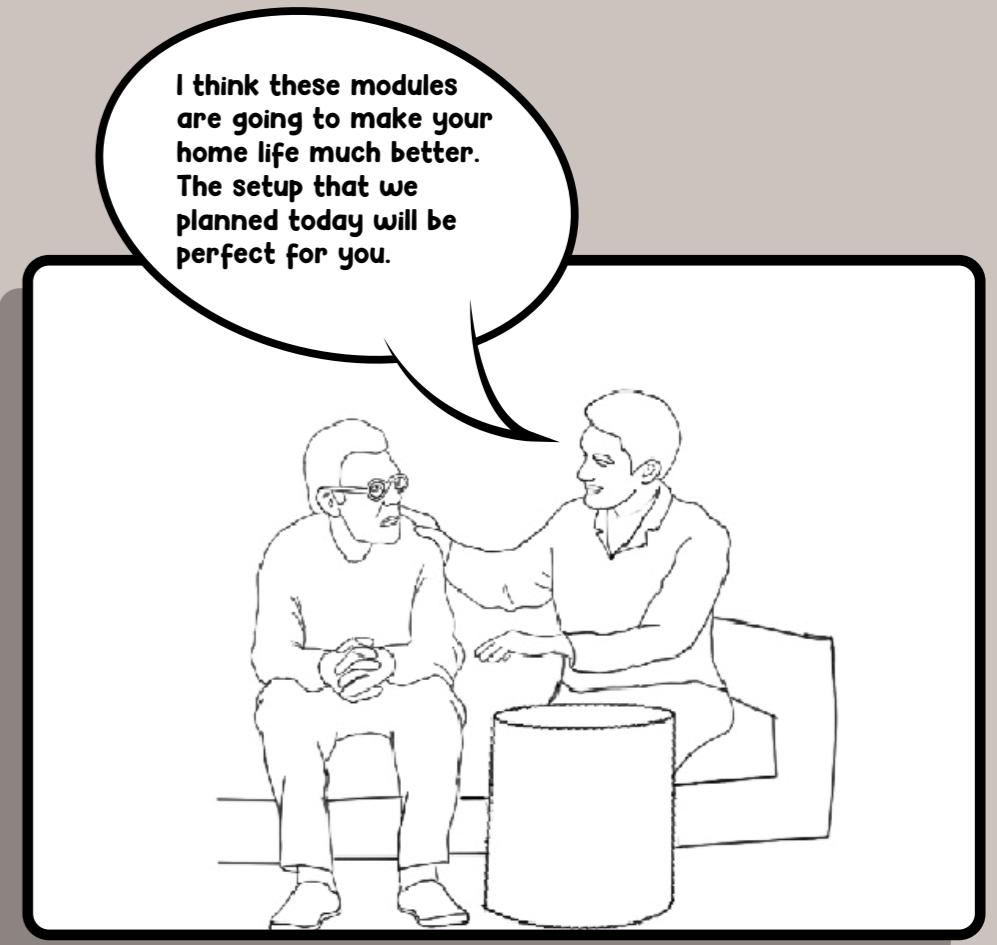
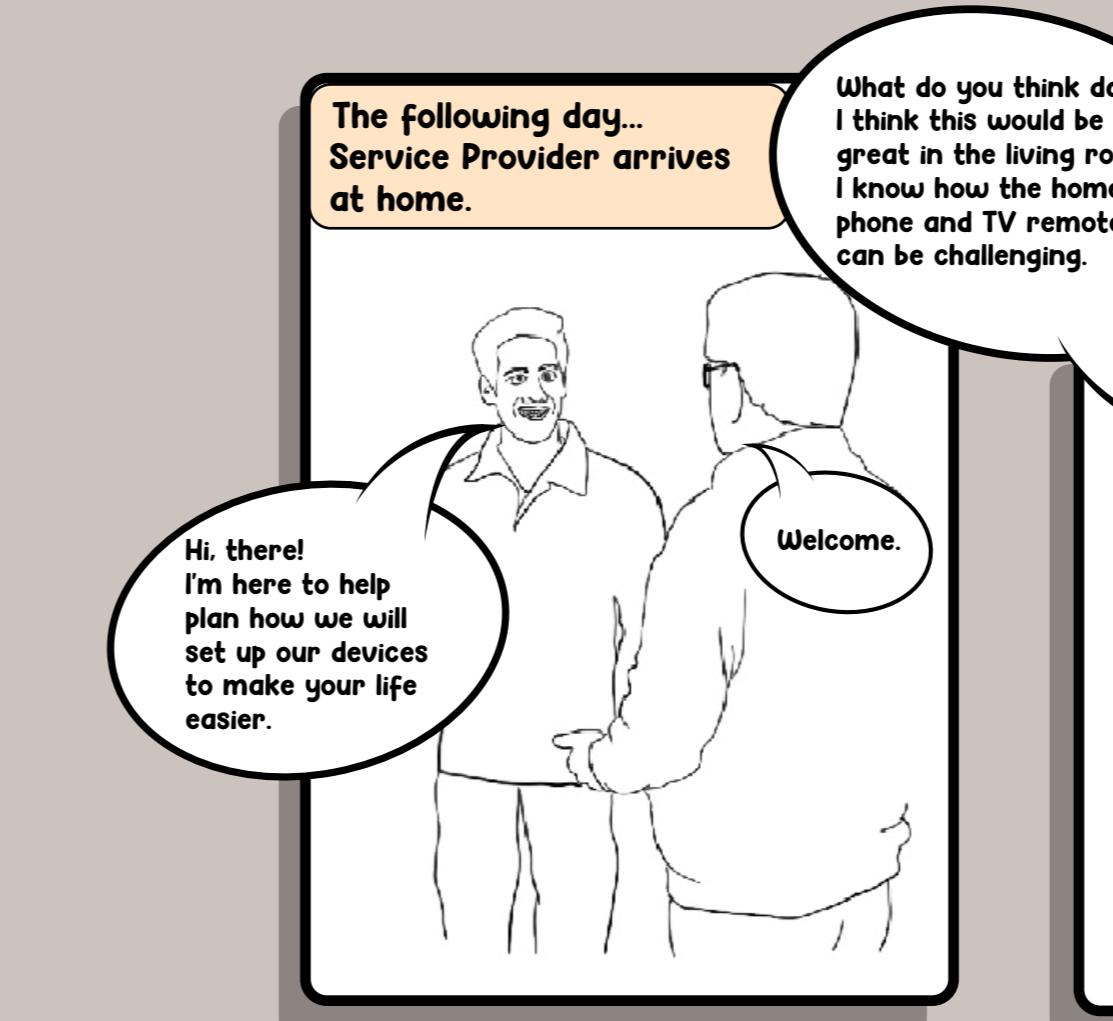
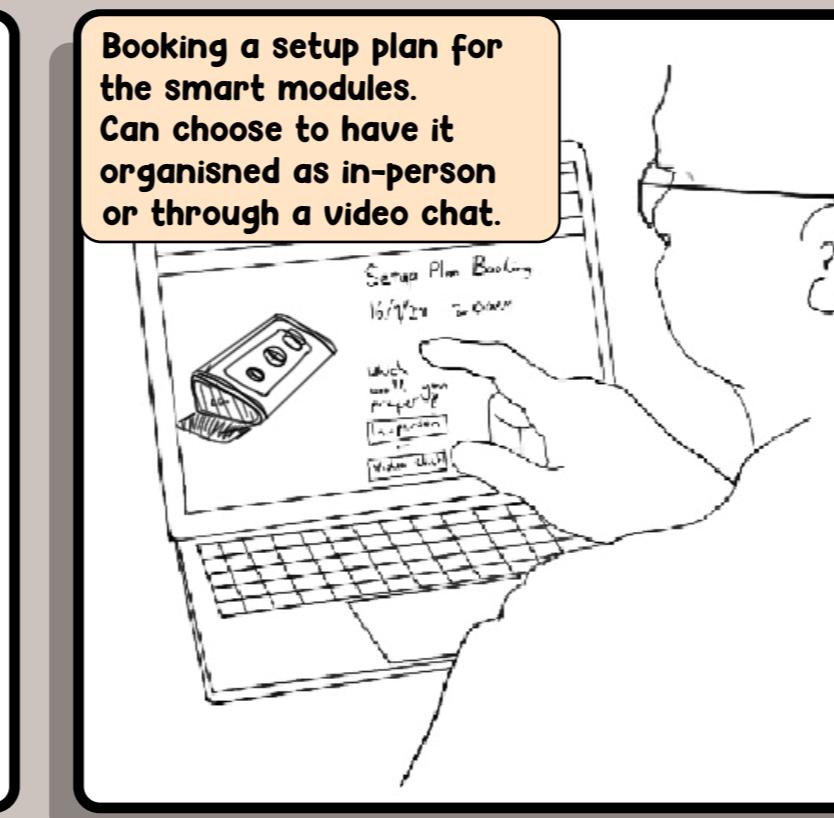
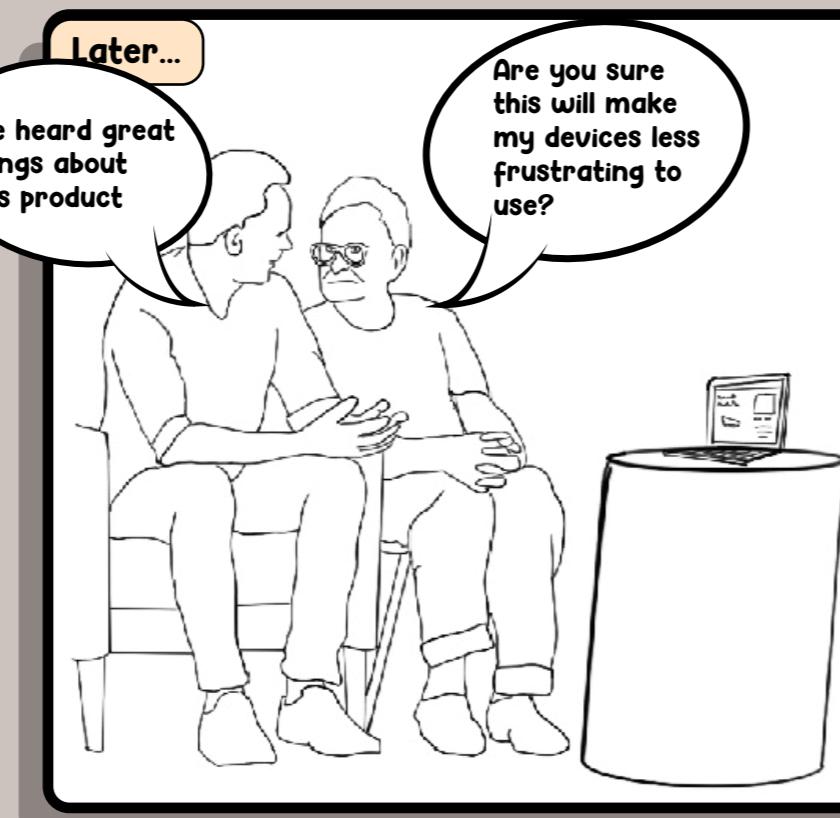
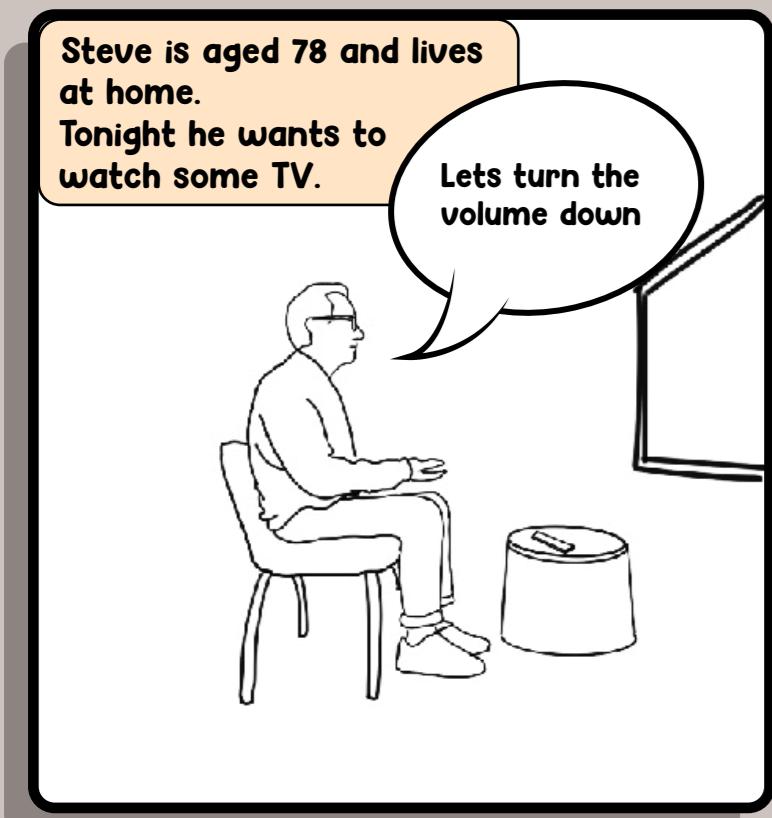
## Ethical

- More safe and secure means of engaging with smart technology.
- Affects a more positive relationship with technology amongst elderly.
- Inclusive design ensures people of many abilities can engage with LEO.

## Social

- Improved quality of life for elderly with enhanced convenience.
- Helps the elderly engage independently with modern systems, fostering a positive relationship with new technology.

# Service Storyboard





# Final Prototype









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## Page 3

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\*Images of elderly people retrieved from <https://www.pexels.com/>

\*Folio icons retrieved from <https://iconduck.com/>

\*Icons for modules and dashboard retrieved from <https://lucide.dev/icons/>

\*Pantone swatches retrieved from <https://www.pantone.com/hk/en/>

\*Home interior mockup retrieved from <https://mrmockup.com/>

\*All internal components including potentiometers, tactile switches, battery and LED retrieved from <https://grabcad.com/library>

\*Dialogue and thought bubbles for storyboard by <a href="https://www.freepik.com/free-vector/pack-dialog-balloons-with-comic-book-vignettes\_1167327.htm#query=comic%20book%20speech%20bubble&position=4&from\_view=keyword&track=ais\_hybrid&uuid=9eca800c-44d4-4d20-baa7-3ff45c6c5f51">Freepik</a>

\*Copilot AI used for information summaries and for generating backplate images for some sketches

## Reflection

Designing for the elderly has made me challenge my assumptions about what makes an interface intuitive. As a user-centred design project, I've learnt about the importance of sharing and testing my ideas with others rather than simply relying on my intuition as a designer. User feedback has played a crucial role in helping me develop my ideas and refine the overall user experience. This project has also challenged me from a technical perspective, helping me to grow in my making skills. I applied a variety of processes to develop my prototype, including metal laser cutting, soldering and programming circuits. I will take these skills and experiences with me into future projects.