

MASTER'S GRADUATION THESIS · INTEGRATED PRODUCT DESIGN

Unwind Intentional Evenings

An alarm clock that introduces friction to phone use in bed & substitutes this habit with an intentional moment to end the day.



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Integrated Product Design · Graduation 17 July 2026

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Executive Summary

In recent years, **excessive late-night phone use** has increased alongside the rise of social media and short-form content. **This habit impairs sleep quality** and delays sleep onset through heightened emotional arousal and light exposure. **The root of this issue is taking the phone to bed**, which perpetuates the same cycle of screen time first thing in the morning.

This project aimed to develop a physical product that introduces friction to using a phone in bed, enabling users to achieve their aspired evening and morning routines. Using an **iterative rapid prototyping approach**, the project identified key opportunities and challenges in changing this behaviour. Insights revealed significant hurdles like low willpower, reachability, cravings for easy entertainment, and a lack of an alternative habit. Ultimately, the research argued that the solution must be **grounded in the environmental design** of the bedroom, where the **target behaviour becomes the path of least resistance**.

In collaboration with design studio New Things Lab, this led to Unwind, an alarm clock that eliminates the dependency on using a phone as an alarm. It addresses the user hurdles both explicitly, by **refusing to set the alarm while the phone is nearby**, and implicitly, by **promoting an unwind ritual** including breathing exercises, ambient light, and audio. Early testing showed potential, though real habit change takes longer to form than the project could test.

Ultimately, this project contributes to the field of slow technology by offering an opposing force to an ever-connected world, encouraging users to rethink their relationship with their devices.

Preface

Personal Motivation

Few topics generate as much shared recognition as our relationship with our phones. Almost everyone I've spoken to during the course of this project, especially my generation, has an opinion and personal struggle with how much time they spend on their screens. That drew me to this subject.

My interest deepened during my minor programme in South Korea, one of the most digitally connected countries in the world, and coincidentally the year that AI and algorithms became mainstream. I became aware of how quietly technology reshapes behaviour. The moment that has stayed with me is seeing a student watching YouTube Shorts while doing situps in the gym, unwilling to leave seconds of time without external stimuli.

I recognise the same pattern in myself. Despite repeatedly intending to use my phone less, the automation of the habit activates. I have rarely finished a long scrolling session feeling that my time was well spent. What interests me is not the technology itself, but the gap between how we want to live and how we actually do: the subtle way that a device designed for convenience has become something we organise our attention around, often without noticing it.

We didn't intend the world to be this way, so can we do anything about it?

Acknowledgements

This project would not have been possible without the support, interest and contributions of many people.

I would like to thank the team at New Things Lab for the opportunity, the design thinking, brainstorming sessions, and the open atmosphere. Insyght, the sister company sharing our office, for the soldering lessons, fun lunches and critical feedback.

Secondly, my coaches Jaap and Peter, for the critical feedback, keeping the meetings fun and light and the support in structuring my design work.

I would also like to thank the experts who generously gave up their time to answer my endless questions during the process of writing this thesis: Stefan van der Stighel, Andries Kalsbeek, Alicja Kryczka from Mudita, Peter Arvad Larsen from Habity, Pien de Jager, Merijn van de Laar, Derek Antosiak, Marieke van Vugt, Christina Schneegass, Gijs Huisman and Saba Kheirinejad, Alien van der Vliet and Bart Wagenaar.

Delft, July 2026

Tobias

Abbreviations & Key Concepts

Abbreviations

EMS (Electronics Manufacturing Services) - manufacturing partner for production, focusing on design for manufacturing.

NTL (New Things Lab) - partner design studio of this project.

RSSI (Received Signal Strength Indicator) - Bluetooth signal used for phone proximity detection.

TRL (Technology Readiness Level) - 1–9 scale of technological maturity of a prototype.

Key Concepts

Attention Economy - the model in which human attention is harvested and sold to advertisers; the structural antagonist of this project.

Bottom-up attention - stimulus-driven attention.

Top-down attention - goal-directed, effortful attention.

Environmental design - the strategy of changing physical surroundings.

ESP32 - a popular System-on-Chip (SoC) microcontroller with built-in Wi-Fi and Bluetooth, similar to Arduino.

Grand gesture - (Newport, 2016) a one-time, high-commitment act that encodes an identity statement and protects future behaviour.

Habit loop - (Clear, 2018) Cue → Craving → Response → Reward; the four-stage model of habit formation and maintenance.

Intention-action gap - the difference between aspired and actual behaviour; the central phenomenon this project addresses.

Novelty bias - the brain's tendency to prioritise new stimuli; exploited by short-form content platforms.

Short-form content - video formats under ~90 seconds (TikTok, Instagram Reels, YouTube Shorts).

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PART I: Context

Chapter 1 - Introduction

1.1 Project Context

We no longer just manage our time; we have to manage our attention, and that is a fundamentally different problem. The Attention Economy describes a system in which human attention is treated as a scarce commodity (Simon, 1971). This central concept of the Attention Economy (Figure 1.1) will be explained further in Chapter 2.

One effect of this system is the intention-action gap: the difference between what we intend to do and what we actually do. The smartphone is a perfect example. Many people aspire to use their phone less, yet the average user still spends over four and a half hours a day looking at it (*Time Spent Using Smartphones*, 2026). The intention is there, but the environment is designed to work against it.

This graduation project explores whether a physical product can close part of that gap. It was carried out in collaboration with New Things Lab, a Dutch design studio that creates minimal, physical alternatives to common smartphone behaviours. The company is introduced in depth in Chapter 2.

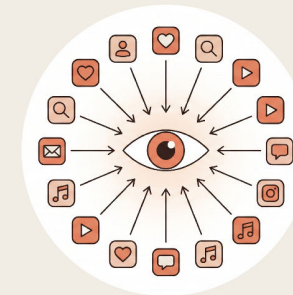


Figure 1.1: Visualisation of the Attention Economy

1.2 Design Goal & Research Question

Design goal: Design a physical product that narrows the intention-action gap around smartphone use.

From this goal flows the main research question of the project:

"How can a physical product restore intentional behaviour in a society that evolved to capture attention?"

This question sets the direction, to be scoped down later. To answer it, three sub-questions are addressed over the course of this report:

1. Where does the Attention Economy undermine intentional behaviour the most? (Chapters 3 to 5)
2. Why do people not act on their intention to change this behaviour? (Chapter 6)
3. How does a physical product work to help people act on their intention? (Chapters 7 to 9)

1.3 Design Approach

The design approach used in this project is iterative rapid prototyping (See Figure 1.2). From early on, physical prototypes were used to test assumptions and generate new hypotheses. Accelerated by 3D printing, early concepts were quickly materialised, tested on tactile interaction and look and feel, and fed back into the next iteration. Designing, testing, and learning happened in short cycles rather than in separate phases.



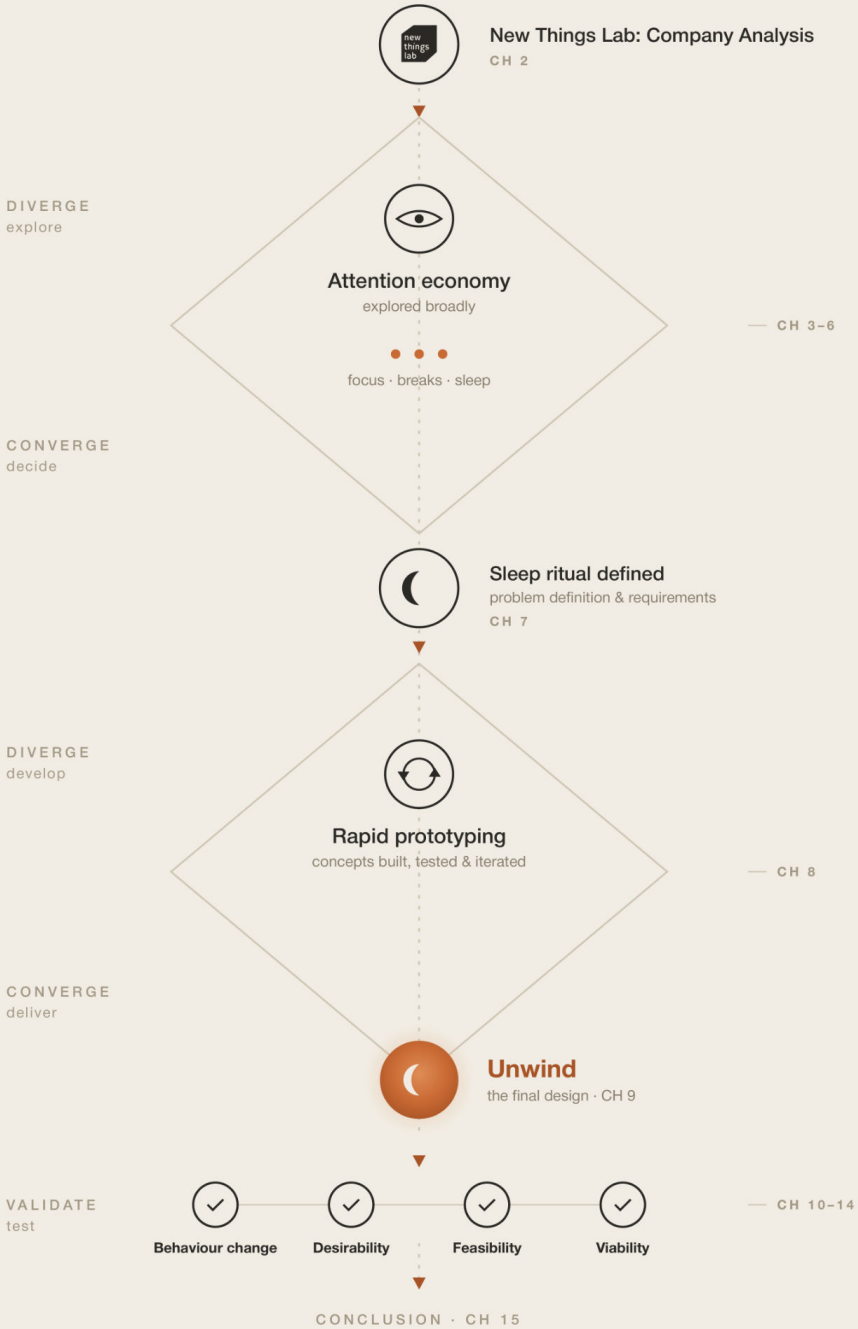
Figure 1.2: Result of Rapid Prototyping

Next to prototyping, a mix of qualitative methods supported the process: desk research, a behavioural survey, expert interviews with chronobiologists, psychologists, and alarm clock designers, a participatory design workshop with high school students, and user tests with functional prototypes. Each method is explained in the chapter where its results are used.

1.4 Design Process

The overall process followed a diverging and converging rhythm, similar to the double diamond method (Visualised in Figure 1.3). Given the broadness of the initial brief, it was necessary to diverge widely first, exploring the Attention Economy as a whole, and then converge on the domains where an intervention would have the most impact.

Figure 1.3: Design process



Chapter 2 - New Things Lab: Company Analysis

In this chapter, New Things Lab is introduced as a stakeholder of this project. First, the brand's principles and current product catalogue are looked into. After this, individual qualities of the products are identified, with the company valuing high-quality materials, a strong visual identity and good interaction qualities. Finally, this project is positioned within New Things Lab, explaining why this pairing is a good fit and what qualities are needed for alignment with their existing catalogue.

2.1 Brand & Product Overview

New Things Lab, founded by Nyckle Sijtsma, is an award-winning Dutch design studio. It operates largely as a Branded House: the master brand provides an "umbrella" and acts as the dominant driver. The three main products: Memo, Zone, and Time Smiles are marketed under the "New Things Lab" banner, which stands for "Dutch design meets function."

The three main pillars of the company are "Slow down" "Create happiness" and "Make it simple (*New Things Lab - About Us*, 2026). While the studio is the master brand, the products (Figure 2.1) all act as individual sub-brands that each add a distinct association to the whole:

- Memo Wallet adds "utility" as an association.
- Zone Timer adds "focus" as an association.
- Time Smiles adds "playfulness" to the brand's personality.

Figure 2.1: Three main products of NTL: Memo, Zone, and Time Smiles



Looking at the products more closely gives a clearer picture of what the brand delivers. The Memo Wallet is a wallet made primarily from aluminium that holds six individual cards. When the hinge is opened, a whiteboard reveals itself, folding out into a handheld writing device (See figure 2.2). The Zone is a minimal focus timer that does away with the seconds display entirely. Instead of the irritating alarm of a phone timer, a gentle chime signals the end of the set time (See figure 2.3). Time Smiles is a minimalist desk clock that tells the time with two dots resembling eyes that follow the hours and minutes, that together with an arc resemble a smiling face.



Figure 2.2 & 2.3: Render of Memo Wallet & Zone Focus timer

Beneath the surface, these products do something more. They play into the identity of the user, functioning as habit enablers. According to James Clear's *Atomic Habits*, there is a fundamental difference between identity-based habits and outcome-based habits: "The ultimate form of intrinsic motivation is when a habit becomes part of your identity" (Clear, 2018). The word identity itself derives from the Latin *essentitas* and *identitem*, meaning "being repeatedly". The products of New Things Lab are physical habit enablers: environmental reminders of the intention-action gap, the difference between what a person does and what they want to do. Buying a Zone is not just buying a timer; it is a statement about being a person who works with focus.

2.2 Material Language & Interaction Quality

Three qualities keep returning across the catalogue: high-quality materials, a strong visual identity, and carefully designed interactions.

High-quality materials

The products are built from materials that communicate permanence and value: the Memo body is machined aluminium, Time Smiles is CNC-machined from bamboo, and the Zone combines a soft-touch finish with glass and wood accessories. These choices position the products as premium objects to keep on a desk and be seen with.

Strong visual identity

The visual identity is a direct expression of the "Make it simple" pillar. Every product has a unique but minimal, clean look: simple shapes and no unnecessary detailing. The Zone displays only minutes; Time Smiles reduces a clock face to two dots. By stripping each object back and doing something differently they are instantly recognisable.

Interaction quality

Most importantly, the interaction with each product is designed to feel good. The Memo's hinge opens with a satisfying motion into the fold-out whiteboard; the Zone is started by simply flipping it onto another side, and it ends a session with a gentle chime rather than a jarring alarm. These interactions make the products feel premium and make the user *want* to pick them up and interact with them.



2.3 Positioning this project at New Things Lab

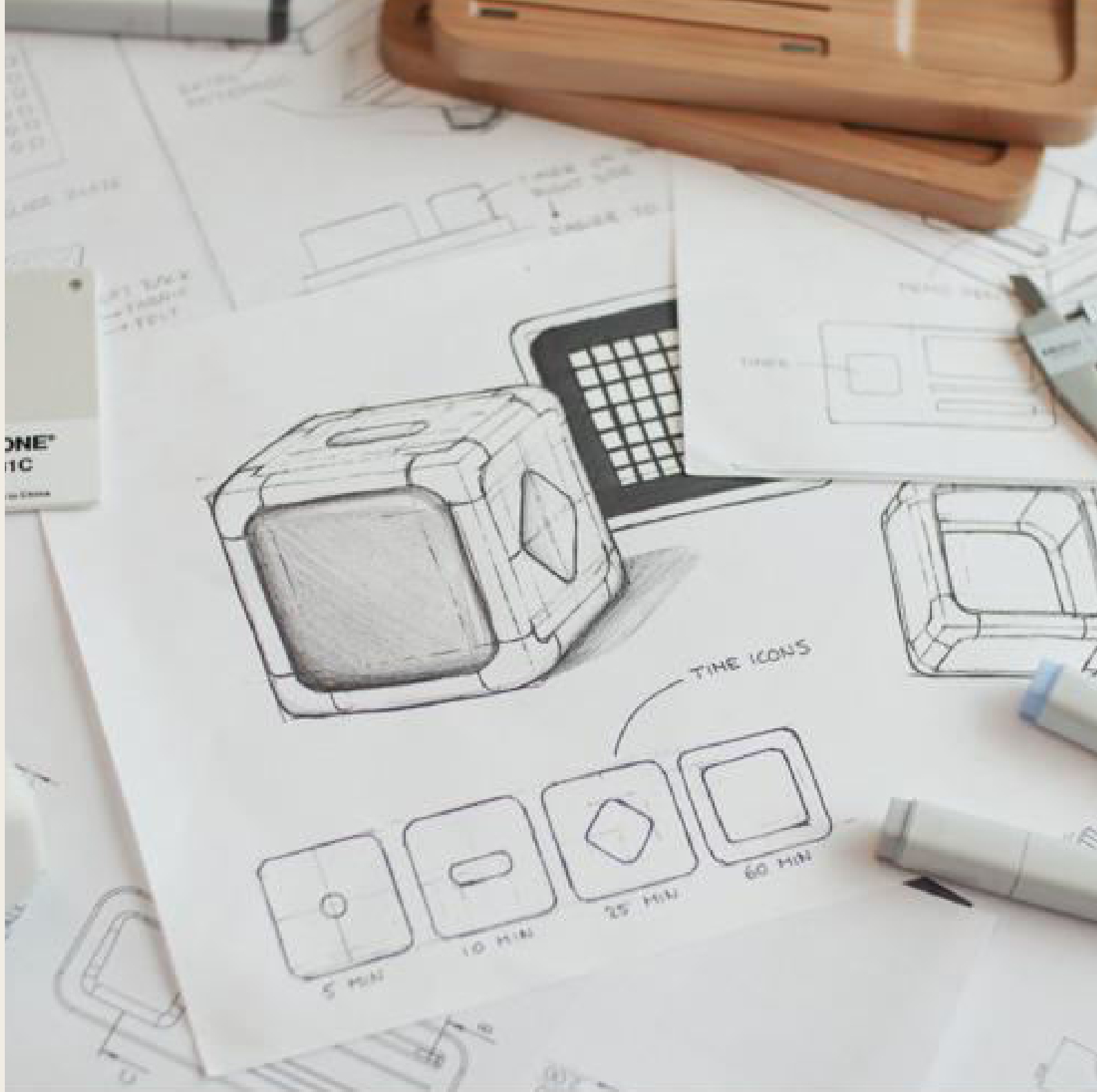
This project is not a free-standing graduation assignment. It is intended to be a potential addition to the New Things Lab catalogue, which brings some requirements.

The material language and interaction quality described in section 2.2. The product needs to share the catalogue's premium materials and its minimal, clean look, and its interaction has to be inviting. The three brand pillars sharpen this further: the product should slow its user down rather than speed them up, keep its function simple, and bring a moment of joy.

The existing catalogue (Figure 2.4) already narrows the intention-action gap in small ways. For example, the products take something people currently do with their phone and make the intentional version of that behaviour the more appealing one. This is why the pairing is a good fit. The brand conditions return in the List of Requirements (Chapter 7). To find out which phone behaviour is worth giving a physical form, the next chapter examines the force behind digital distraction: the Attention Economy.



Figure 2.4: Overview of Products



PART II:

Research

Chapter 3 - The Attention Economy

This chapter gives a theoretical background to the rise of the Attention Economy. Historically, this started with serving advertisements to consumers to make money. With the age of data, though, the incentives have also shifted to collect as much personal data as possible, to make those ads more personalised and valuable. This has led to AI-powered personalised recommendation systems that optimise for watch time. People are more addicted to their screens than ever, and this has resulted in a reduced quality of three subdomains that will be illustrated.

3.1 Background

In Richard Serra and Carlota Fay Schoolman's 1973 short film *Television Delivers People*, they critique the mass media landscape by saying that television is not a medium designed to deliver programs to viewers. Rather, it is a delivery system that packages audiences and sells them to advertisers (KunstSpektrum, 2011). They state, "Television delivers people," deconstructing the illusion that the consumer benefits from "free" content.

Two years before this, Herbert A. Simon introduced the term Attention Economy (Simon, 1971). It describes the fight for consumer attention and positions attention as a scarce commodity. Humans have limited cognitive resources that can be used at any given time, and with our attention we can choose to spend those resources on different types of information.

In the modern Attention Economy, this concept has evolved much further. The incentive is no longer just to show ads, but to collect as much personal data as possible, making those ads more personalised and more valuable. Today's digital platforms offer "free" services in order to capture people's attention and log their data, which they then sell to the highest bidding advertiser. When a service is free, you are the product.

Central to this issue is the mobile phone. It is the primary gateway for these distractions: mobile devices account for just over half of all global web traffic (*Desktop vs Mobile vs Tablet vs Console Market Share Worldwide*, 2026), and an even larger share of social media use. Even its presence in a user's peripheral vision can significantly impair focus (Ward et al., 2017). The recent influx of short-form content has exacerbated this issue to a higher degree.

Short-form content

The rise of short-form content marks a shift in digital media, from traditional long-form narratives to vertical videos typically under 90 seconds. The rise, especially among kids, teens, and young adults, was solidified by the explosive growth of TikTok, followed by Instagram Reels and YouTube Shorts (see Figure 3.1). During COVID, when a lot of normal life fell away, the time people spent mindlessly scrolling increased sharply.

Technologically, this rise is driven by AI-powered recommendation engines that eliminate "choice friction" through infinite scrolling interfaces. **People don't have to choose what to watch anymore;** they just **choose to look at "something" else**. Short-form content exploits the human novelty bias, where the brain favours new information over old information and rewards it immediately.

This shift has measurable consequences. Research by a group of Chinese scientists proved that watching short-form videos can diminish control of people's attention (Yan et al., 2024). This fight for focus is further complicated by the high information density of short-form media, which can lead to cognitive fatigue and a diminished capacity for deep thought.

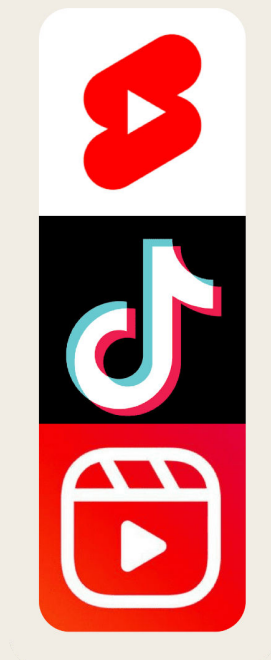


Figure 3.1: The three most popular short-form content apps

3.2 Problem domains

This constant connectivity has led to three critical shifts in daily life:

- **Less intentional focus:** letting algorithms choose what we spend our time on.
- **No real downtime:** a reduction in quality downtime and restorative breaks, as mindless scrolling replaces conscious rest.
- **Decreased sleep quality:** the Attention Economy encourages evening screen use, leading to significant distractions that lower sleep quality (Zanella et al., 2025).

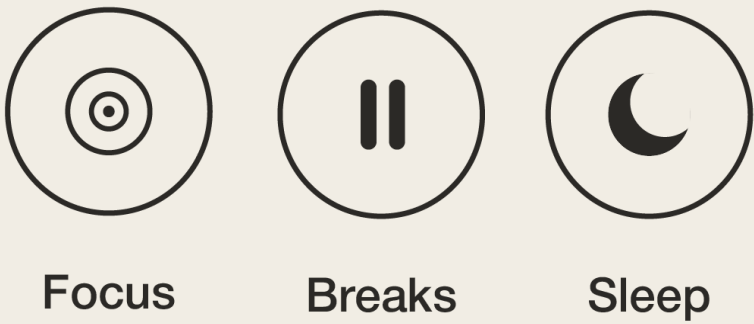


Figure 3.2 Chosen domains

Looking ahead, these three domains (see Figure 3.2) are not likely to improve on their own. As AI matures, the fight for focus could evolve into ultra-personalised, generative content designed to exploit individual psychological vulnerabilities in real time. Humans already struggle to distinguish between human-made and AI-generated content (Velásquez-Salamanca et al., 2025). The finding is that without intervention, the pull on our focus, our rest, and our sleep will only get stronger, and human agency will keep eroding.

This answers the first sub-question of this project: the Attention Economy undermines intentional behaviour the most in the moments when attention is unguarded. When we try to focus, when we take a break, and when we go to sleep. These are the domains where a product that stimulates intentionality can benefit users the most, and where the eroding effect of the Attention Economy can still be reversed. The next chapter explores each of these three domains in depth, to find where an intervention can have the most impact.

Chapter 4 - Explorations

To design for an intervention against the Attention Economy, it is necessary to understand the cognitive and biological systems that govern focus, breaks, and sleep. This chapter reviews the relevant theory across all three domains: the mechanics of attention, the science of restoration, and the biology of sleep. Each section closes with a set of design implications that inform the direction of the project.

4.1 Focus

In our modern world, focus has become more than just a productivity habit, but a skill to reclaim our lives. While we used to manage our time, we now have to manage our attention, fighting against evolutionary biology that does not do us any good anymore. The same mechanism that made us be able to spot a lion in the distance long ago, now makes us glued to our phones.

4.1.1 Why Focus Matters

Our attention operates in two primary modes(See figure 3.2): Bottom-up attention is a stimulus-driven process where the brain reacts to external cues, which is a mechanism rooted in our evolutionary need to detect environmental change (Theeuwes, 2010).

Conversely, top-down attention is a goal-directed process where the individual intentionally directs focus based on internal priorities and task demands (Guribye et al., 2016). The modern "Attention Economy" is built on exploiting this reflexive bottom-up system. Digital platforms design algorithmic feeds to trigger this bottom-up system, rewarding you with dopamine, rather than letting your top-down attention have time to choose a new focus. Stimulus-driven attention can be seen on the left side, where the signal comes from the eyes (V1,) and goes to the brain (PFC, Pre-Frontal Cortex). With Top-down attention, the brain has the highest signal that travels to the eyes, telling them what to focus on.

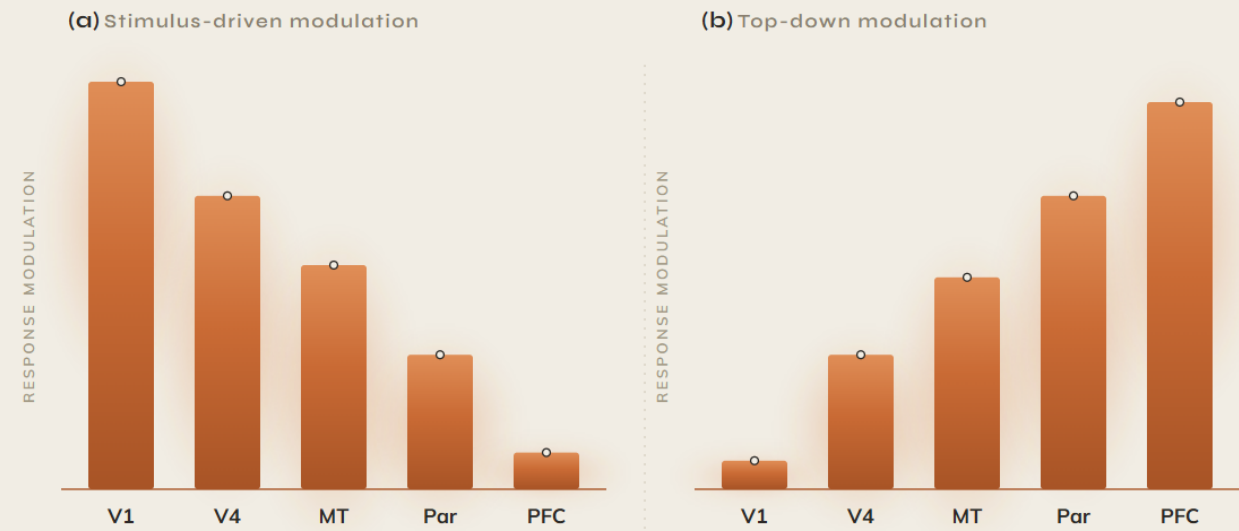


Figure 3.2 Bottom-up vs Top-down attention

4.1.2 How to tackle

Cal Newport suggests **the grand gesture** as a way to put your intention to work (Newport, 2016). “By leveraging a radical change to your normal environment, coupled perhaps with a significant investment of effort or money, all dedicated toward supporting a task, you increase the perceived importance of the task. This boost in importance reduces your mind’s instinct to procrastinate and delivers an interjection of motivation and energy.” In practice, this can come down to using your willpower for one big decision that will impact the ease of any following decisions. Some examples can be: “Booking a hotel room with no phone access just to write the first draft of a book” or “Paying upfront for a marathon entry fee to force a training regimen.”

Van der Stigchel emphasises that while the world is increasingly designed to capture attention (bottom-up), you maintain the most sovereignty over your environment. There is a distinct conflict between intended behaviour, like the desire to focus, and actual behaviour, such as the impulsive

checking of a notification. Rather than trying to "fix" human discipline or design a tool that acts as a coach, the **solution lies in environmental design**.

Having a bit of space left over in our attentional space leaves room to **reflect on the best approach** to a task, but this **requires metacognition**, our ability to monitor one's own mental state, as the primary defence against distraction. Meditation is cited as a gold standard in scientific literature because it teaches users to recognise the exact moment their attention drifts.

4.1.3 Conclusion

To get over the shift of the Attention Economy, we should aim for intention. Using the grand gesture is a way to cement your own intention. We must also prioritise environmental design over raw discipline to bridge the gap between our intended focus and impulsive behaviour. Finally, using metacognition through practices like meditation allows us to recognise and redirect our attention.

“Like fingers pointing to the moon, other diverse disciplines from anthropology to education suggest the skilful management of attention is the sine qua non of the good life and the key to improving virtually every aspect of your experience.” – Winifred Gallagher

4.2 Breaks

In the modern Attention Economy, the concept of a "break" has fundamentally changed. Besides lots of people having problems with taking breaks when they need it (Bosch & Sonnentag, 2019), we often spend our rest scrolling through social media. Understanding the cognitive science of restoration, unconscious thought theory, and mind wandering is essential for taking better breaks and seeing what impact scrolling has.

4.2.1 Why Breaks Matter

A break is more than just time off. It is a period during which the brain continues to function differently. Ap Dijksterhuis, a social psychologist, developed the Unconscious Thought Theory (UTT), which states that the unconscious mind has a far greater processing capacity than our conscious awareness. Dijksterhuis proved that the unconscious mind can integrate complex data sets more effectively than the conscious brain (Dijksterhuis & Nordgren, 2006).

This is a scientific theory for the idea of having a "shower thought." When we step away from a complex problem, we distract the conscious mind. This allows the high-capacity unconscious mind to continue mulling over the problem, often leading to better outcomes. While stating that unconscious thought seems to be better at complex problems, conscious thought is better at analytical problems, where logical steps have to be taken to move toward a solution. Also, without conscious thought, unconscious thought will not solve your problems. While this research might suggest that we should avoid consciously thinking of solutions, it is important to deliberately delve into the issue and identify the problems you wish to solve.

Using your phone during a break is the opposite of productive. When taking a break with your smartphone, you are not letting your brain rest; you are numbing it. True restoration requires a complete disengagement from directed attention, allowing the brain's systems to reset.

4.2.2 How To Tackle

A central framework for understanding rest is Attention Restoration Theory (ART). ART explains that our top-down attention is a finite resource that becomes fatigued over time. To restore this resource, we need environments that provide gentle stimuli (Ohly et al., 2016). It argues that walking in nature is the best way to get this gentle stimulation, way better than using your phone to scroll social media.

When your mind wanders, the brain enters a state of perceptual decoupling to prioritise internal, self-generated thoughts (Schooler et al., 2011). This is also known as daydreaming. This shift is driven by the activation of the Default Mode Network (DMN). It creates space for multiple concepts in your mind at the same time and combines them to generate novel insights (Zedelius & Schooler, 2015)

4.2.3 Conclusion

To fight the Attention Economy, we must treat rest with the same intentionality as with focus. Designing for better breaks should involve stimulating people to go away from their desks, providing gentle stimulation like nature, letting the mind wander and leaving the phone on the desk.

“To simply wait and be bored has become a novel experience in modern life, but from the perspective of concentration training, it’s incredibly valuable.” - Cal Newport

4.3 Sleep

Due to phone usage at night, sleep quality has been declining. The digital disruption of sleep is not just about melatonin suppression; it is about cognitive arousal. Research distinguishes between passive use, like watching a show, which requires little alertness and can even help regulate emotions and stop rumination, and active use, like scrolling through Instagram or TikTok. Active use evokes constant emotional shifts, with every video triggering a new emotion. This keeps the nervous system alert and makes it impossible to get tired. Understanding how sleep works, and why waking up is so hard, is essential for designing better evenings.

4.3.1 Why Sleep Matters

Sleep is split into two categories: REM and NREM sleep. REM sleep facilitates creative problem-solving, much like the mind wandering described in 4.2, and NREM sleep is key for putting thoughts into long-term storage. People need both phases to get a good night's rest.

Getting into sleep is regulated by light and temperature, the anchors of the circadian rhythm. In the evening, less light lets melatonin levels rise, and a cooler environment lets your core temperature drop, signalling the brain to get sleepy. Artificial light at night halts this effect, making it harder to fall asleep. The opposite happens in the morning: light hitting the retinas stops melatonin production and stimulates cortisol, waking you up.

Getting out of sleep has its own problem. Waking up tired is a combination of two factors: sleep inertia, the difficulty of the brain transitioning between mental states, and simply not getting enough quality sleep. Investigations into light and temperature show promising results for softening sleep inertia and improving subjective alertness (Mu et al., 2022). A better transition from sleep will not solve bad sleep quality, though.

4.3.2 How To Tackle

Sleep scientist Matthew Walker names three aspects that matter most for sleep quality: **regularity, lifestyle choices, and psychological factors** (Walker, 2017). Regularity functions as the anchor of your internal clock; a consistent schedule reinforces the biological signals for rest and wakefulness. Lifestyle choices involve managing external variables like caffeine and alcohol, which block sleep-inducing chemicals or distort the sleep phases; alcohol, for example, suppresses REM sleep. Psychological factors

address your mental state; high stress keeps the nervous system in high alertness, making it difficult to transition into rest.

The phone in bed works against all three. It pushes bedtime later and makes it irregular, it delivers exactly the emotional stimulation a winding-down brain does not need, and it keeps stress within arm's reach. A physical tool for the sleep ritual should therefore move the focus from willpower to environmental architecture, tackling two things: sleep quality, helping people get a better night's rest, and sleep inertia, assisting the transition between wakefulness and sleep.

4.3.3 Conclusion

Designing for better sleep means designing the bedroom environment so the intended action is the easier action: dim, warm light in the evening, a gentle transition in the morning, and the phone out of reach.

"Sleep is the single most effective thing we can do to reset our brain and body health each day" - Dr. Matthew Walker

Chapter 5 - Evaluation of Domains

In this chapter, the three domains will be evaluated based on the severity of the problem, the size of the intention-action gap, the role of willpower, and product opportunity together with fit at New Things Lab. After this, a decision will be made, and the design brief will be updated.

5.1 Multiple Criteria

Consequence severity

Poor focus and poor breaks carry real costs: reduced productivity, less creativity, slower cognitive recovery. Both score partial. Sleep scores higher because sleep deprivation also degrades both focus and the quality of breaks, making it the upstream variable the other two domains depend on.

Intention-action gap

Focus scores partial: the experience of reaching for your phone when trying to work is widely felt. Breaks score weak: most people do recognise phone use during breaks as a problem, but don't actively want to stop this habit. Sleep scores high: "I know I should put my phone down before bed" is a big sentiment, but is something that people find hard to do themselves (Walker, 2017).

Willpower

Willpower depletes across the day. Focus problems typically occur in the afternoon when concentration slips, but the user still has meaningful self-regulatory capacity. Breaks degrade similarly as the day goes on. Both score weak. By bedtime, willpower is at its daily minimum. The behaviour occurs when resisting it is hardest. A product here could eliminate the need for willpower and work through environmental design.

NTL fit & product opportunity

NTL's products substitute phone functions with premium physical alternatives. Zone already occupies the space of improving focus in the workplace. Making a second product in the same category is less

strategically coherent. For breaks, there is no clear phone function to substitute, and the most restorative break activity: going into nature, does not actively need a physical product to work. Sleep presents the clearest substitution opportunity: phone alarm dependency is something a physical product can directly replace. However, it is currently far away from the current catalogue, which primarily focuses on products for the professional environment.

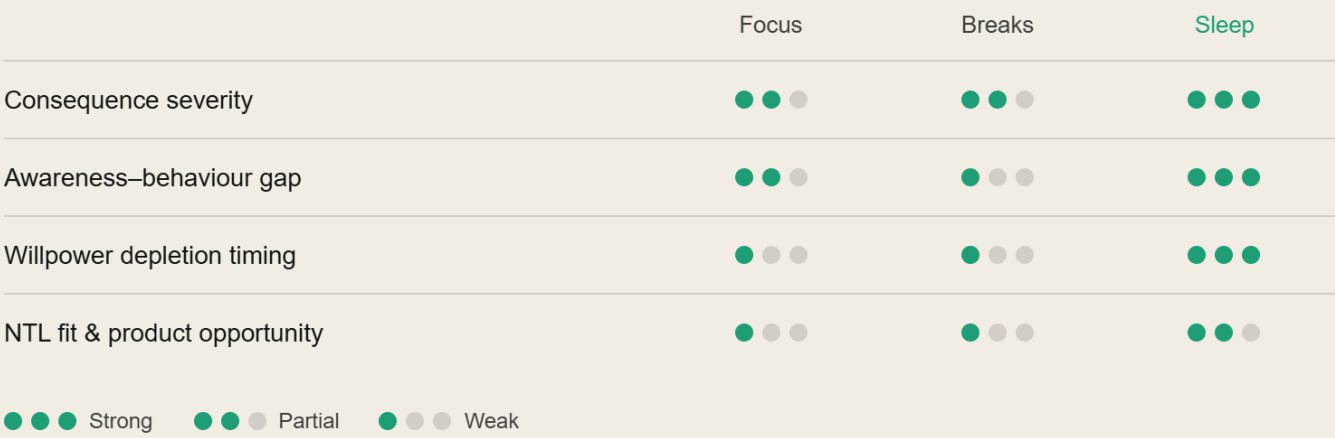


Figure 5.1: Decision matrix comparing focus, breaks, and sleep across the four criteria

5.2 Decision and Answer to First Research Questions

Across all four criteria, sleep comes out on top (Figure 5.1). It is the problem that affects the others; the intention-action gap is biggest, and the behaviour happens when willpower is at its daily minimum. That last point sets the design direction: a product for the evening cannot rely on discipline; it has to work through environmental design.

This completes the answer to the first sub-question of this project:

“where does the Attention Economy undermine intentional behaviour the most?”

Chapter 3 narrowed it down to the moments when attention is unguarded: focus, breaks, and sleep. The evaluation in this chapter shows that sleep is where the undermining hits hardest. Nowhere is the gap between what people want their evenings to look like and what they actually do bigger, and nowhere is willpower less able to close it.

The project therefore continues with the sleep ritual as its domain. This leaves us with many questions about people's current and intended evening routines. In the next chapter, findings of all sleep behaviour research will be summarised.

Chapter 6 - Understanding Sleep Behaviour

This chapter contains everything from sleep-specific research. A survey was conducted around sleep rituals to identify the experienced intention-action gap and get a sense of the size of the problem. Experts in biology, psychology and alarm design were interviewed to explore how these problems can be addressed through design. The main hurdles are clustered into various reasons that people still take their phones to bed. The behaviour is also analysed through the lens of the habit loop, a framework that helps understand habits and break bad ones.

6.1 Sleep Survey

A survey was conducted to gain an understanding of current sleep routines and statistics. A total of 60 people participated in the survey. Because the intention-action gap is central to the sleep ritual, people were asked to shed light on their current and desired Evening and Morning routines.

6.1.1 Results

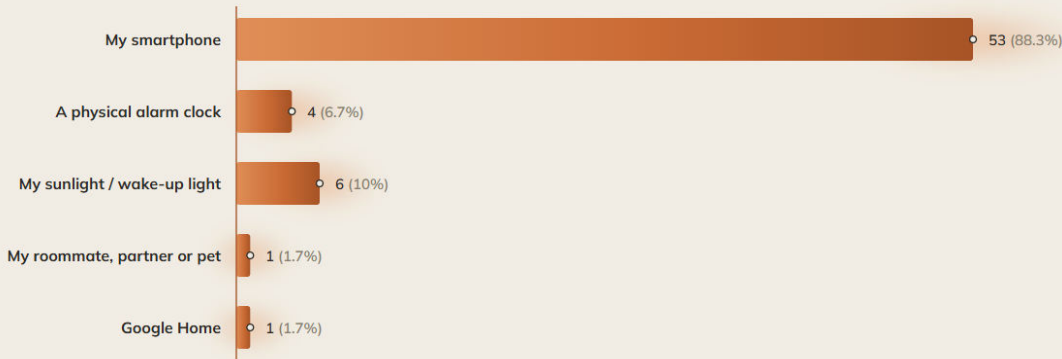


Figure 6.1: Alarm Usage

88% of participants of the survey used their phone as an alarm (Figure 6.1). 10% of people use a wake-up light. Note here, the percentages do not add up to 100%, because some people use multiple kinds of alarms to wake up. For all graphs, see Appendix C.

The gap between intention and reality is most visible in the transition periods:

Currently, **54.4% of participants scroll on their phones in bed**, and 52.6% watch streaming services. However, when asked about their Aspired Night Routine, the top desires were reading a physical book (68%), engaging in skincare or self-care rituals (50.9%), or journaling (21.7%).

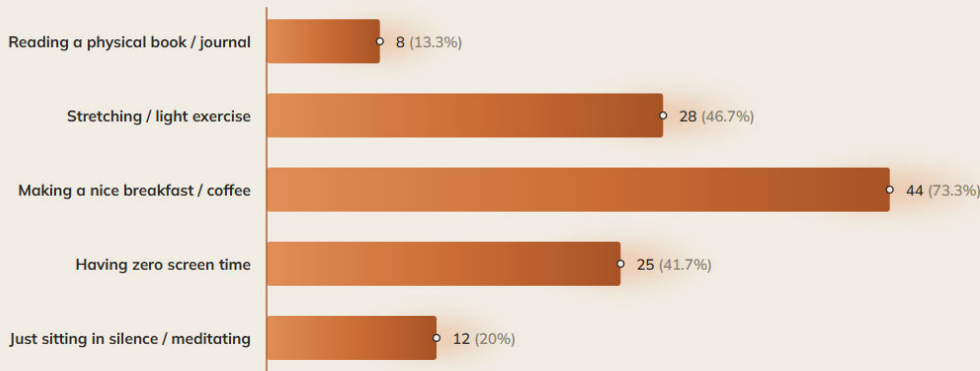


Figure 6.2: Aspired morning routines

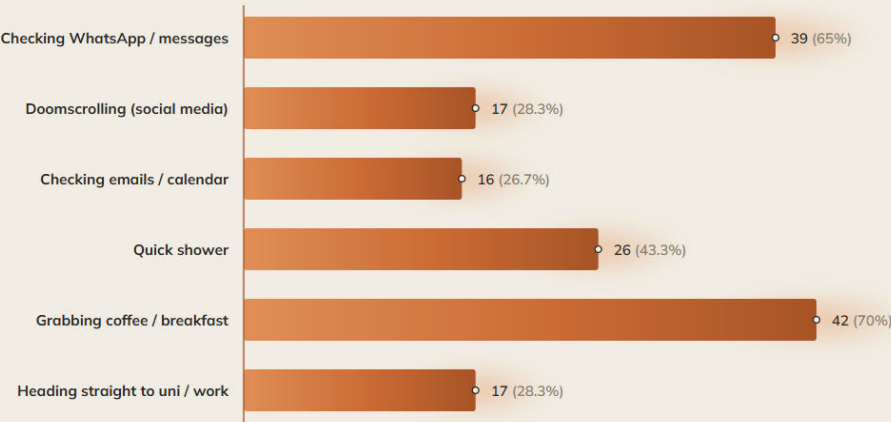


Figure 6.3: Current morning routines

Upon waking, the primary frustration for 65% of respondents is feeling "foggy" or on "autopilot." While **65% immediately check messages** (Figure 6.3), their Aspired Morning Routine paints a different picture: 73.3% want to enjoy a slow breakfast/coffee, 46.7% want to stretch, and 41.7% crave "zero screen time." (Figure 6.2)

When asked about **removing one habit** of their morning or night routine, **over three quarters of answers were phone related** (Figure 6.4). Answers like: “Doomscrolling in the morning” “scrolling at night and staying up too late because of that” and “Screentime before bed” were most common.

6.1.2 Conclusion

The survey results reveal a clear disconnect between people's current routines and what they actually want. **Most participants default to screen habits like scrolling, even though they don't want to.** Seasonal conditions, particularly the absence of natural light in winter, add another layer of difficulty to an already challenging transition. Together, these findings suggest that the barriers to better sleep and wake routines are **both behavioural and environmental**. To get a better sense of the difference between intention and action, we will take a deep dive into the hurdles for changing this behaviour.



Figure 6.4: Aspiration of removing one habit

6.2 Hurdle Analysis

Understanding why people keep their phone on the nightstand is not as simple as pointing to the alarm. The survey showed that more than 70% of participants would delete a phone-related habit if they could, but right now the phone stays. This chapter investigates the specific psychological, functional, and habitual barriers that stand between the intention and reality.

The analysis draws on the survey results, conducted sleep interviews (Appendix B), and desk research. Insights were clustered into five categories, each representing a distinct type of hurdle (See Figure 6.5).

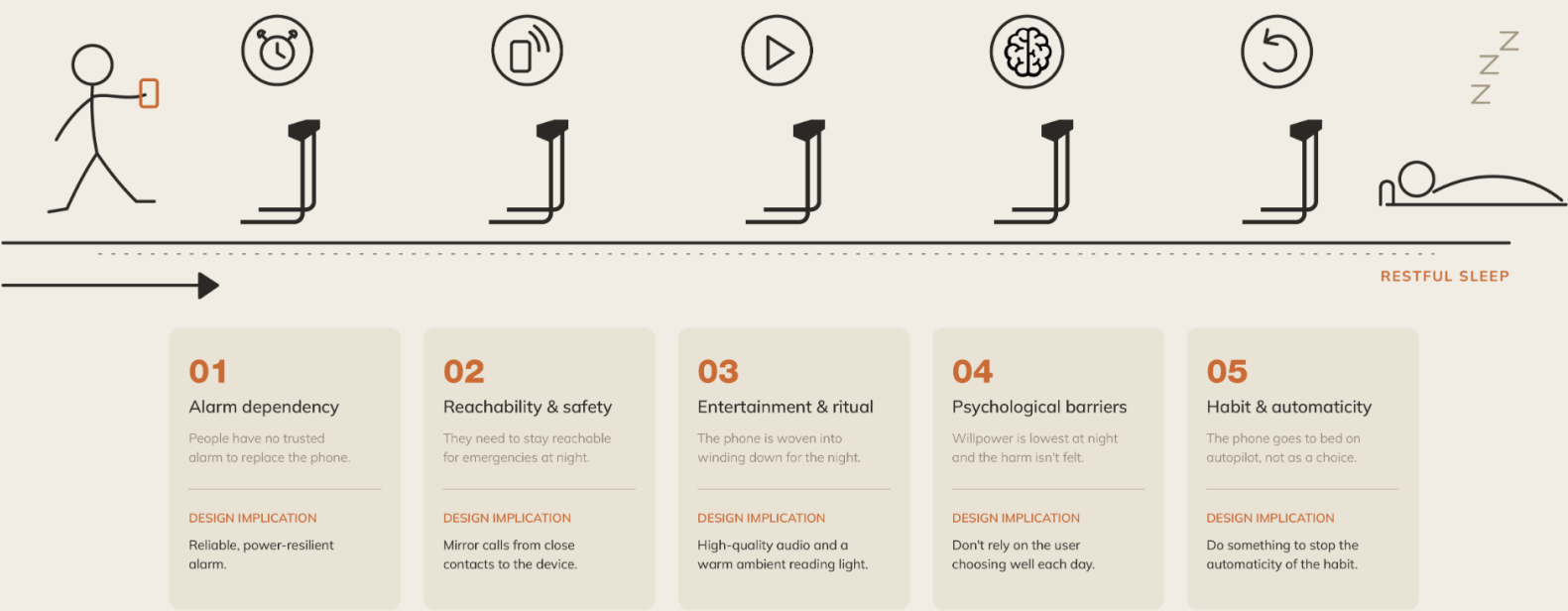


Figure 6.5: The five most important hurdles

6.2.1 Alarm Dependency

The most direct and functional hurdle is the simplest: people do not have another alarm. The phone alarm is familiar, reliable, and configurable. Users know how it works, they trust it, and have no direct reason to replace it. Several sub-hurdles reinforce this dependency: the belief that other alarm clocks are less reliable, the specific fear of power outages disabling plug-in clocks, and an ingrained high trust in the smartphone as a device overall.

This cluster represents the starting point for the design. Put simply, to overcome this hurdle it should have a reliable alarm.

6.2.2 Reachability & Safety

Even if the alarm problem is solved, many people are not comfortable leaving their phone in another room because they need to remain reachable. This takes several forms: emergency contact from family, or urgent messages from work. Secondary functional uses, like using the flashlight at night, also have to be addressed.

The biggest concern for users is the ability to reach family members in an emergency. It must be kept in mind that there should still be a way to contact the users if the phone goes out of the room.

6.2.3 Entertainment & Evening Ritual

A significant hurdle is that the phone is woven into the evening ritual itself. Watching a series or YouTube video in bed has become normalised for a large portion of users. Background sound at night, like white noise, pink noise, podcasts or music, is for some users the reason that they still take the phone.

This led to a discussion with Derek Antosiak from *Optimize Your Biology*. Derek is a Blogger and YouTuber who does research-backed reviews of wake-up lights and circadian technology (YouTube, 2026). A recurring point was the poor quality of contemporary alarms. Derek described most alarms as medical tools with confusing menus and bad speakers. He emphasised that high-fidelity audio is essential for a premium experience.

The goal should not be making it possible to scroll social media on the alarm clock. Listening to music or a podcast is a good, low-stimuli way to end the day. This implies that high-quality sound is really

important. For people who want to be on their phone anyway, this hurdle is too high to overcome, so these people are not considered the target demographic.

6.2.4 Psychological Barriers

This is the cluster that makes behavioural change difficult, regardless of what the product offers. By the time a person goes to bed, their willpower is at its lowest point of the day. Passive scrolling numbs stress and loneliness, and in the moment, the dopamine feels good. For those who struggle with ruminating thoughts at night, the phone also offers a reliable distraction from anxiety.

Critically, people do not feel the negative effect of the phone in the moment, other than going to bed significantly later than they planned. This makes trying to convince the user with rationale ineffective because the user cannot connect cause and effect. The design must therefore not rely on the user making a better choice every day. Instead, the environment must be structured so that the better choice is the easiest one.

6.2.5 Habit & Automaticity

Many people bring their phone to bed without thinking about it, so the behaviour is no longer a decision. The behaviour is often reinforced by environmental factors, such as the nightstand being the only available power outlet in the room. The habit is also strengthened by the current morning routine: the desire to check messages immediately when waking up.

This cluster confirms a core design principle established in the research phase: environmental design is more effective than willpower. Something in the current automaticity has to be challenged to change this habit.

6.2.6 Conclusion

Alarm dependency is the core. This means that for a good product, it should reliably replace the alarm, have power outage resilience and be operable in the dark. Reachability adds a wish to mirror emergency calls, so the phone can leave the room without missing that one important call.

The evening-ritual cluster asks the product to absorb the restful parts of phone use rather than reproduce scrolling, quality sleep-sound audio, and a warm ambient reading light. Users who do not see phone use as a problem will not be focused on, narrowing the target demographic.

Environmental design beats willpower. Because willpower is lowest at bedtime and the harm is not felt in the moment, adding friction against taking the phone to bed, and ideally making the phone-free option the path of least resistance.

Because this habit is so hard to break, it will be precisely analysed in the next section.

6.3 Habit Loop

This section uses the theory and framework of Atomic Habits, a groundbreaking book about habits and changing them(Clear, 2018). The habit loop works like this: Cue, Craving, Action, Reward (Figure 6.6).

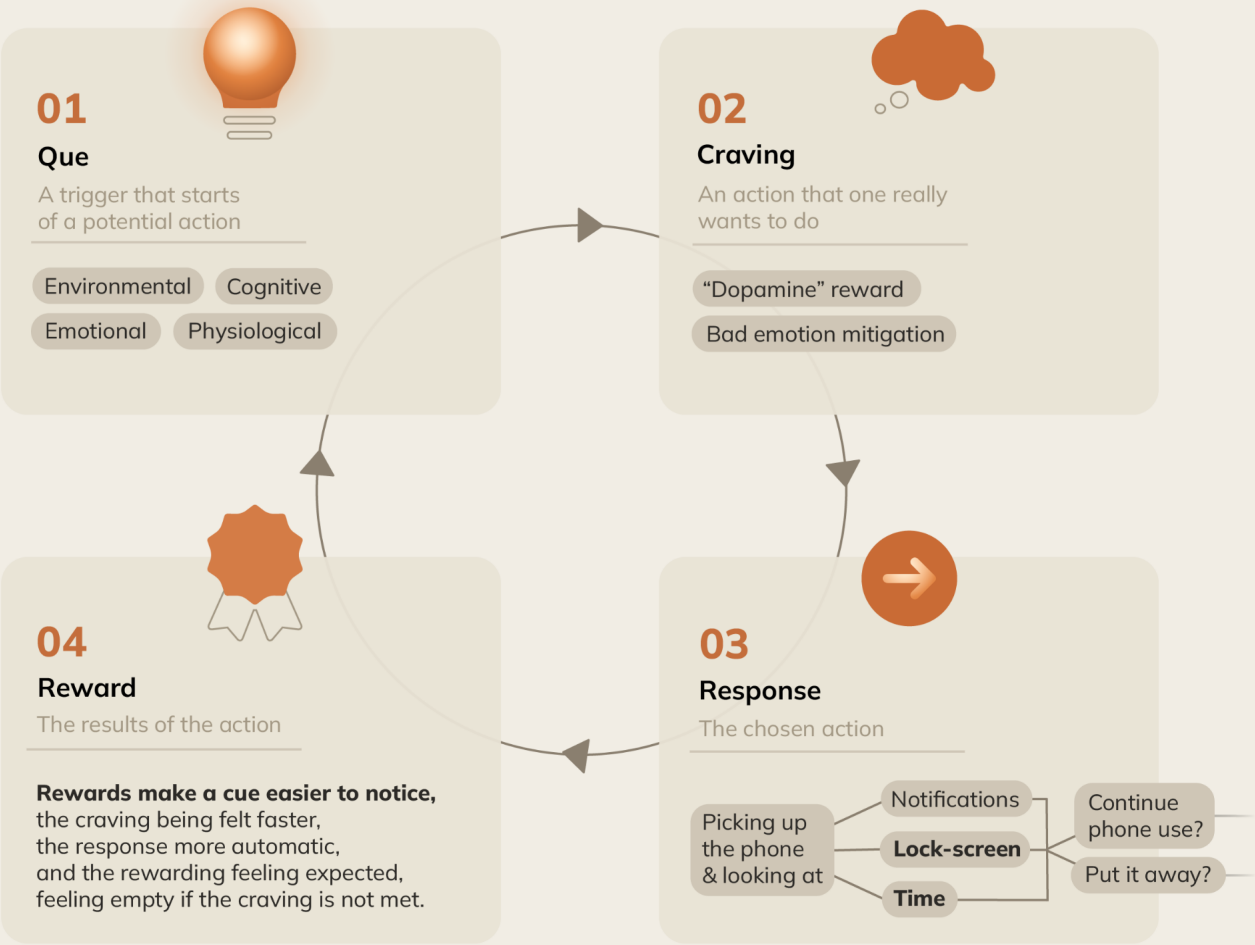


Figure 6.6: The Habit Loop

6.3.1 Loop Reinforcement

Phone use in bed becomes a powerful habit because it combines strong cues with rewards. Every time the habit loop is completed, the brain learns that picking up the phone leads to something enjoyable or interesting. The cue becomes easier to notice, the craving becomes stronger, and the response becomes more automatic. Over time, the brain begins to expect the reward, making it feel uncomfortable when the craving is not satisfied.

Another reason the habit is difficult to break is that bedtime phone use is connected to many other phone habits throughout the day. Each time a person checks messages or scrolls social media, the association between the phone and reward becomes stronger. By bedtime, the brain has already been repeatedly reinforced to view the phone as a source of satisfaction and relief.

6.3.2 Immediate Rewards

The rewards are especially powerful because they are immediate and varied. A phone can provide entertainment, social connection, novelty, information, distraction from stress, relief from boredom, and a sense of control within seconds. Unlike the benefits of sleep, which are delayed until the next day, these rewards are available instantly. This makes the phone highly attractive when willpower is low at the end of the day.

The consequences of the habit are much less immediate. Phone use in bed delays sleep onset, reduces sleep quality, suppresses melatonin production through blue light exposure, and especially increases mental arousal. However, because these negative effects occur later, they are often outweighed by the immediate rewards of phone use.

6.3.3 Breaking the loop

The easiest way to change a habit is not to break it, but to replace it. The craving does not disappear, so it needs somewhere to go: a substitute behaviour that answers the same need. At the same time, the loop is most vulnerable at its start. Rather than relying on willpower to resist a craving that is already triggered, it is far more effective to remove or weaken the cues, so the loop never begins.

For the design, this means two things. The device should get the phone out of reach of the bed. And it should offer a substitute action in its place, giving the evening craving a new, healthier outlet. Remove

the trigger, redirect the craving, and healthy sleep behaviour stops being a battle and becomes the default.

6.4 Why Intention is not enough

This chapter set out to understand the behaviour behind the intention-action gap in the bedroom. The survey confirmed the gap is real and wide: 88% of participants use their phone as an alarm, most scroll or stream in bed, and yet their aspired routines look completely different, with reading, self-care, and screen-free mornings on top. People know what they want their evenings to look like. They just do not get there.

The findings of this chapter explain why, answering the second sub-question of this project: why do people not act on their intention to change this behaviour? Four forces work together against them.

First, the phone is functionally locked in. It is the alarm, the safety line for emergencies, and the source of evening audio and entertainment. Leaving it outside the bedroom means giving up real functions, not just bad habits.

Second, the timing is against them. The decision to leave the phone happens at bedtime, exactly when willpower is at its daily minimum and a numbed, scrolling brain is most welcome.

Third, the feedback is invisible. The rewards of picking up the phone are instant and varied, while the costs, delayed sleep and a foggy morning, only arrive the next day. Without a felt consequence, rational arguments do not land.

Fourth, there is no decision at all anymore. Bringing the phone to bed is an automatic habit, reinforced by every phone interaction during the day and even by the bedroom layout itself, like the nightstand holding the only power outlet.

People do not fail because their intention is weak, but because the environment is stacked against it. This is the central finding of the research phase. A product cannot talk users into better behaviour; it has to remove the functional reasons the phone is in the bedroom. The next chapter converts this into a sharpened problem definition and a list of requirements.

Chapter 7 - Problem Definition

In this chapter, the findings of the research are converted into a refined design goal and a list of requirements. Using the phone as an alarm is the primary culprit, and creating a substitute for this requires overcoming all of the hurdles that people experience because of this change.

7.1 Refined Design Goal

The survey made the problem explicit. When asked "If you could delete one habit around your sleep ritual, what would it be?", more than 70% of responses were phone-related. The problem is not that people lack awareness; it is that the alarm keeps the phone within reach at precisely the two moments when users are least equipped to resist it: right before going to bed and first thing in the morning.

The research points to two mechanisms for change. The habit loop showed that the loop is most vulnerable at its start, so the cue has to be weakened by adding friction to the current behaviour. The hurdle analysis showed that the phone fills real needs in the evening, so simply blocking it is not enough; the craving needs somewhere to go. Together, these refine the design goal from Chapter 1 into:

Refined design goal: Design a **physical product** that **adds friction** to taking the phone to bed, and **offers a substitute** for the habits it replaces.

Adding friction covers the environmental side: the product must remove the phone's reason to be in the bedroom and make bringing it anyway a deliberate act instead of an automatic one. Offering a substitute covers the behavioural side: the restful parts of the current ritual, the alarm, the evening audio, the moment of winding down, need a new home. What this product should be, do, and feel like is captured in the list of requirements below.

7.2 List of Requirements

This section takes everything uncovered in the research phases and converts it into a concrete list of requirements.

Requirements are divided into two kinds. A Requirement (marked *Should*) is a non-negotiable: the design must satisfy it to be considered successful. A Wish (marked *Could*) is a desirable quality that would meaningfully strengthen the concept but is not essential.

The requirements are organised into three categories.

Look & Feel covers the sensory and aesthetic character of the product, as well as the quality of how the user operates it.

Functional covers what the product does, its technical capabilities and the practical jobs it performs.

Habitual covers how the product supports the formation and maintenance of new behaviour patterns.

Look & Feel

- Should have a premium feel.
(NTL Analysis, Ch 2)
- Should have a satisfying interaction quality.
(NTL Analysis, Ch 2)
- Should have an intuitive alarm-setting interaction, operable in the dark.
(Hurdle Analysis, Ch 6)
- Could provide a warm, ambient reading light without stimulating the nervous system.
(Hurdle Analysis, Ch 6)
- Could play into differences between seasonal light conditions.
(Survey, Ch 6)

Habitual

- Should change the environment so the intended behaviour is easier to perform.
(Sleep Research, Ch 4)
- Should add friction to taking the phone to bed, encouraging users to keep it out of the bedroom.
(Hurdle Analysis & Habit Loop, Ch 6)
- Should offer a substitute wind-down activity that fulfils the restful needs the phone serves.
(Hurdle Analysis & Habit Loop, Ch 6)
- Could encourage moments of meditation.
(Focus Research, Ch 4)
- Could encourage mind wandering.
(Breaks Research, Ch 4)

Functional

- Should be a physical product.
(NTL Analysis, Ch 2)
- Should aid the transition to sleep.
(Sleep Research, Ch 4)
- Should completely replace the phone as an alarm, matching its reliability.
(Survey & Hurdle Analysis, Ch 6)
- Should work without mains power, or include a backup battery.
(Hurdle Analysis, Ch 6)
- Should have high-fidelity audio for alarm sounds and evening listening.
(Hurdle Analysis, Ch 6)
- Should work standalone, with no dependency on a connected phone.
(Hurdle Analysis, Ch 6)
- Should provide a gradual wake-up transition using light and/or sound to reduce sleep inertia.
(Sleep Research, Ch 4 & Survey, Ch 6)
- Could mirror emergency calls from the user's phone.
(Hurdle Analysis, Ch 6)

PART III: Design



Chapter 8 - Concept Development

A lot of Concept Development has been done in the form of brainstorming, sketching, prototyping, interviews with designers, sleep experts and behavioural psychologists, this chapter summarises the learnings of these.

8.1 How Much Friction?

The design goal asks for friction against taking the phone to bed. Chapter 6 showed that bedtime phone use survives because of the habit. Adding even a small amount of effort at that moment can break the automaticity. The question is not whether to add friction, but how much.

The interview with alarm clock designer Peter Arvad Larsen of Habity showed the soft end of the spectrum. Habity has had recent success on Kickstarter launching an alarm, marketing it as a no-phone alarm. Habity deliberately focuses on the substitute habit and does not force the phone out of the way. As Larsen put it: "You don't want the user to hate your product." This project argues it does not do enough. For people who genuinely struggle, a purely optional product leaves the habit alive, and the phone wins.

The hard end of the spectrum fails for the opposite reason. A product that locks the user out, punishes a slip-up, or blocks a Saturday morning episode in bed stops being an ally and becomes an opponent. Too much friction causes abandonment: the user rejects the product and defaults back to the phone alarm, and the intervention achieves nothing.

This leads to the calibration that defines the concept: explicit at a single anchor moment, implicit for the rest of the night. At the moment the user sets their alarm, the product checks whether the phone is nearby, and refuses to confirm until it is not. After that, the product never punishes. If the phone comes to bed anyway, the alarm still works. Instead of fighting the user, the design creates one small, daily moment of intentionality: "Do I really need my phone in bed today?"

8.2 Offering a Substitute: The Unwind Ritual

Friction alone just creates a gap. The second half of the design goal fills it. The question goes from "how do we stop the phone" to "what do we put in its place."

A revelation during this phase set the scope of that ritual:

If the evening is fixed, the morning fixes itself.

The phone that never comes to bed cannot be there when the alarm goes off either. The product does not need to compete with the phone at wake-up; it only needs to win the evening. The substitute should therefore be built around the transition into sleep.

8.2.1 Looking back at history

To understand what a good pre-sleep ritual looks like, it helps to look at how humans wound down for most of history. As read in the book "How to sleep like a Caveman" (Figure 8.1), the Hadza are a hunter-gatherer tribe in Tanzania whose way of living has barely changed for thousands of years, which makes their habits a useful window into how our bodies were designed to live. One consistent finding is that the Hadza do not go to sleep when the sun goes down. They gather around the fire. Without artificial lighting, the fire is their only evening light source: dim, warm, and free of blue wavelengths.

Figure 8.1: How to Sleep Like a Caveman

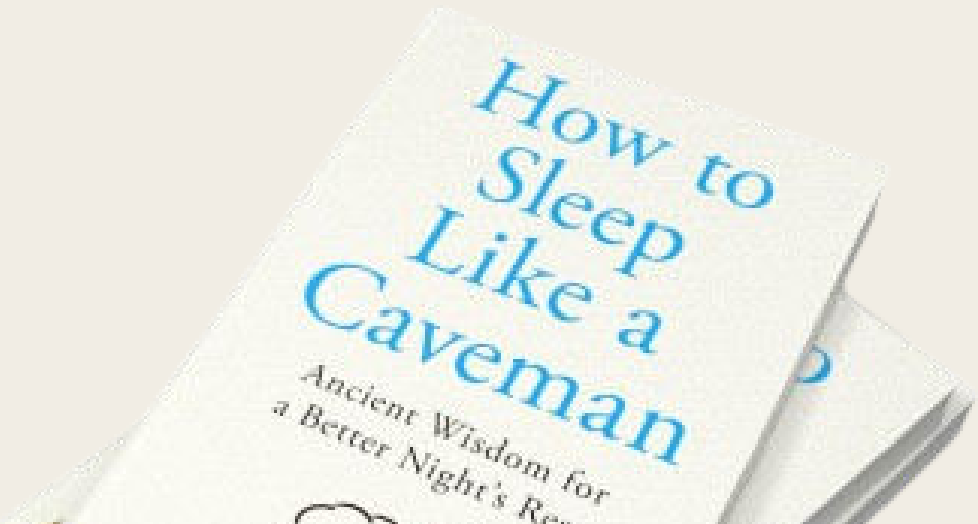


Figure 8.2: People around a fire

8.2.2 The campfire as an Interaction Vision

The campfire offers more than light. People sit together, tell stories, reflect, and get mesmerised by the flames (Figure 8.2). This project takes those qualities as the direction for the unwind ritual: not the campfire literally, but its core character. The product should give off the same dim, warm, flickering light and invite the same kind of quiet reflection at the end of the day.

8.2.3 Unwind Brainstorm

Below are the results of a brainstorm to capture the interaction qualities of the campfire (Figure 8.3). The main interesting ideas to use, that have not been implemented before are the Stories, Mesmerisation, it being the orientation point of the room, flickering Light and feeling of Safety.



Figure 8.3: Various qualities of the campfire

8.3 Use-Case Archetypes

Before any form could be designed, a more important question is where the product will live. The placement of the alarm determines its relationship to the phone, and with it, the entire behavioural logic of the concept. Three archetypes were explored (Figure 8.4).

8.3.1 Alarm Elsewhere in the Room

The first idea was to remove the alarm from the bedside table entirely. If the alarm lives across the room, the phone can join in that place in the evening, giving it a clear "landing spot" away from the bed. The product could even double as a dock or charger, making the phone's new location feel natural and logical.

The logic to use this as a way to remove the phone seems good, but it breaks down when interacting with the alarm. Research confirmed that most people are unwilling to get out of bed to silence their alarm. And more critically, they are faced with their phone the moment they turn off their alarm. Placing the alarm across the room also limits the interactions that can be designed for the bedside. For example, reading, breathing exercises and meditation. None of these is available if the device is out of reach. The archetype trades one problem for a worse one.

8.3.2 Two-Part Product (The Swap)

Another concept is a two-part system built around a single interaction: the swap. One part, like a dock, stays in a fixed location away from the bed. The other part, the alarm, normally rests there too. Each evening, the user physically swaps their phone into the dock and carries the alarm to the bedside. The act of swapping becomes a ritual that marks the transition into the Unwind period. This concept has a nice appeal. It gives the phone a designated home outside the bed.

The critical flaw emerges in the morning. When the alarm goes off and the user goes to silence it by returning it to the dock, just like the other idea, their phone is right there waiting. The concept successfully removes the phone in the evening, but makes it second nature to swap the alarm back for the phone, before the user is fully awake and has no willpower to resist it. For this reason, this concept was set aside.

8.3.3 Alarm on the Bedside Table (Chosen Direction)

The third archetype keeps the alarm on the nightstand. Rather than having the phone and alarm interact together, technology is used to make people conscious of their phone habits in the evening.

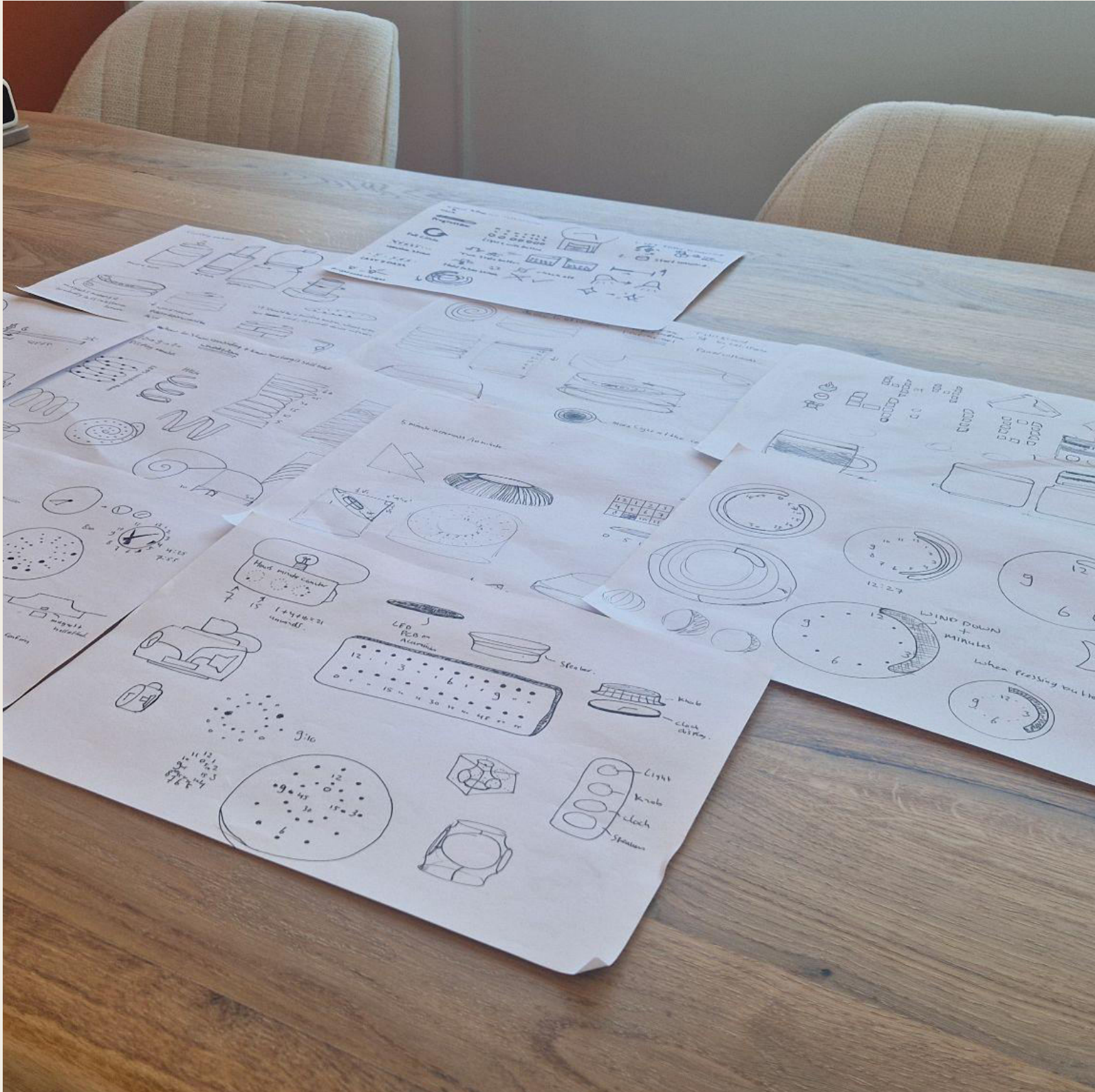
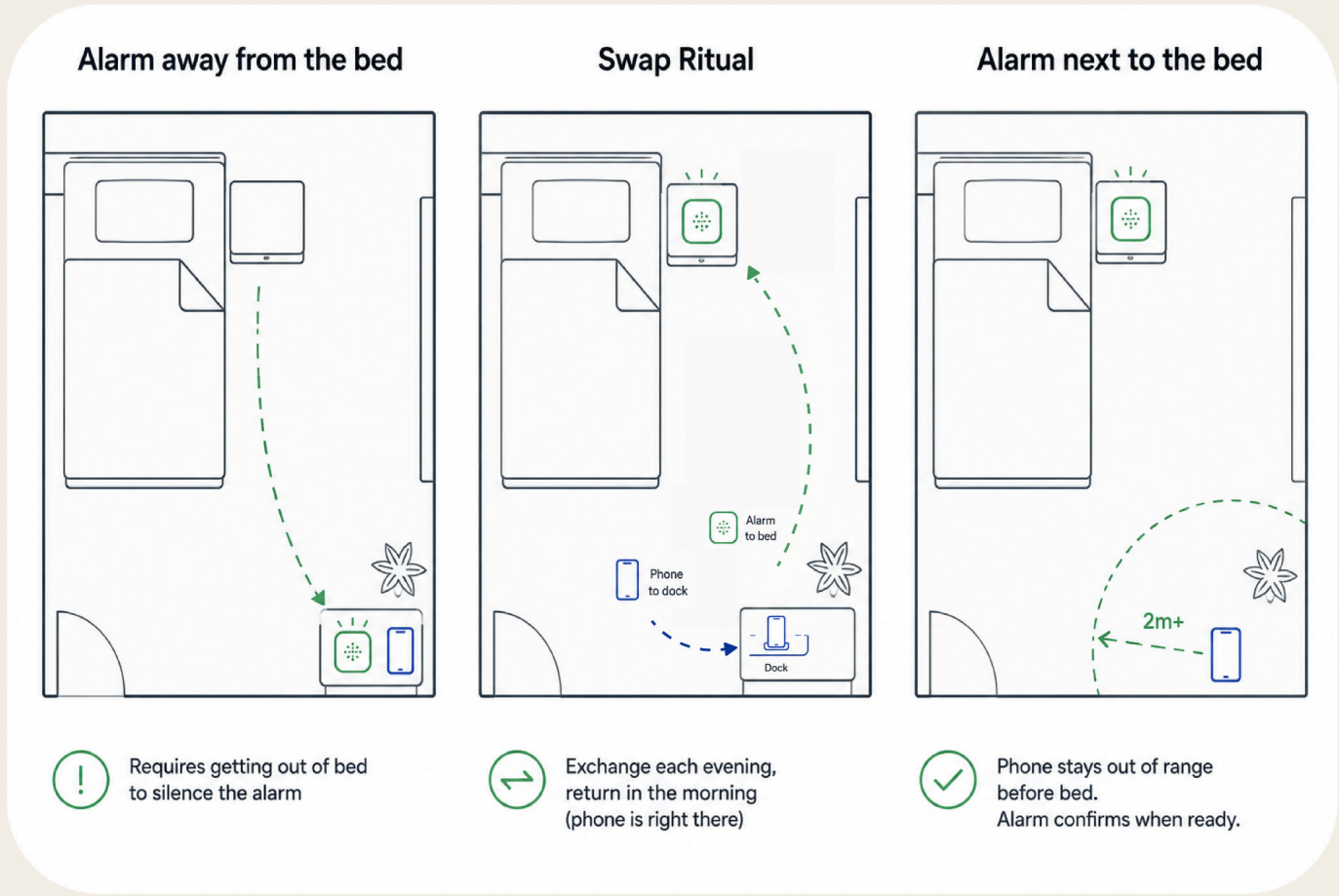
From Chapter 8.2, we know that the primary job of the product is not to compete with the phone in the morning, but it is to make the bedside a phone-free zone by the time the user gets into bed.

The mechanism for achieving this uses Bluetooth RSSI to estimate how far away the phone is from the alarm. The act of setting the alarm each evening becomes the moment of accountability: During the physical interaction with the alarm, the device checks the phone's location. If the phone is still within range, the alarm does not confirm.

Once the phone is away, the user is able to activate the alarm.

Even if the phone is taken to bed later on, this does not deactivate the alarm. We do not want to add too much friction to the night, even if the user slips up once, or wants to watch an episode of their favourite TV show on Saturday morning. Doing this too explicitly will make the user reject the alarm, defaulting to using their phone as an alarm again. Instead of fighting the user, it creates a small, daily moment of intentionality: "Do I really need my phone in bed today?"

Figure 8.4: Three Product Archetypes



8.4 Progression of Prototypes

Following the research and concept development, a phase of rapid prototyping was conducted to further develop different concepts (Figure 8.5). Building on the identified insights and design principles, different aspects such as interaction and form were explored through prototyping, feedback sessions and small interaction test. This chapter outlines the key design decisions that shaped the initial concept. It is structured around the four design questions the prototypes were built to answer.

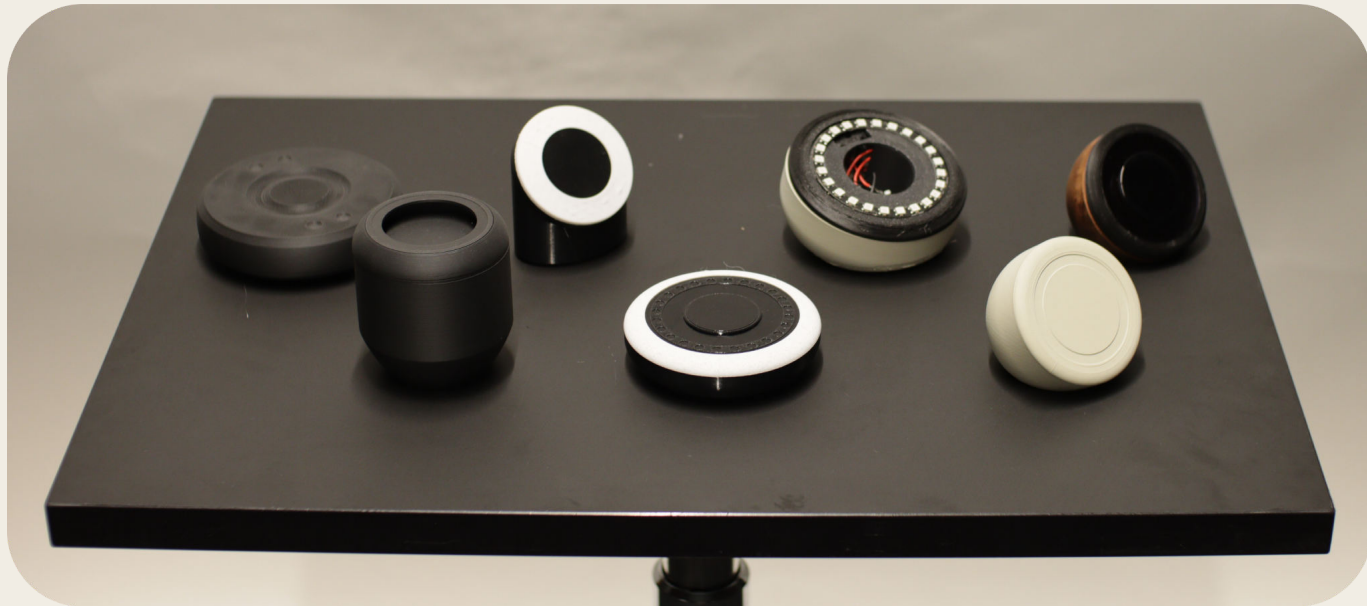


Figure 8.5: Different Prototypes

8.4.1 What should the balance between implicit and explicit be?

The first pair of prototypes tried out the two extremes (Figure 8.6). The **Wind Down Lamp** took the implicit route: building an alternative habit to reclaim the final hour of the day. The user commits to a duration for their evening ritual, the bulb acts as a visual countdown, and an OLED display grows a "streak flame" across cumulative evenings of reading, journalling, or meditating. The **Swap Pebble** took

the explicit route: a screen-free alarm built around a physical swap, where the phone is docked in another room and the pebble takes its place on the nightstand; in the morning, a gradual sunrise and a low haptic hum wake the user, and the phone is only released by returning the pebble to its dock.

The lamp proved too large to fit the company's product scale, but its rotating interaction and streak planted the Unwind seed of the campfire metaphor that runs through the final concept. The pebble's swap logic was a fun idea, but its bulky body contradicted the soft form language handheld devices need.

Decision: pursue the more implicit, ritual-building direction, while retaining the pebble's principle that the phone leaves the bed.

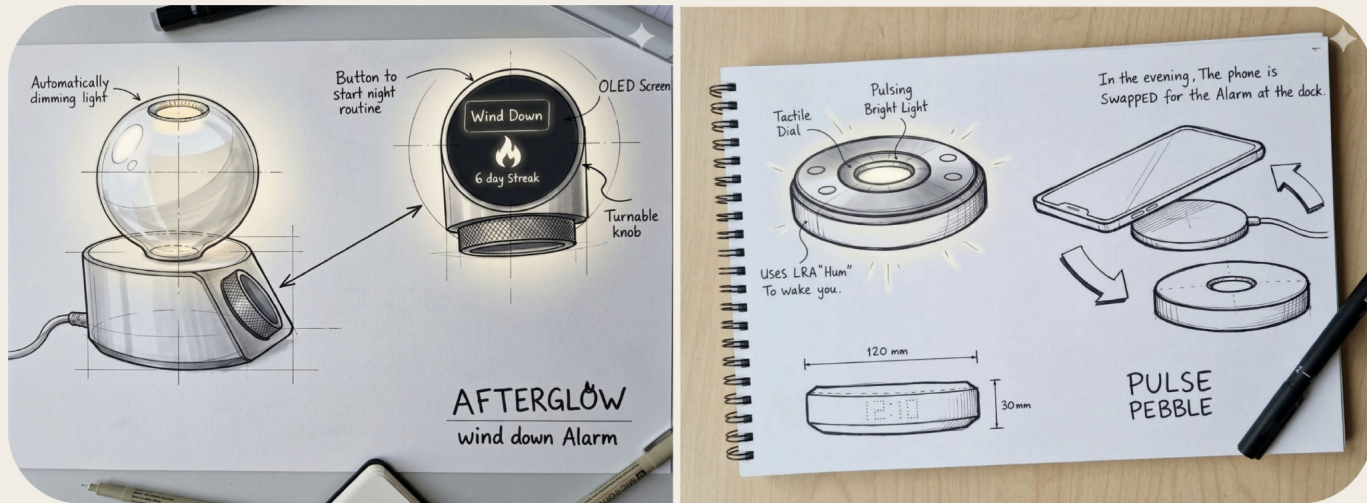


Figure 8.6: Visualisations of Wind Down Lamp and Swap Pebble

8.4.2 What role should the phone play?

The **Magnetic Wireless Charger** (Figure 8.7) followed the "Alarm elsewhere in the room" Archetype, and tested whether the phone should be incorporated into the interaction: docking it would signal "the phone is no longer needed tonight" while charging it for the next day. The magnetic snap was satisfying, but the prototype did not work with the idea "out of sight, out of mind" principle from the hurdle analysis.



Figure 8.7: Visualisation of the Magnetic Wireless Charger

Decision: the phone stays out of the product. The dial around the round screen worked well and became the core of the interaction model.

8.4.3 How should the interaction work?

With the dial and screen chosen, the **Standing Dial** (Figure 8.8) transferred it to a standalone object that fits the New Things Lab size and size. Other smaller interaction elements were also prototyped, printed and tested (see Figure 8.9).



Figure 8.8: Visualisation of the Standing Dial

In Figure 8.8, you can see the CAD, AI visualisation, and physical form prototype. The form was too small to rotate comfortably while standing on a surface, and the shape was a bit too static for the user to want to pick it up.

Decision: a rotating, clickable bezel as the single interaction, designed to be operated with one hand, but needing more rounding near the bottom.



24 hour dial display. This so it also works when you put it upside down.



On or off switch, with the switch acting as the 0



Rotate part of the N to make two "FF's"

On → Off



Physical interaction of rotating the clock 90 degrees to set the alarm.



Figure 8.9: Other interaction Prototypes

8.4.4 What form should it take?

The **Puck** series explored rounding variants to find a soft form language fitting the Unwind context: intentional, without hard edges, and with the LED ring introduced as an abstraction of the fireplace design metaphor. What the puck lacked was directionality: nothing told the user where the front was.

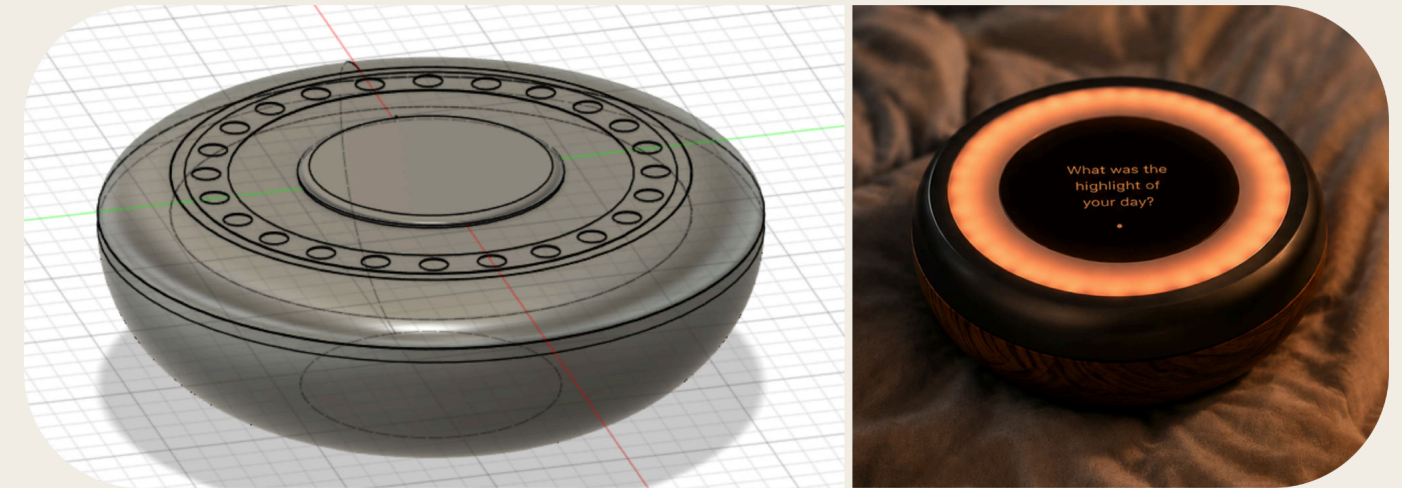


Figure 8.10: Visualisation of The Puck

The Tilted Puck (Figure 8.10) resolved this by tipping the face toward the user, giving the object an orientation while keeping the soft geometry. User feedback on this form was strongly positive.

Decision: the tilted, softly rounded puck with the LED fire ring — combining the form language, the directionality, and the proven bezel mechanics into the initial concept.

The **Tilted Puck** later proved the mechanics: after iterating through 3D-printed spur gears, the bezel became both turnable and clickable, and the full electronics (ESP32 with OLED display) were integrated and tested (see Figure 8.11)

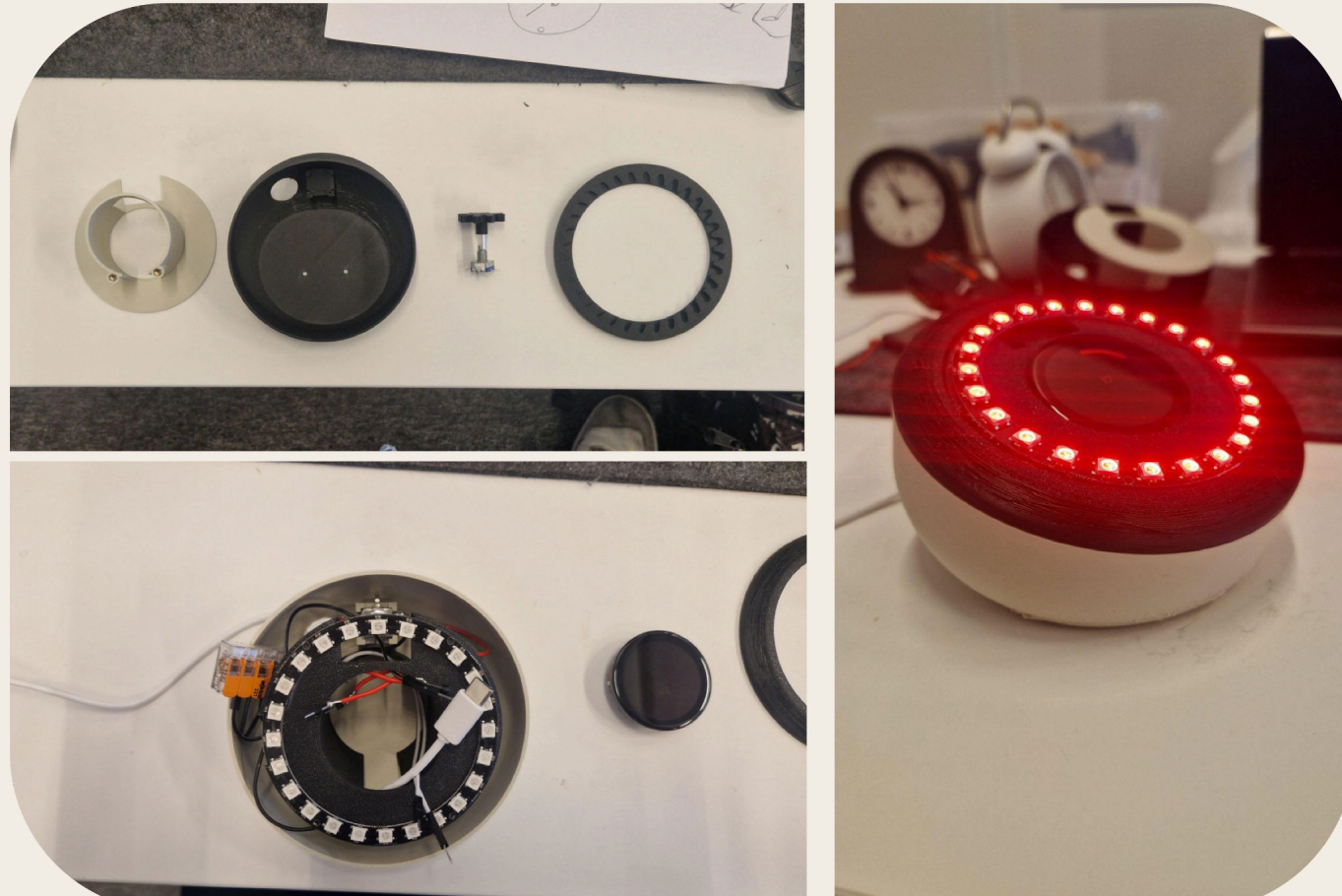


Figure 8.11: Progression of the Tilted Puck prototype

8.4.5 Conclusion

Each question contributed something to the concept. It will be a ritual-building product, operated through a single rotatable, clickable dial. The form is soft and tilted; this prototype was used to perform a Function and Interaction test in Chapter 8.6.

8.5 UI prototyping

Since UI design and programming were not the focus of this project, a quick way of prototyping a working program was needed. In the end, a combination of LVGL and Claude Code was used to make the device fully functional as an alarm to test interaction.

LVGL (Light and Versatile Graphics Library) was chosen for the UI prototyping of this project. This is a graphics library for embedded devices (*LVGL — Light and Versatile Embedded UI Ecosystem*, 2026). Using LVGL is the standard when programming a lightweight GUI on a small display, where there is limited storage space. An ESP32 with an OLED screen was used in this project, so this was a good workflow.

Through coding with Claude Code, it becomes possible to use text and sketches to prototype these UI's with a lot of freedom and speed (see Figure 8.12). All UI elements can be found in Appendix E.

Claude Code gets access to a specific part of your file system, being able to directly read and write files. The output is a .ino file which can be flashed to the ESP-32 board to begin testing. A GitHub repository was created to log all the changes (Hilberink, 2026/2026).

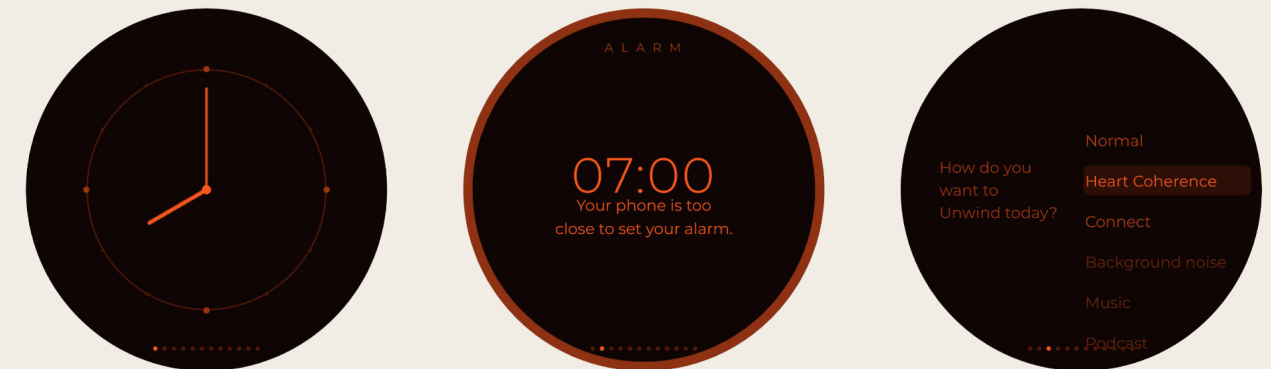


Figure 8.12: Various UI elements

8.5 Participatory design workshop

A participatory design workshop was conducted with a group of fifteen high school students, to explore the problem space from the perspective of a younger generation (Figure 8.13). Most of these teenagers did not own the problem this project addresses. **Their parents enforced rules about phones in the bedroom**, and their screen time was limited through parental controls. The gap between intention and action only appears when people move out, gain agency over their own evenings, and have to become their own parents.

The **target demographic** therefore shifted older: **young adults who have agency**, recognise the problem, have **already tried putting the phone away, and have failed**. This is why the form and interaction tests later in this chapter were conducted with young adults aged 21 to 26.

Figures 8.13: Design Workshop



8.6 Function and Interaction Test

This project is centred on people who struggle to put their phone away in the evening, so the concept has to be tested by potential users. The main objective was to gain insight into the interaction of the product, evaluate its functional aspects, and understand which friction it introduces.

The questions to answer were:

What interaction qualities do users like and dislike?

Which functions would users actually use as a substitute habit? And what is missing?

8.6.1 Method

Five participants aged 21 to 26 took part in two group sessions, each consisting of a concept introduction, a hands-on interaction scenario with the functional prototype, and a semi-structured group discussion (Figure 8.14 and 8.15). For the demo, several ways of guiding the Unwind were available: a breathing exercise, reflection questions (alone or together), music, podcast, and background noise. Users were prompted to set an Unwind duration with a minimum of ten minutes. Sessions were recorded on audio and video; the UI used can be found in Appendix D.

Figure 8.14: Function Discussion & Brainstorm



Figure 8.15: Interaction Test and Questionnaire

8.6.2 Results

The participants' evening phone habits varied widely. One had already been keeping her phone on the other side of the room for two years and fell outside the target group; the other four all struggled with putting their phone away at night to some degree. Their reasons matched the hurdle analysis: the alarm, staying reachable, watching a video to relax, checking the agenda, and scrolling to get tired.

"I want to do things intentionally."

"I think intentionally being aware of an Unwind ritual is the best feature."

"I see the added benefit mostly in the lamp dimming, so it feels like you see the sun go down."

"This must be for someone who already feels they have the problem, and that it just doesn't work. That is the target group."

The concept was well received by people who already saw their evening phone use as a problem they wanted to fix. For this group, the main value was not the phone-blocking, but the structure it gives at the end of the day. The dimming lamp stood out as the most liked feature. The concept works best

when the user already wants to change; it does not create motivation. This directly confirms the target demographic reasoning from 8.1.

Ranked from most to least interest, the features scored as follows:

- **Dimming lamp / reading light:** the most universally valued feature, appreciated both for winding down and as a practical reading light that removes the need to get out of bed to turn off a lamp.
- **Podcast:** moderate interest, though selecting a podcast without picking up the phone was raised as an unresolved friction point; a default or pre-selected podcast was suggested.
- **Reflection questions:** well received, especially the couple-facing "connect" questions, seen as a natural, low-effort way to close the day.
- **Breathing exercise / guided meditation:** secondary interest, appealing as an endpoint of the Unwind once the light has dimmed too far to read.
- **Movement / yoga / stretching:** mentioned spontaneously as a desirable addition not currently in the prototype.

Three observations concerned the design directly. The LEDs were too bright during setup; participants suggested a diffuser so the ring glows rather than spotlights. The rotate-and-press dial was described as intuitive, but the device was too light, requiring two hands to operate; a heavier form or a grip at the base was suggested. And the "breathe in / breathe out" text on the display during the breathing exercise was found unnecessary; participants preferred the ring to simply expand and contract in light, so they could look at the ceiling instead of the device.

The full questionnaire and answers can be found in Appendix D.

8.6.3 Conclusion

The Unwind light and the intentionality framing were the most compelling aspects of the concept; the phone-blocking was secondary and needs to be adjustable rather than fixed. The interaction itself was positively received. The evaluation confirmed the two big calls of this chapter: the friction calibration of 8.1 and the target group it was calibrated for. It also produced concrete refinements: diffuse the LED ring, add weight to the body, drop the breathing text, and add a stretching and meditation guide to the Unwind options. The main product risk is that the device requires the user to arrive with motivation it cannot create itself, which reinforces the importance of positioning it clearly for a specific, self-aware audience. With these refinements incorporated, the next chapter presents the final design: Unwind.



Chapter 9 - The Design: Unwind

This chapter presents the final design of this project: Unwind, an alarm clock that takes away the phone's reason to be in the bedroom (figure 9.1). The name captures the function and core interaction: the user winds the dial to start their Unwind Ritual. First, the rationale behind the design is summarised. A user scenario then shows the product in its context of use. Finally, the physical design and the interaction design are presented in detail.

Figure 9.1: Unwind next to other alarm clocks



9.1 Rationale

Unwind is a physical product for the bedroom, designed to replace the smartphone on the nightstand as the first and last thing people interact with every day. The goal is to reintroduce intentionality into the evening routine by changing the physical environment, rather than relying on the user's depleted willpower.

9.1.1 Behaviour Change Strategy

People know scrolling before bed is bad for their sleep. They do it anyway, because at the end of a tiring day, willpower is gone. Unwind therefore does not try to convince the user of anything. It applies the two mechanisms developed in Chapter 8: friction at one point, and a substitute for the rest. When the user sets the alarm, Unwind checks whether the phone is nearby and only confirms if is not. After that, it never punishes; if the phone comes to bed anyway, the alarm still works. In place of the phone, it offers an Unwind ritual that makes the user experience an intentional evening (see Figure 9.2).

Figure 9.2: Behaviour Change Strategy

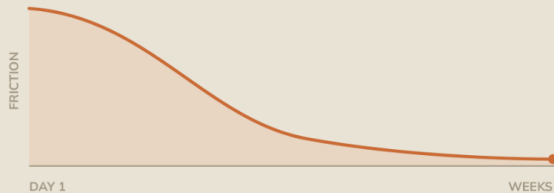
01

The nudge

ADDS FRICTION, EVERY DAY

Setting the alarm uses Bluetooth RSSI, so the phone cannot be close to the bed. Phone-free becomes the default, and the daily friction breaks the phone-to-bed loop.

FRICTION OVER TIME



The friction sparks a moment of intention. As the habit is learned, it fades to nothing.

A soft nudge, not a hard lock.

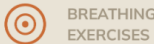
Grabbing the phone later never stops the alarm, because too much friction causes abandonment.

02

The substitute

OFFERED ALONGSIDE THE NUDGE

Removing the phone leaves a gap. The substitute fills it with an intentional substitute.



BREATHING EXERCISES



MUSIC OR PODCASTS



READING LIGHT



REFLECTION QUESTIONS

Unwinding at the end of the day

9.1.2 Mechanism and Target Demographic

New Things Lab products work because of the identity-based habit mechanism described by James Clear: buying Unwind is the commitment, the moment where the user says: I am a person who takes their sleep seriously. This mechanism only works for a specific kind of person, someone who already recognises the problem, has probably tried putting the phone away and failed, and is looking for an object that gives their intention physical weight. That is the target demographic (Figure 9.3). They value premium objects that mean something, and they are willing to spend money on a habit they want to build. The user evaluation in Chapter 8 confirmed both sides of this: the concept works when the motivation is already there, and it cannot create that motivation itself.

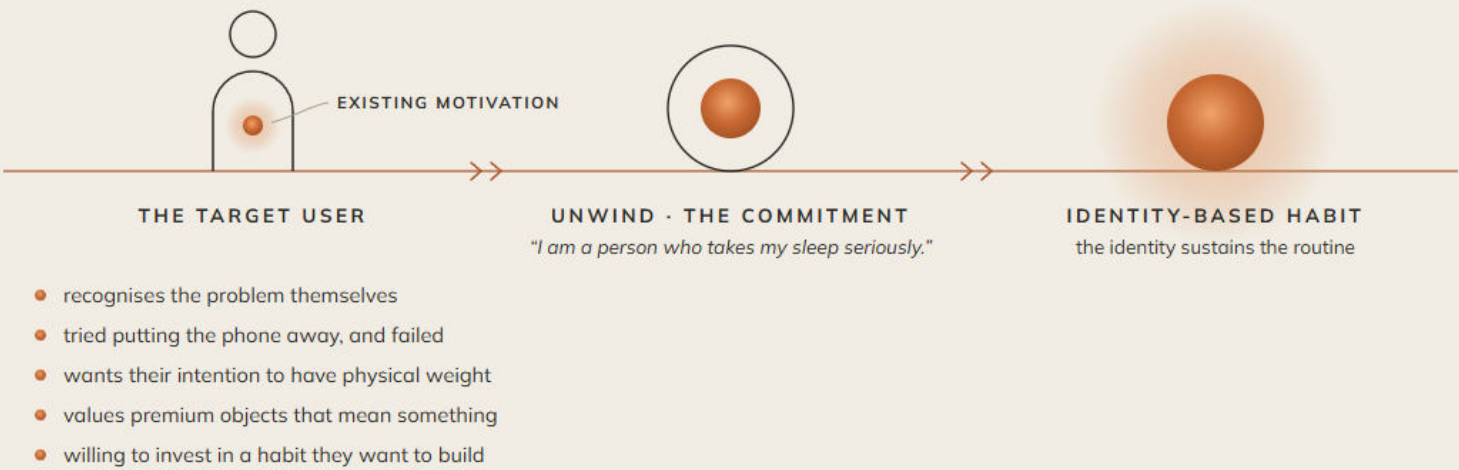


Figure 9.3: Mechanism and Target Demographic

9.2 How Unwind works

This section first walks through one night with Unwind with a user scenario (Figure 9.4) and average day with Unwind, and then explains the features behind it.

9.2.1 User scenario

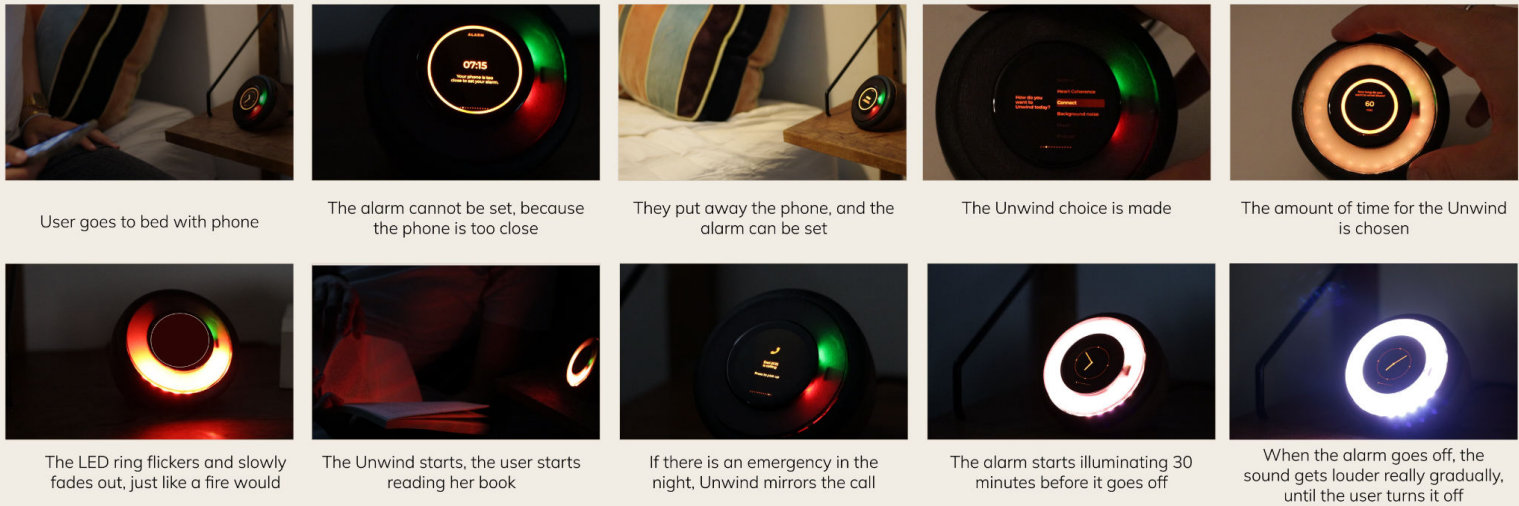


Figure 9.4: User Scenario

An Average day with Unwind

It is 22:30, and the user gets into bed the way she always has: phone in hand. When she tries to set tomorrow's alarm, it refuses. Her phone is still on the bed, and the display tells her so. This is the one explicit moment Unwind allows itself, the small daily question of whether the phone really needs to be there. She sighs, walks the phone to the dresser, and the alarm confirms.

The display asks how she wants to Unwind today. She turns past heart coherence breathing, the Connect questions she does with her boyfriend on Sundays, and background noise, and settles on no guided Unwind. She turns the dial down from 60 minutes to 20. The Unwind starts and she opens her book, reading by the warm light of the ring. When it gets too low to read, she puts the book away and lets her thoughts drift. The last embers go out. The room is dark, the phone is far, and nothing within arm's reach wants her attention.

The alarm mirrors calls from her phone, in case of an emergency. The display shows that her dad is calling, and one press of the dial picks up. Leaving the phone behind never means being unreachable.

Thirty minutes before the alarm, the light starts to turn on, gradually building to ease her out of sleep. The alarm itself starts nearly inaudible and grows so slowly that most mornings she is awake before it ever gets loud. One press of the dial ends it. There is no phone within reach, no feed waiting. The first minutes of the day are her own.

9.2.2 Unwind in the evening

Within the Unwind, the user can select a guided session: a breathing exercise, reflection questions, background noise, or audio. The breathing exercise is guided entirely by the ring expanding and contracting in light, so the user can look at the ceiling instead of the device.

For audio, Unwind acts as a standard Bluetooth speaker: music or a pre-selected podcast starts without the phone needing to be touched again. The podcast is the modern version of stories around the fire: audio that fills the space without demanding too much, chosen in advance so the phone does not need to be touched again.



Figure 9.5: Unwind Visual

If no guided session is chosen, the Unwind still happens. The light dims and begins to flicker, and the user is free to do whatever feels right: read, journal, meditate, get their clothes ready for the next day, or let their mind wander (See Figure 9.5).

9.2.3 Waking up

Through research, we've learned that seeing the in the night is not necessarily beneficial, because it makes you worry about how many hours you can still sleep. This is why the display is normally off. Thirty minutes before the alarm, though, a warm light gradually fades in to support the natural wake-up process (Figure 9.6). This helps you make yourself aware that you have less than 30 minutes left and have to option to not get into a new sleep cycle. When it hits the wake-up time, the alarm builds from nearly inaudible to impossible to sleep through; the goal is that the user wakes up before the alarm becomes annoying. A single press on the dial silences it. Because the phone never came to bed, the morning needs no managing: it fixes itself.

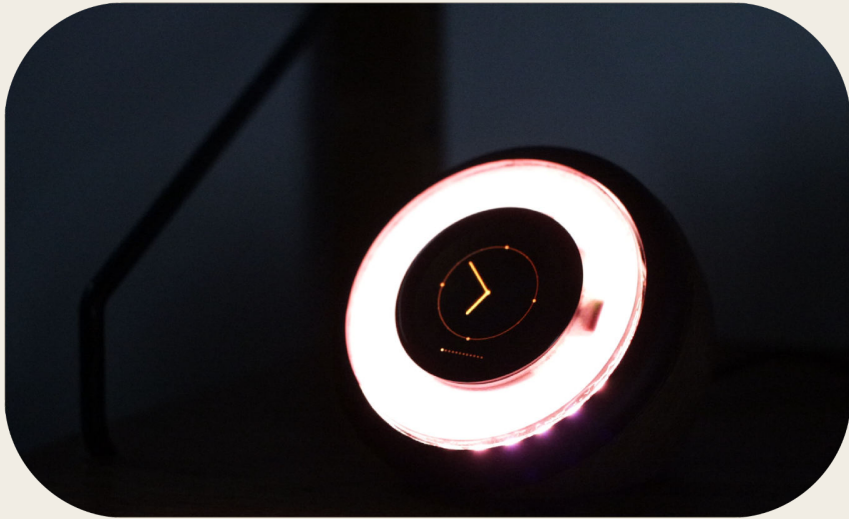


Figure 9.6: Gradual Light Increase

9.2.4 Staying reachable

For people who need to stay reachable overnight, Unwind mirrors calls from selected contacts via Bluetooth, so the phone can stay in another room without the fear of missing an emergency (see Figure 9.7).

Figure 9.7: Emergency Call Mirroring





9.3 Visual Design

Unwind incorporates the qualities of a tactile product: an analogue feeling through physical interaction, with a digital backbone. Each choice traces back to the research.

9.3.1 Form

The body is a compact, tilted rounded shape, and its face points toward the user (see Figure 9.8). The tilt gives the object a clear orientation on the nightstand and makes the display readable from bed. The form has no hard edges, and is weighted so the dial can be operated with one hand, a feature that came from the feedback of the interaction test.

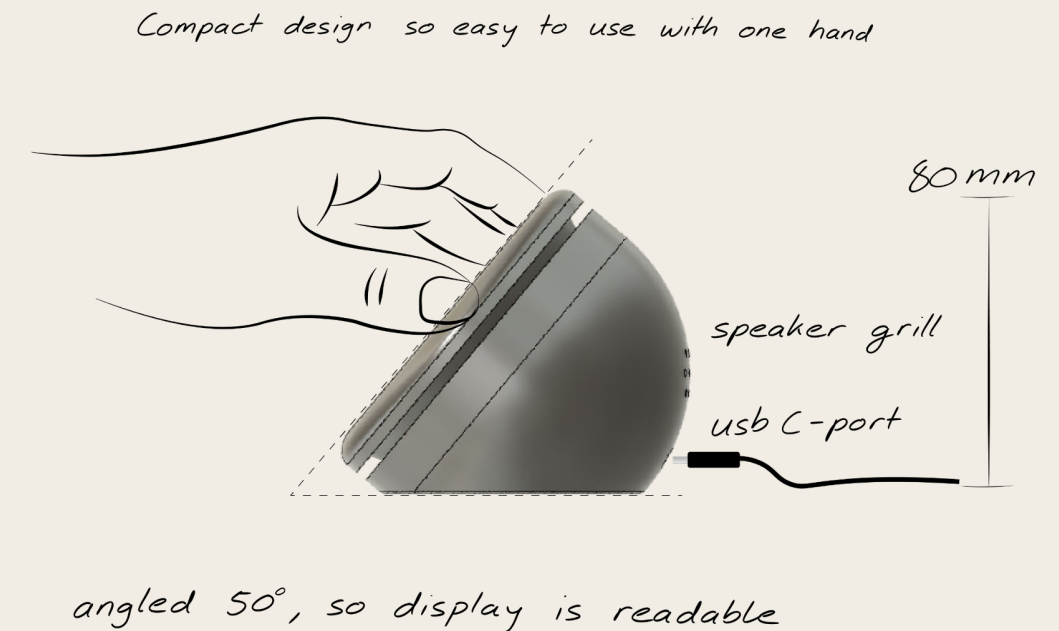


Figure 9.8: Compact Form of Unwind

9.3.2 Material language

The material and light qualities of the campfire translate into the material language (Figure 9.9). Treated wood and black aluminium feel premium and friendly at once, and they fit the portfolio of NTL, where both materials have been used before; Dark wood is the same as the focus bundle, and the matte black aluminium of the dial ring deliberately aligns with the Memo Wallet (Figure 9.10 & 9.11).

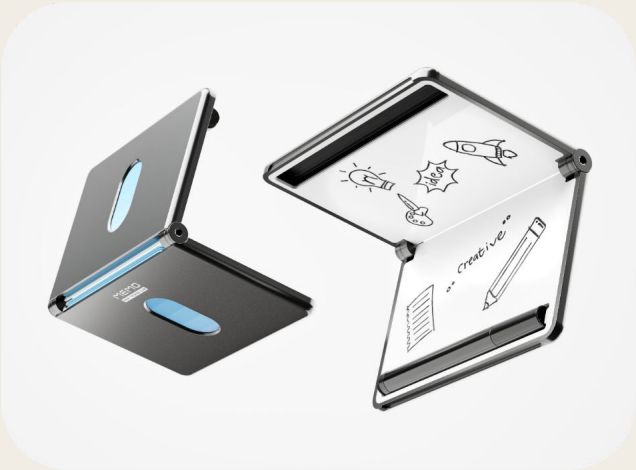


Figure 9.10 & 9.11: Dark Milled Wood of the Zone stand and Anodised Aluminum Memo Wallet

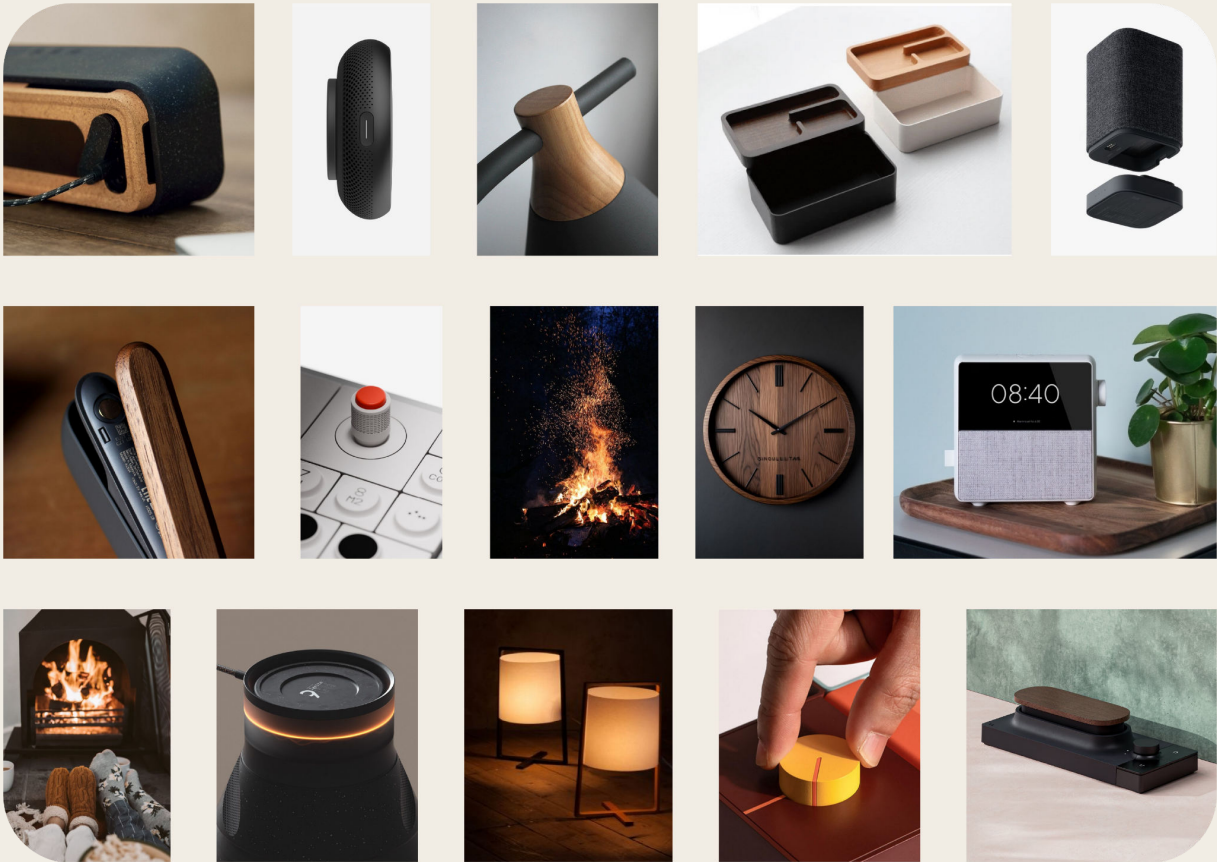


Figure 9.9: Material Language



9.4 Internals

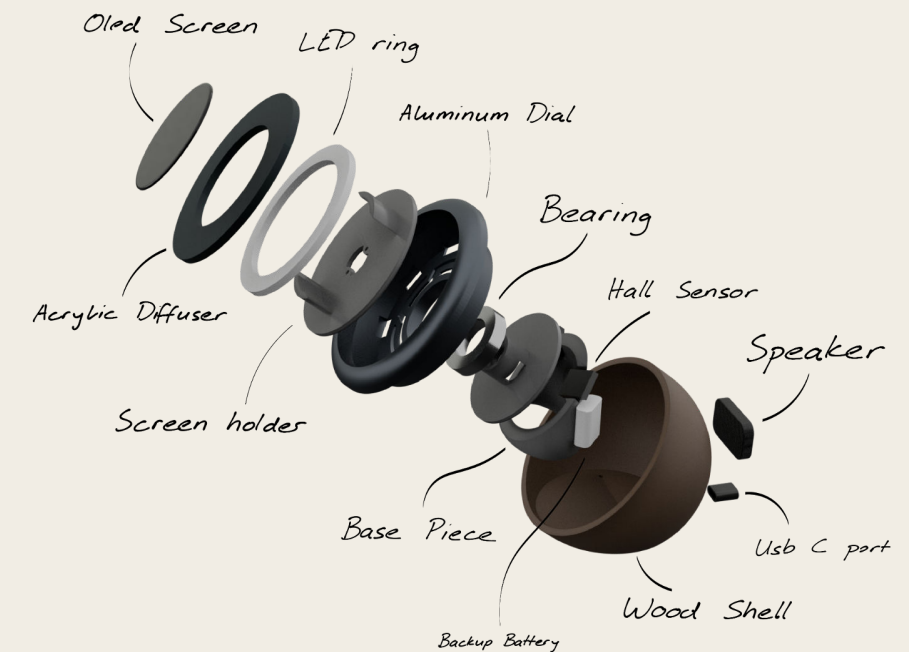


Figure 9.12: Exploded View Components

9.4.1 Exploded View

Above, you can see the components of the Unwind (Figure 9.12). The wooden shell forms the outer body of the product and houses the speaker grill and the USB-C port. The base piece is screwed onto this shell with two M4 screws, and the bearing and aluminium dial are press-fit onto this base. The top part, labelled screen holder, is fastened to the base with the same kinds of bolts, passing through the dial assembly so the dial remains free to rotate on its bearing. The LED ring is fixed to the screen holder with adhesive, the OLED screen is press-fit into the holder, and the acrylic diffuser is form-fitted between these two. All wiring from the OLED screen is routed through the hollow center of the bearing down to the electronics in the bottom of the product, keeping the rotating dial free of any cables.

9.4.2 Mechanics of Dial

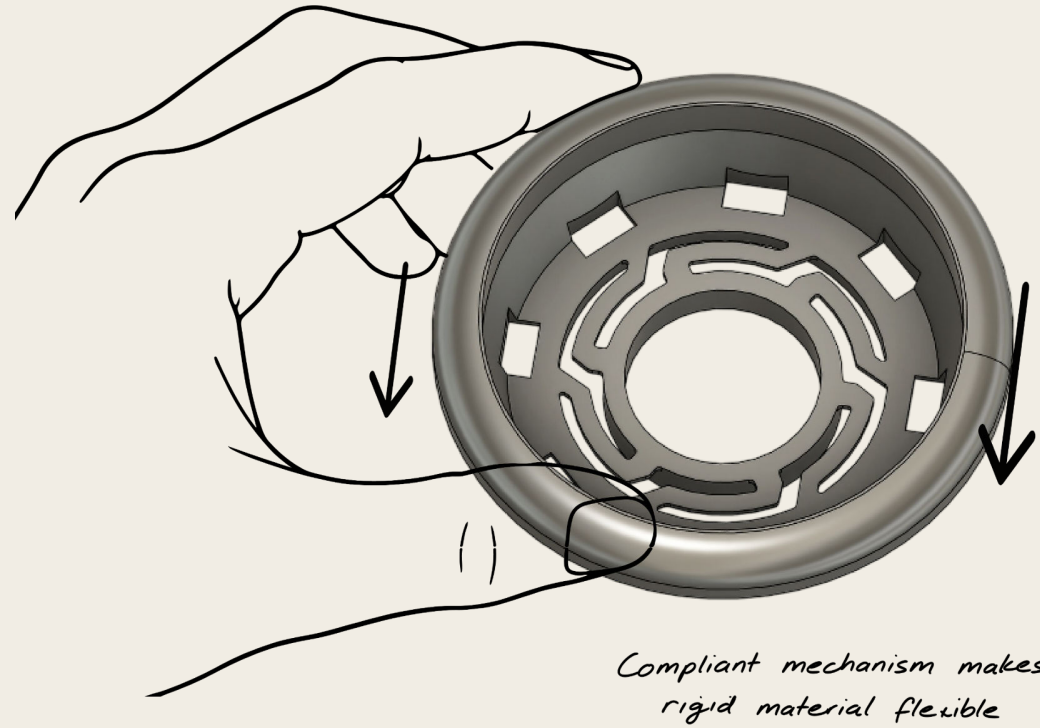


Figure 9.13: Compliant Mechanism

Unwind is operated through one interaction: rotate and click. It keeps the interaction simple and satisfying. The dial is on a bearing, giving frictionless scrolling, but incorporates a haptic engine that makes you feel every rotation.

A compliant mechanism is incorporated in the dial, so the dial becomes able to be pressed down (Figure 9.13). This, in turn, activates the button that is fastened to the base piece (Figure 9.14).

Dial gets pushed down, and button activates

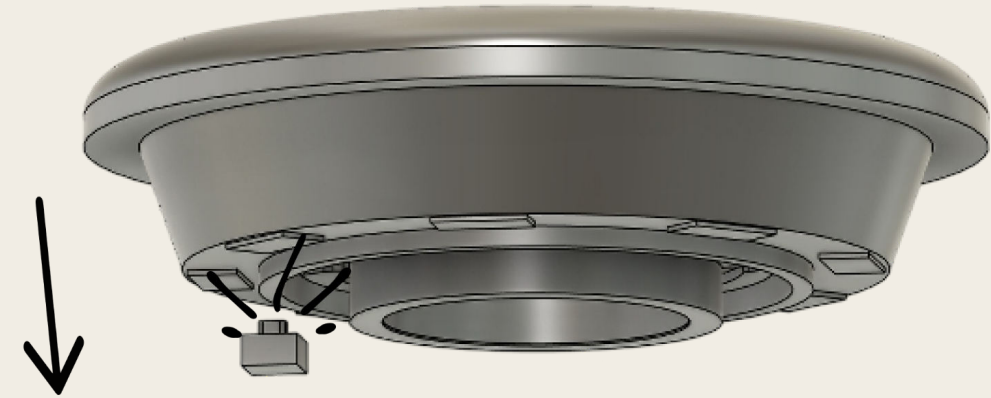


Figure 9.14: Button Mechanism

9.4.3 Electronics of the Dial

The rotation of the dial is measured without any physical contact. Eight magnets sit in the aluminium dial, spaced evenly, and two hall effect sensors are placed on the base below it.

Every time a magnet passes over a sensor, the sensor gives a short pulse. By counting these pulses, the device knows how far the dial has turned. One sensor alone cannot tell which way the dial is turning, because the pulses look the same in both directions. That is why there are two sensors, placed out of phase.

A passing magnet reaches one sensor just before the other. The order in which the two sensors react shows the direction of the turn. This way, every step of the dial is, and nothing touches or wears out physically.

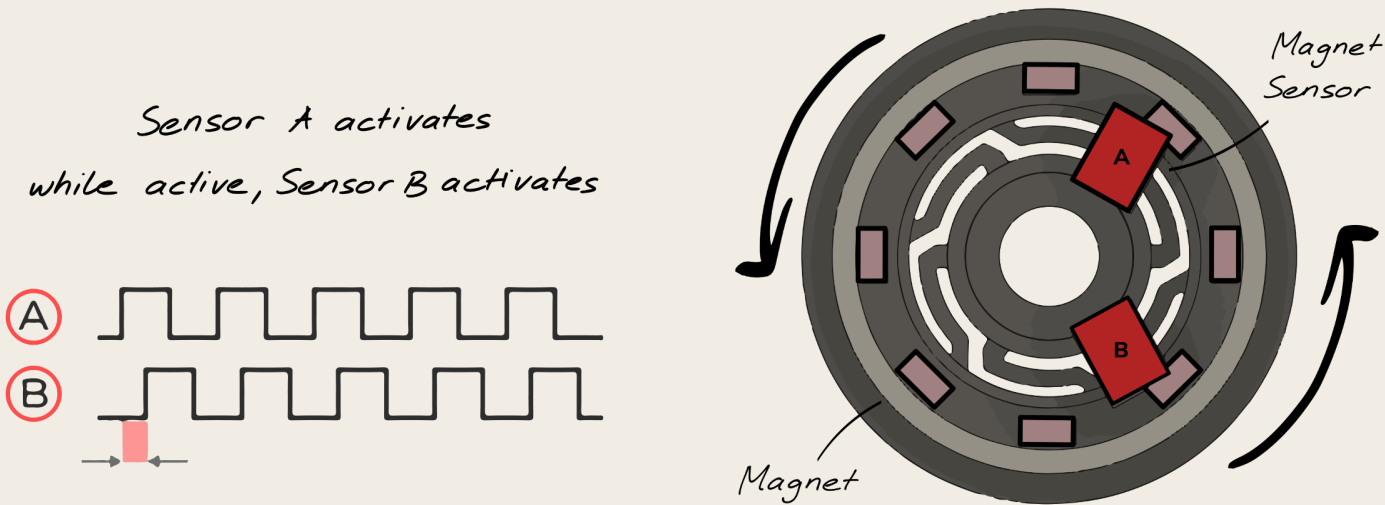


Figure 9.15: Turning Mechanism

9.4.4 Wiring

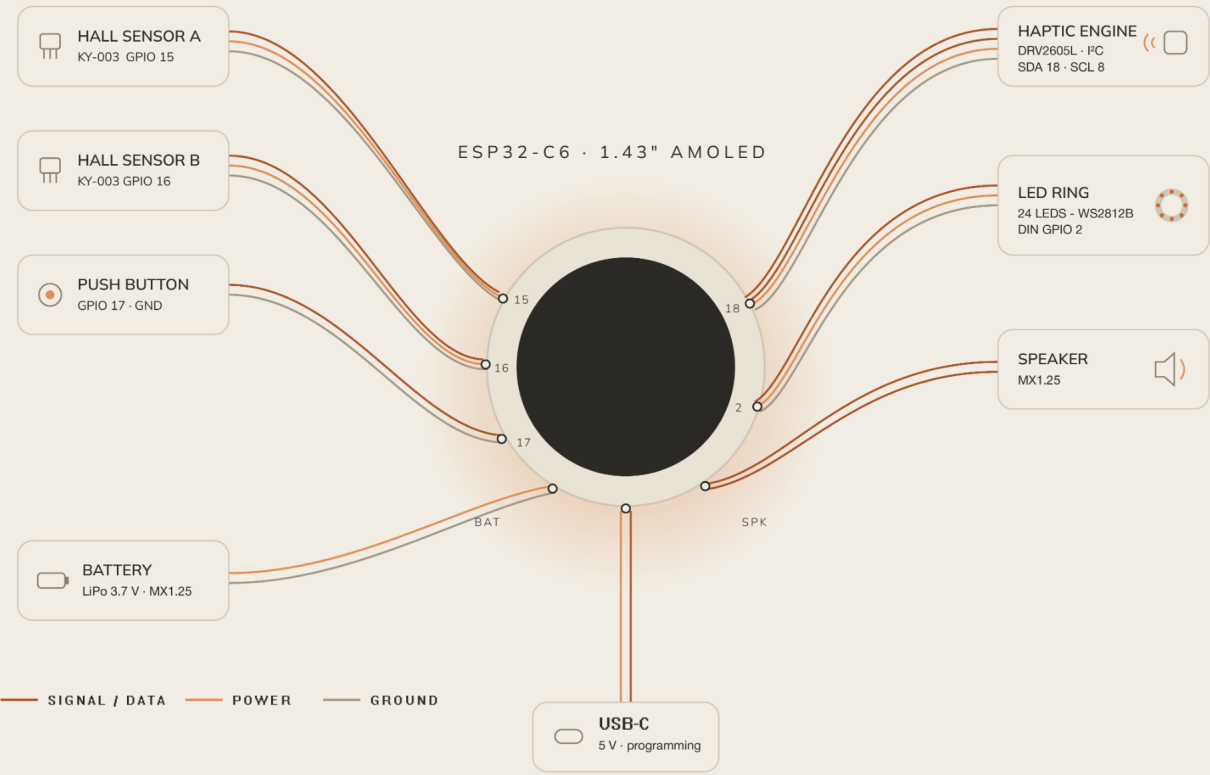


Figure 9.16: Wiring Diagram

Inside, the product runs on an ESP32 with built-in screen. This functions as the brain of the device, with all components being connected to it (Figure 9.16). The product will be a normally connected device, with the battery serving as a backup, that activates when the device temporarily loses power.

9.5 Conclusion

This chapter set out to answer how a physical product helps people act on their intention. Unwind shows that the answer is not to motivate the user, but to change the environment so that acting on the intention becomes the easier thing to do. It lowers the moment of effort to one deliberate choice when the alarm is set, replaces the phone with a ritual that is pleasant to reach for, and anchors the intention in an object the user has chosen to own and touches first and last each day.



PART IV: Validation



Chapter 10 - Behaviour Change Validation

Chapter 9 set out how Unwind changes behaviour: friction at one point, a substitute for the rest, and a purchase that acts as the commitment. Because that strategy is a behavioural claim rather than a technical one, this chapter tests it against theory and expert judgement. Two behavioural psychologists were consulted, each from a different tradition. Alien van der Vliet is a researcher and advisor at the Knowledge Centre for Psychology and Economic Behaviour (KCPEG) at Leiden University, with a background in social psychology and behavioural economics. Bart Wagenaar is a social psychologist and the founder of Drover, a behaviour-change agency. Their input is organised thematically below, together with the habit literature.

10.1 Designing for the environment, not the willpower

Alien pointed to the review of habit research by Carden and Wood, which supports the core decision to design for the environment rather than for discipline. **People who score highly on trait self-control do not resist temptation more effectively in the moment; they just arrange their lives to make the better choice easier**(Carden & Wood, 2018). Unwind does this by keeping the phone out of the bed by default. The same literature adds an important condition: these environmental strategies work for people who already intend to change, which is exactly the demographic Unwind is aimed at, and not a general public that must first be convinced.

10.2 Locating the real problem with COM-B

Bart looked at the design through the COM-B model (Michie et al., 2011)). It says every behaviour needs three things at once: Capability, Opportunity, and Motivation. Placing the phone-to-bed habit in this model shows where to act. Capability is not the problem, since almost anyone can leave their phone in another room. Opportunity is what Unwind adds, because an alarm that only works once the phone is away creates the chance to act differently. That leaves Motivation as the real issue. As Bart said, if people do not want the change, no amount of nudging will create it.

But motivation is not one thing. **COM-B splits it into reflective motivation**, the conscious wish ("I want to sleep better"), and **automatic motivation**, the impulses and habits that act without thinking. Habits

and addictions sit in the automatic side, and that side is the hardest to change. Wanting to scroll less but still scrolling is not a lack of ability; it is a fight inside motivation, where the reflective wish loses to the automatic habit, especially late at night when willpower is low. "I can quit, I just do not want to" is the same thing: a weak reflective wish against a strong automatic pull.

This also marks the edge of what Unwind can do. When the automatic pull has grown into a real addiction, a gentle nudge built for the already-motivated cannot help someone in that state. **Unwind is made for the habit, not the addiction.**

10.3 From wanting to doing: the trigger and the commitment

Wanting to change is needed, but it is not enough. People also need a moment that turns the wish into action. Bart linked this to the Fogg Behaviour Model (Fogg, 2009), where behaviour only happens when Motivation, Ability, and a Trigger come together. Unwind is that trigger. Setting the alarm is a small daily trigger that meets a person who already has the motivation and the ability, and makes the intended action more likely. As Bart put it, "it is great to use the alarm clock as a trigger for a change people already want to make."

The purchase adds to this. Buying Unwind is a choice made in advance, knowing the future self will find it annoying, exactly to raise the odds of following through. Bart connected this to Cialdini's idea of commitment and consistency: once people have chosen and paid for something, they want to act in line with that choice, because going against it feels wrong. Clear's identity idea, the COM-B reading, and this consistency principle all point the same way: Unwind works by attaching to a decision the user has already made, which is exactly in line with the grand gesture of Newport (Newport, 2016).

10.4 How bold can the friction be?

This raises a question the project has not fully answered: how bold the friction should be. Bart argued that for this user a clearly present, even slightly annoying intervention is not a flaw but what buyers expect, since "a bold intervention is exactly what buyers expect." Unwind is bold at one point, the alarm will not set while the phone is near, and soft for the rest of the night. Carden and Wood (2018) support that restraint, because hard rules tend to be dropped once they can be.

The right level of friction is a balance. More friction means more impact for people who need a strong push, but it costs autonomy and shrinks the group willing to accept it. Less friction reaches a wider group, since many people recognise part of this problem, but it may become too weak to change anything. Unwind's mix of an explicit trigger and an implicit ritual is one attempt to sit in the middle, but people differ, and for some a bolder version might work better. Which level is right cannot be decided by theory. It has to be tested with a real market, and this is picked up in the discussion.

10.5 Limitations

This validation is based on theory and expert opinion, not on an experiment. This will be looked into in the next chapter. Unwind is also not built for real addiction. Finally, the claim that matters most for the long term, that the delayed benefit is enough to keep the habit going, is not proven here and is left to the long-term testing proposed in the recommendations.

10.6 Conclusion

Approached from two sides, the habit literature through Alien and the COM-B and Fogg models through Bart, the analysis points the same way. Unwind's mechanism is sound, but it holds under one condition: the user must already want to change. For that user, Unwind supplies the missing pieces. It creates the opportunity to act, delivers a well-timed trigger at the moment the alarm is set, and builds on a choice the user made themselves, so the intervention is felt as their own rather than imposed. What it does not do, and does not try to do, is create motivation where there is none.

This shifts the questions away from the mechanism, which the experts support, and toward the user. Whether enough people hold that motivation, and would spend money to act on it, is a question of desirability. How bold the friction should be is taken up in Recommendations.

Chapter 11 - Desirability

Desirability asks two things: do people want the product, and does it actually help them. This chapter looks at both. The first part is a short multi-day test in a real bedroom, which gives an early read on whether Unwind works in use. The second part turns to the market, and to the question the report cannot yet answer: whether enough people want this strongly enough to pay for it.

11.1 Multi-day user test

This test was the first time Unwind was used where it is meant to live, on a nightstand overnight (Figure 11.1). The participant was a roommate who struggles to stop using their phone at night, which fits the intended user. They used the working prototype for three nights in a row and gave structured feedback each morning. With one participant over three nights, this is a small proof-of-concept: it can show potential, but not long-term effect.



Figure 11.1: Setup of User Test

11.1.1 What worked

On the first night, the participant completed a 15-minute Unwind ritual. The breathing exercise worked well, but was too long for the 15 minutes he chose. The phone-distance detection worked correctly while the phone was on. The intended behaviour was that the phone would be moved out of range, and this happened, but the participant went further and powered the phone off completely. This was an even stronger response than the design aimed for, and not one that had been considered as a possible

outcome, which makes it a valuable finding. The morning alarm was a clear highlight; the participant specifically liked the way it woke them up.

The effect went beyond usability. The participant reported falling asleep around thirty minutes earlier, and reading a book instead of reaching for the phone, and said they would want to keep using the device for longer. This is an early indication of the effect Unwind can have, but it cannot say anything about the long term, because the novelty can wear off and a habit cannot change in three nights.

One observation stood out as a strong signal for the concept as a whole. On the second and third nights, the participant remembered on their own not to take the phone to bed, and so never felt the friction of the product at all (Figure 11.2) The friction part of Unwind only becomes relevant when the bad habit shows up; when the right habit is already there, it stays out of the way. This is exactly the premise:

if the behaviour is good, the nudge does not need to be triggered.

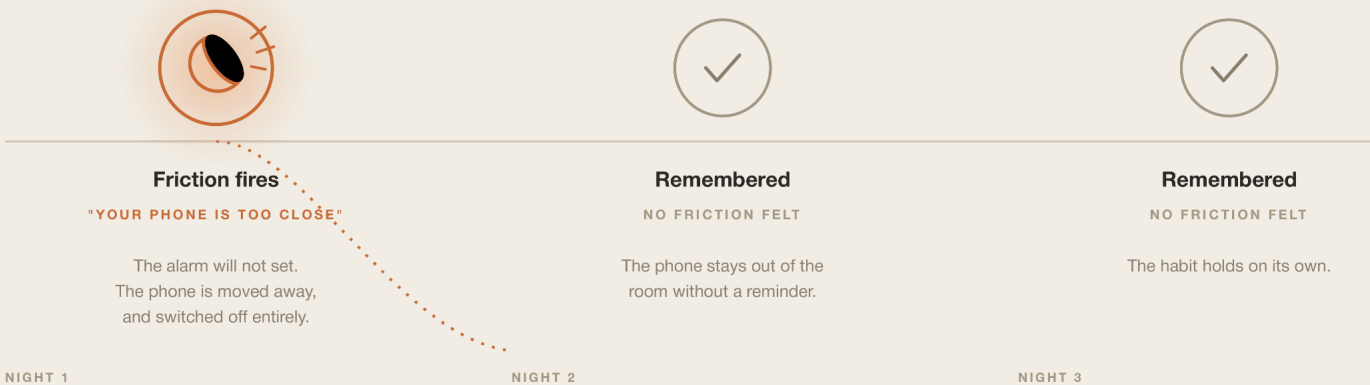


Figure 11.2: Three nights with Unwind

11.1.2 What needs improvement

The light intensity of the LED ring changed too much. This test was done with an older prototype before the acrylic diffuser was added and the light was dialled in. Also, they suggested a feature that notices when the alarm has not been used for several nights and asks the user why. This is an interesting idea that will be discussed in recommendations.

11.1.3 Limitations

Three nights is not enough to measure habit change, and the novelty of a new device can flatter the result. Some features were also not final. Bluetooth needed a manual setup step through the nRF Connect app, and music and podcast playback did not work yet. The final product uses a Bluetooth 5.0 module that presents itself as a normal speaker and broadcasts an RSSI signal for phone-distance detection automatically, removing the setup step.

11.2 Does the demographic exist, and will they pay?

Chapter 9 described the user, the person who already recognises the problem and wants a tool to act on it, but not in size, and size is where the doubt lies. On paper, the potential is enormous, because everyone sleeps and a large share of people say they scroll too much at night. But saying so is cheap. Recognising a problem, genuinely wanting to change it, and being willing to spend money on a premium object to do so are three different things, and only the last is a real test of the motivation. There is also the possibility that evening scrolling is a guilty pleasure people do not actually want taken away, in which case the stated wish to stop is not backed by real motivation. Whether a group exists that is both large enough and committed enough to put money behind the intention cannot be answered from the qualitative evaluation alone. This is a question of market desirability, and testing it is proposed in the recommendations.

11.3 Conclusion

The signs are promising. In a real bedroom, the participant wanted to keep using Unwind, fell asleep earlier, and read instead of scrolling. The test confirmed the core premise that the nudge only has to work on the hard nights. It even produced a stronger response than intended, with the phone switched off rather than just moved away. These are early signals of potential, not proof, since a single participant over three nights cannot show whether the effect lasts.

Market desirability is the open part. The problem is widely recognised, but recognition is not the same as a purchase, and willingness to pay has not been tested. Unwind therefore looks desirable in the hand, while its desirability in the market remains the main thing left to validate, together with the expected costs looked into in Chapter 13, Viability.

Chapter 12 - Feasibility

Feasibility asks whether Unwind can actually be built and made. This chapter first sets out the choice of components and the reasoning behind each one, and then looks at how the product would be manufactured, including the production processes, the assembly, and the bottlenecks found during prototyping.

12.1 Choice of Components

12.1.1 Wooden shell

The outer body is a compact block of walnut, roughly 80 by 80 by 80 mm, CNC-milled from solid wood (See Figure 12.1). Because the block is small, the material cost is low, and the cost sits mainly in machining time rather than material.

12.1.2 Dial ring

The dial ring is CNC-machined aluminium (See Figure 12.2). Anodisation was chosen as a surface finish because it becomes part of the aluminium surface rather than sitting on top of it, which makes it more resistant to wear and keeps the metallic character of the material. A matte black anodisation was selected to align the finish with the MEMO Wallet, giving Unwind a consistent identity within NTL.



Figure 12.1: Wooden Shell



Figure 12.2: Aluminium dial



Figure 12.3: Oled Display at night

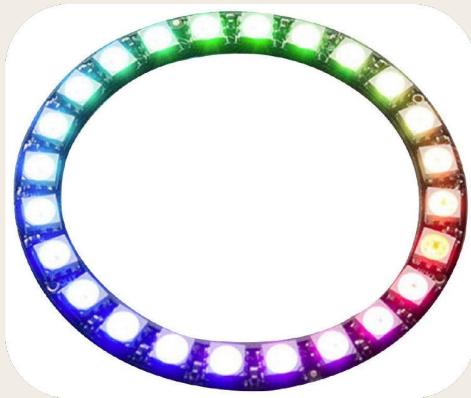


Figure 12.4: LED Ring

12.1.3 Display

Among screen technologies, three were compared. LCD was eliminated because its backlight stays on regardless of what is shown, and the backlight accounts for 70 to 85 percent of an LCD's power use, so a nearly black screen is still not dark in a dark room. E-ink was a reasonably low-power option, but it is not self-illuminating; without a front light, it is unreadable in the dark, and adding one removes much of the point of the technology (E Ink, n.d.), while round colour e-ink is also not reliable enough at this production scale. OLED was chosen (See Figure 12.3): each pixel makes its own light and can switch off independently, so black areas draw almost no power (Displaymodule, n.d.), which suits a bedside device that shows very little most of the time. In early prototypes, an off-the-shelf ESP32 board with a built-in OLED is used; once demand is validated, a custom PCB with a dedicated round OLED would be manufactured.

12.1.4 LED ring

A 24-LED WS2812 addressable ring was chosen (See Figure 12.4). It is an off-the-shelf part that keeps cost low. The LEDs are paired with a thin acrylic diffuser sheet, and the gap between the ring and the acrylic is critical to getting an even glow. If volume increases significantly, a custom PCB with COB (chip-on-board) LEDs and a purpose-built diffuser would be a logical upgrade, because COB LEDs give a more even output by design and remove the dependency on diffuser spacing.



Figure 12.5: Speaker

12.1.5 Speaker

A 40 mm driver is close to the largest that fits within the footprint. Audio quality is directly tied to the product's value, because Unwind replaces the phone as the source of sleep audio, podcasts, and breathing guidance, so poor sound would undermine the core proposition. A high-quality full-range 40 mm driver was chosen so the product holds up against the audio users are used to from their phones (See Figure 12.5).

12.1.6 Battery

A backup battery is a hard requirement: if the power goes out overnight, the alarm must still work. The two common options are a cylindrical 18650 cell or a flat LiPo pouch cell. The 18650 is impractical here because it would need extra geometry to house it, so a flat LiPo pouch cell (See Figure 12.6) was chosen, since it fits the available space in the base.

12.1.7 Port and electronics

USB-C is the industry standard for charging consumer electronics and was the straightforward choice. A wall adapter is not included in the box but can be ordered separately, keeping the base product lighter for users who already own a USB-C charger. The electronics are built around an ESP32 as the brain, connected to all other components. In production this would sit on a custom PCB that also carries the Bluetooth module, USB-C, and battery management.



Figure 12.6: Battery

12.2 Manufacturability

12.2.1 Production processes

Unwind combines a small set of established processes. The walnut shell and the aluminium dial ring are CNC-machined. The internal structural parts, the base and the screen holder, are injection-moulded plastic. The electronics are PCB-assembled. The remaining parts, the LED ring, the speaker, the LiPo cell, the bearing, and the display in the prototype, are off-the-shelf.

12.2.2 Assembly

The product is designed to be assembled without complex tooling. The walnut shell forms the outer body and houses the speaker grille and the USB-C port. The base is fixed to the shell with two M4 screws, and the bearing and aluminium dial are press-fit onto the base (See Figure 12.7). The screen holder is fastened to the base through the dial assembly, so the dial stays free to rotate on its bearing. The LED ring is glued to the screen holder, the OLED is press-fit into it, and the acrylic diffuser is form-fit between them. All wiring from the display runs through the hollow centre of the bearing down to the electronics in the base, so the rotating dial stays free of cables. Because the dial is read contactlessly, there are no wearing electrical contacts in the main interaction.

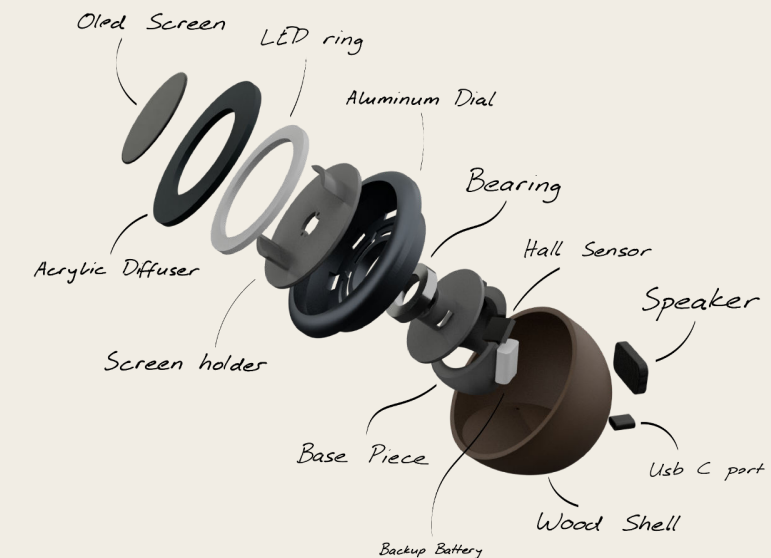


Figure 12.7 Exploded View

12.2.3 Volume and process fit

The intended launch is a small first batch through a Kickstarter campaign, on the order of one to a few hundred units. CNC machining and off-the-shelf parts suit this low volume well, since they need little fixed tooling. The one real tooling commitment is the injection mould for the internal plastic, which only pays off across a batch. The COB LED ring, the custom PCB, and the dedicated round OLED are treated as upgrades for once volume is validated, rather than commitments for the first run.



Figure 12.8: Wiring through middle



Figure 12.9: Wires Under Screen

12.2.4 Prototyping challenges

The hardest constraint in prototyping was the compact size (See Figures 12.8 and 12.9). Fitting, soldering, and wiring every component together by hand inside the small enclosure was the main difficulty, and it is the kind of problem a proper design-for-manufacturing pass is meant to solve. Tuning the gap between the LED ring and the diffuser to get an even glow was the other fiddly point, which the COB upgrade would remove.

When looking at the technology readiness levels of the prototype, it has reached Technology Readiness Level 6, with this being defined as(*What Are Technology Readiness Levels (TRL)?*, n.d.):

“Prototype system verified. Examples might include a prototype system/model being produced and demonstrated in a simulated environment.”

12.2.5 Design for manufacturing and partner

Getting to a higher TRL, the detailed design-for-manufacturing work could be outsourced to an undisclosed manufacturing partner, who would handle the CNC aluminium machining, injection moulding, PCB assembly, and wood component sourcing. This is discussed further in the Viability chapter.

12.3 Conclusion

Unwind is feasible to build for fully functioning prototypes to validate market demand, reaching TRL 6. After this stage though, it relies on standard processes, CNC machining, injection moulding, and PCB assembly, and on mostly off-the-shelf parts, with an assembly designed to go together without special tooling. The main technical risk is packing the electronics into the compact form, which a design-for-manufacturing pass with the manufacturing partner is set up to solve.

Chapter 13 - Viability

Viability asks whether Unwind makes sense as a business: whether it can be brought to market, at what cost, and at a price people are willing to pay. This chapter sets out the route to market, the manufacturing approach, a cost estimate for a first batch, and how the resulting price compares to the products Unwind would sit next to.

13.1 Route to market

New Things Lab has a repeatable route to market that keeps financial risk low while generating real demand before committing to large-scale production. Both previous products, the Zone and MEMO, followed the same model: develop the product to a high level of specification, then launch a Kickstarter campaign to validate demand and fund the first production batch.

The results confirm the approach works. The Zone raised €259,788 against a goal of €4,800, from 2,535 backers. MEMO raised €66,487 against the same threshold. In both cases the minimum goal was set to cover a first batch of around 100 units, so reaching it covers the main fixed costs of production without NTL carrying stock risk. Everything above the goal can be reinvested into tooling quality, packaging, or later runs. This model suits Unwind as well, since the product has a clear reason to exist, which is a strong basis for a campaign.

13.2 Demand uncertainty

The biggest financial challenge in launching a physical product at this scale is not knowing demand in advance. Chinese manufacturers require minimum order quantities that are too large for a small studio to absorb without confirmed sales, and tooling such as an injection mould has a fixed cost regardless of how many units are made. At low volumes, this fixed cost is a large share of the cost per unit. A €2,500 mould adds €12.50 to every unit at 200 units, but only €1.25 at 2,000. A first batch of around 200 units is planned as the production run following a successful campaign.

13.3 Manufacturing approach

Production relies on an established relationship with an undisclosed manufacturing partner, who handles a large part of the design-for-manufacturing work: CNC aluminium machining, injection moulding, PCB assembly, and wood component sourcing. Working with a trusted partner at this stage shortens turnaround and simplifies logistics.

The level of specification handed over needs careful management, however. Underspecifying the design leaves material choices, surface finishes, and tolerances to the manufacturer, which invites cost-cutting decisions that degrade the look and feel. This matches what Peter Arvad of Habity, whose phone-free bedside clock ran a successful Kickstarter this past year with a similar Chinese manufacturer, said in an interview (See Figure 13.1): manufacturers can help, but do not go to them too quickly, because they will influence the design. NTL's brand depends on a premium finish, so every visible surface and every mechanical interaction has to be specified in detail before manufacturing begins.

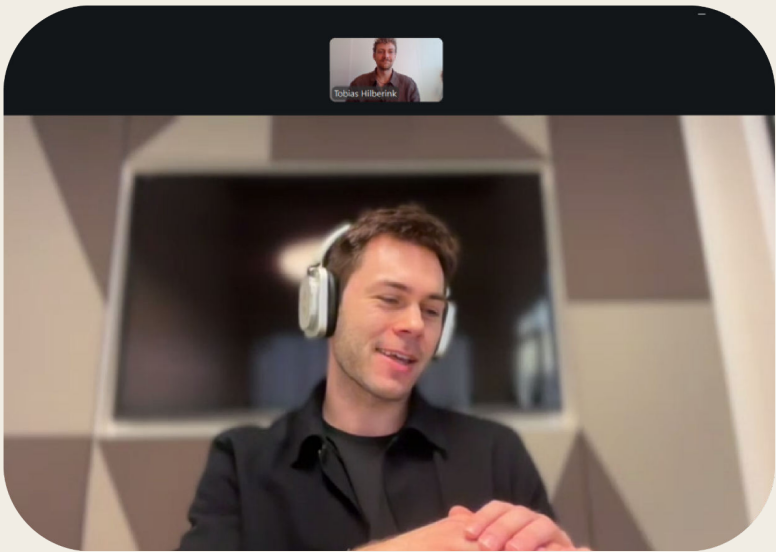


Figure 13.1: Interview with Peter Arvad of Habity

13.4 Cost analysis: first batch of 200 units

The figures below (13.1 and 13.2) estimate the cost of a first batch of 200 units, 500 units and 1000 units. The bill of materials is built from rough component prices on AliExpress; Full BOM with sources can be found in Appendix F.

Per unit at 200 units



Total: €138.80 per unit
Labour and QA (€13.00) shown as the final segment.

Fixed costs (€8,000 total, spread over the batch)

● Injection mould tooling	€2,000
● PCB design	€1,000
● Bluetooth module pre-certification	€1,500
● CE certification (EMC, safety, technical file)	€3,500
Total fixed	€8,000

Figure 13.1 Cost Analysis (200 units)

Cost per unit falls with batch size

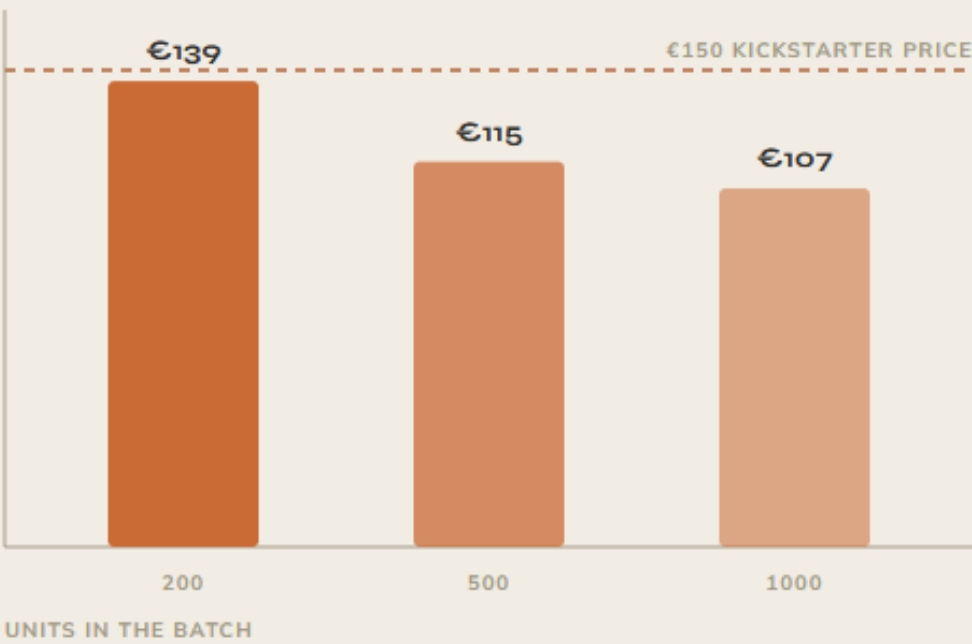


Figure 13.1 Cost with different batch sizes

Adding the BOM (€85.80) and the other costs (€35.50) gives roughly €121 per unit at 200 units. Because this is a low estimate, a 20 percent margin can be added for fluctuations, giving about €145 per unit. A Kickstarter price of €150 would cover expenses with a small buffer. At 200 backers and €150, the campaign goal would be around €30,000, covering the batch and leaving room for first-run issues.

Two things are important here. First, the figures are rough estimates from public component prices, not quotes, so the real numbers will move once the manufacturer prices the design. Second, and more importantly, the per-unit cost depends heavily on the batch size chosen for the campaign. The fixed

costs- the injection mould, the PCB design, and the certification- are spread across every unit, so they fall sharply as volume rises. The same fixed costs that add roughly €22.50 per unit at 200 units add only a few euros per unit at 1,000, and almost nothing at scale. The Kickstarter minimum order quantity therefore has a large effect on the price that has to be asked, and a stronger campaign directly lowers the cost per unit and improves the margin.

13.5 Price in context

To judge whether €150 is realistic, Unwind can be placed next to the premium bedside clocks it would compete with (see Figure 12.3). These products share the same promise: replace the phone at night with a calmer, screen-free device.

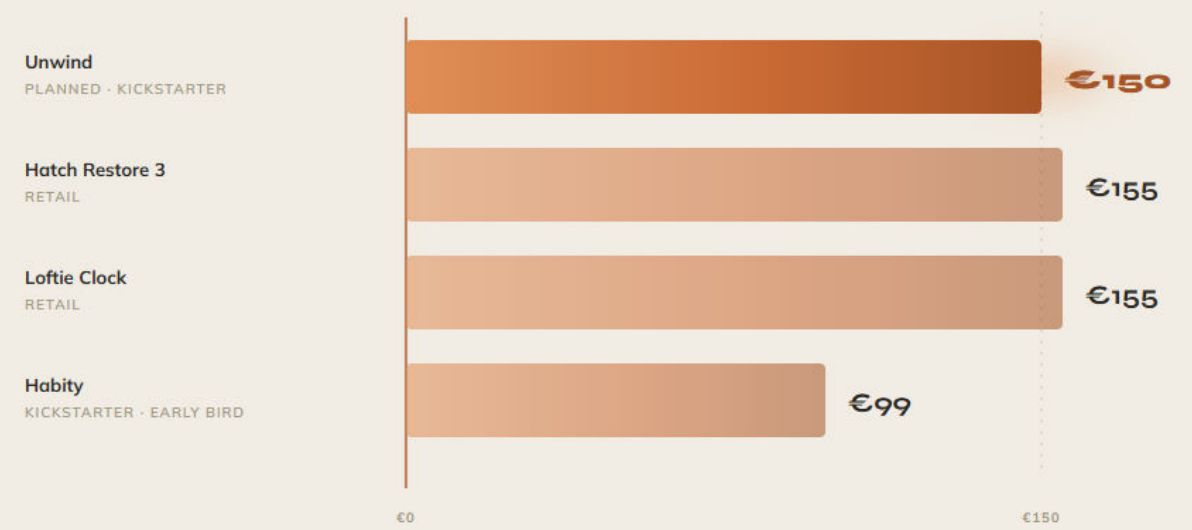


Figure 12.3: Price of Unwind against competitors

Unwind's planned €150 sits inside this range. The retail-priced competitors, Hatch and Loftie, sit around €155, and Habity, the closest comparison as a phone-free, Kickstarter-launched bedside clock, started at €99 as an early bird before shipping. A €150 campaign price is therefore in line with what buyers already pay for this kind of product, and Unwind's premium materials and tactile interaction support sit at the higher end of the range.

13.6 Conclusion

Unwind fits NTL's proven Kickstarter route, which validates demand and funds the first batch before committing to stock. A first run of 200 units lands at an estimated cost of roughly €145 per unit including margin, supporting a €150 campaign price that compares well within the price range of comparable products such as Hatch, Loftie, and Habity. The estimate is rough, and the batch size committed by the campaign has a large effect on the true per-unit cost, so a stronger campaign both lowers cost and widens margin. The remaining uncertainty is not the cost or the price, which are workable, but the demand: whether enough backers appear at all, which is the question raised in the desirability chapter and taken up in the recommendations.

Chapter 14 - Requirements Evaluation

14.1 Evaluation

The requirements gathered through the research were grouped into three sets: Look & Feel, Habitual, and Functional. This chapter checks the final design of Unwind against each one. Every requirement is marked as met, partly met, or not met, with a short note explaining the judgement.

A "should" is a requirement; a "could" is a wish. The status reflects the design and what could be tested with the prototype, not proven long-term performance, which is discussed in the limitations.

Look & Feel

- ☒ **Should have a premium feel.**
Walnut and matte black anodised aluminium. ●
- ☒ **Should have a satisfying interaction quality.**
Rotate-and-click bezel with haptics, contactless. ●
- ☒ **Should have an intuitive alarm-setting interaction, operable in the dark.**
Used without trouble in the dark during the test. ●
- ☐ **Could provide a warm, ambient reading light without stimulating the nervous system.**
Read a book by the ring; intensity still too dynamic. ●
- ☐ **Could play into differences between seasonal light conditions.**
Not implemented; a possible future feature. ○

Habitual

- ☒ **Should change the environment so the intended behaviour is easier to perform.**
Setting the alarm makes phone-free the default. ●
- ☒ **Should add friction to taking the phone to bed, encouraging users to keep it out of the bedroom.**
Alarm only sets once the phone is out of range. ●
- ☒ **Should offer a substitute wind-down activity that fulfils the restful needs the phone serves.**
Breathing, audio, reading light, reflection. ●
- ☐ **Could encourage moments of meditation.**
Possible during the wind-down, not actively prompted. ◐
- ☐ **Could encourage mind wandering.**
Dimming light leaves room, not actively prompted. ◐

Functional

- ☒

Should be a physical product.
A standalone physical device.

●
- ☒

Should aid the transition to sleep.
Tester fell asleep about 30 minutes earlier.

●
- ☒

Should completely replace the phone as an alarm, matching its reliability.
Replaces the phone; must stay plugged in.

●
- ☒

Should work without mains power, or include a backup battery.
LiPo backup runs the alarm in a power cut.

●
- ☒

Should have high-fidelity audio for alarm sounds and evening listening.
Quality 40 mm speaker; media streaming not yet working.

●
- ☒

Should work standalone, with no dependency on a connected phone.
Only optional media uses Bluetooth; no wifi reliance.

●
- ☒

Should provide a gradual wake-up transition using light and/or sound to reduce sleep inertia.
Fading light plus a slow low-frequency guitar strum.

●
- ☐

Could mirror emergency calls from the user's phone.
Validated by Wizard of Oz; not yet streamed live.

●

14.2 Conclusion

The Look & Feel requirements are met, apart from the seasonal-light wish, which was left out of scope. The Habitual requirements are met in the design, with the two wishes around meditation and mind wandering only partly met, since the product allows them but does not actively prompt them, and with the long-term habit effect left untested. The Functional requirements are met: the gradual wake-up, standalone operation, and sleep transition work well, the alarm replaces the phone as long as it stays plugged in, and the speaker and emergency-call mirroring are in place even though live media streaming still has to be finished on the final module. Across all three groups, the remaining gaps are implementation and testing gaps, not design gaps.

PART V: Discussion



Chapter 15 - Conclusion

The goal of this thesis was to design a physical product that adds friction to taking the phone to bed, and offers a substitute for the habits it replaces. Behind that goal sat a larger question: how can a physical product restore intentional behaviour in a society that evolved to capture attention?

The research showed that the answer is not to fight the user's willpower but to change the environment around it. The Attention Economy captures people through their surroundings, and willpower is weakest at exactly the moment it is needed most, at the end of a tiring day. Designing for discipline therefore fails, while designing for the environment works, but only for people who already want to change. Restoring intention, in other words, is less about self-control than about making the intended choice the easy one.

The end result of this is Unwind, an alarm clock that takes away the phone's reason to be in the bedroom. It applies a single, well-timed point of friction, the alarm that only sets once the phone is away, and fills the gap the phone leaves with a substitute ritual of breathing, audio, reading light, and reflection. The purchase itself acts as the commitment. In doing so, Unwind adds something to the portfolio of New Things Lab and carries its three principles at once: it helps the user slow down, it is made to create a little happiness, and it keeps the interaction simple.

Chapter 16 - Limitations

Limitations tied to a single test or chapter are noted where they appear; the points below concern the wider validity of the work.

Behaviour change is inherently hard to measure. The value of Unwind rests on a behavioural claim, that it helps people use their phone less at night, and this kind of effect is slow and personal. Within a graduation project, it could be tested but not proven.

The long-term effect was not tested. The one real-use test ran for three nights with a single participant. That is enough to show potential, but not enough to show whether the effect survives once the novelty fades and a habit has had time to form. The central promise of the product, a lasting change in the evening routine, therefore remains unverified.

The market potential was not validated. The intended user is described in kind but not in size, and it is not known whether enough people want this strongly enough to pay for it. In theory, though, everyone in the world sleeps, and if this problem is only recognised in 1 in 10.000 people, you are left with a market potential of around 800.000 customers. Recognising the problem, wanting to change it, and buying a premium object to do so are three different things, and only the first two were proven.

The mechanical design is not finished. Unwind is a working prototype, not a production-ready product. Bringing it to market would need a proper mechanical and design-for-manufacturing pass before a first batch could be made.

Finally, the concept somewhat idealises how people would use it, and the real effect will vary from person to person. Unwind does not need to convert every user's night routine. If it meaningfully reduces phone use in the bedroom for the people who choose it, that is enough.

Chapter 17 - Recommendations

The limitations point to a clear set of four next steps. They are listed in order of priority, from what should happen first to what follows once the concept is validated.

1. Find the first users through a small marketing campaign. Find a small group of people who genuinely recognise this problem and struggle with it. This does two things at once: it starts to validate whether the demographic is large and committed enough to pay, and it gives a real group to design the next steps around. This could be done with a promotional video to be released on the day of the graduation presentation.

2. Build a small batch and test it over time. Produce a small run of prototypes, around twenty, and give them to that first group for a longer period. A longer test with real users is what can show whether the effect lasts once the novelty fades, and it will surface the practical pain points that only appear in daily use.

3. Test how bold the friction should be. The project settled on friction that is bold at one point and soft everywhere else, but the right level is a balance between impact and autonomy, and it differs from person to person. With the first group in place, trial bolder and softer versions of the nudge to find where the balance sits for this user, since this is something only a real market can decide.

4. Complete the design for manufacturing with an EMS partner. Once the design and the final feature set are validated, hand the product to an EMS supplier such as the manufacturing partner for a proper design-for-manufacturing pass. This is where the mechanical design is finished, the electronics are laid out on a production PCB, and the CE certification is completed, and it is done last because it only pays off once the concept is proven and the volume is known.

5. Set up a Kickstarter campaign. Just like the other products of New Things Lab, this product could get over the first batch problem by getting an initial consumer base. This keeps risks low, and validates the idea on a bigger scale.

Chapter 18 - Personal Reflection

Designing for behaviour change is hard. That became clear over this project, because behaviour is complex and habits are strong. Once a pattern has settled into someone's brain, it is simply hard to get out again. But it was great to be able to lift the curtain on this fundamental problem between people's reflexive motivation and their real motivation, the phenomenally interesting intention-action gap.

It was interesting to watch the conversation change whenever I raised the topic. One moment someone would say, "yeah, that is a bad thing that I do, I need your alarm," and the next, "well, actually I really like the things I saw on TikTok yesterday." Learning to sit with that contradiction, rather than trying to argue people out of it, is one of the most useful things I take away.

I am very happy to say that for the last week I have been using Unwind myself. I might be biased :-), but it has helped me build better habits in the evening. Let's be honest: phone use is not a small, irritating habit, it is a full-on addiction. I have to be fair and admit I have occasionally slipped up and grabbed my phone after setting the alarm. Even so, waking up has felt more natural than it ever has, and focusing on these transitions between brain states made me realise that waking should be a gradual process, not a sudden "alarm."

If I did this again, I would try to get the product into real bedrooms sooner and for longer. This was also due to the fact that this project had no real starting point at NTL. The real project brief was basically: "Make a product" The freedom of this was amazing, so I could take my time to find something to do which I was really passionate about, but it took some time for me to get my footing.

I am proud of the work I have done. I have seen my prototyping strengths grow even further, and I can genuinely say that I built a nearly fully functioning product for my graduation.

AI Statement

I used a few different AI tools to help put this report together, focusing on efficiency and accuracy while making sure the final content remained my own. Here is a breakdown of how they were used:

For better phrasing and clarity, I used DeepL Write. It's important to note that this isn't "generative" AI—I didn't ask it to write new sections. Instead, I pasted my own text, and the tool suggested ways to improve the flow and word choice (*DeepL Write*, n.d.).

To handle the heavy lifting of turning audio into text, I used TurboScribe. This was used to transcribe all coach meetings, expert interviews, and participant sessions, giving me a solid written foundation to work from (*TurboScribe*, n.d.).

I used Gemini to help sift through those long meeting transcripts. It helped me pull out the most important insights and key themes. To stay accurate, I manually checked every insight Gemini found against the original transcript to make sure nothing was taken out of context. Also, I used Nano banana pro, the visualiser AI to guide me in visualisation, brainstorming and altering images (*Google Gemini*, n.d.).

To keep the research organized, I used NotebookLM. By uploading all my sources there, I could ask specific questions and get answers based only on those documents. This helped prevent the AI from making things up (hallucinating) and kept the report grounded in the actual evidence (*Google NotebookLM*, n.d.)

To build and scale the program for the working prototype, I used Claude Code, an AI powerful like ChatGPT, but works way better because of the integration of it in the desktop. It can read and write files from your computer. Because of this, it was possible to test UI way easier, rather than focussing a lot more time to generate a way less integrated prototype (*Claude Code*, n.d.).

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Appendix A - Project Brief

Project Proposal form
IDE Master Graduation Project

In this proposal the agreements made between student and supervisory team about the student's IDE Master Graduation Project are set out. This document needs to be prepared for the Kick-off meeting and should be submitted in MyCase.

Name studentTobias HilberinkStudent number5060273

Project titleProductivity Tool - New Things Lab

Please state the title of your graduation project (above). Keep the title compact and simple. Do not use abbreviations. The remainder of this document allows you to define and clarify your graduation project.

MSc programme☐ Design for Interaction☒ Integrated Product Design☐ Strategic Product Design

☐ Other (in case of a double degree outside IDE):

Introduction

Describe the context of your project in the box below; What is the domain in which your project takes place? Who are the main stakeholders and what interests are at stake? Describe the opportunities (and limitations) in this domain to better serve the stakeholder interests. (max 250 words)

New Things Lab is seeking a new productivity tool to be used while at your desk. While computers and phones manage our time, they also contribute to "screen fatigue" and cognitive overload. The domain of this project is behaviour change of productivity.

Stakeholders
One of two main stakeholders is New Things Lab, a YES!Delft design company founded by IDE alumnus Nyckle Sijtsma. The recent success with the Zone Timer validates the market demand for physical tool and can be a starting point.
The other key stakeholder is the desk-based worker struggling with boundary management, and maintaining "flow" in work.
Other stakeholders include colleagues and persons around the user. This device should not be deemed annoying by others.

Opportunity and Limitation
The opportunity lies in moving beyond simple time-tracking and having other ways of interacting with the user. I want to tackle the mental effort challenge. Maximising the effect of the limited amount of energy someone has for mental labour stands at the core. People are not aware of their own behaviour enough. Getting to know your subconscious working habits can help you use your energy wisely. An example is doing less mentally challenging work at the end of the day, when your brain is tired or when you experience an afternoon slump after lunch. This would be different for every user, and could mean a smart product that gets to know the user.
The limitations are achieving this functionality without reintroducing problems of overstimulation.

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Introduction (continued): space for images

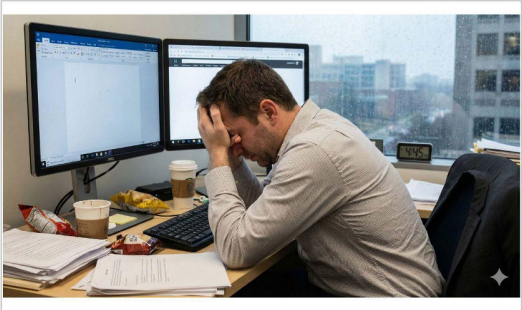


Figure 1: AI Generated(Gemini using Nano Banana Pro) photo of desk worker having problems with productivity

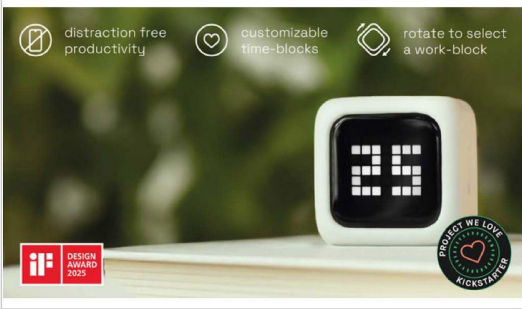


Figure 2: Previous Productivity Product NTL - Zone Timer

Problem Definition

What problem do you want to solve in the context described in the introduction, and within the available time frame of 100 working days? (= Master Graduation Project of 30 EC). What opportunities do you see to create added value for the described stakeholders? Substantiate your choice. (max 200 words)

Problem Definition

Desk workers of the future lack a physical product with cues to manage mental workload. This absence leads to a lack of structure, increased cognitive load and difficulty in switching between "focus", "rest" and "low mental load work" "social work" and other modes to be determined.

The specific design challenge is to create a physical product with smart cues. The conflicting requirement is the need for "smart" behaviour, data-driven or logically sound versus the wish of the client keeping the product simple.

Also, the product must be manufacturable and scalable for a consumer market while offering a premium, tactile Look and Feel.

Assignment

This is the most important part of the project brief because it will give a clear direction of what you are heading for. Formulate an assignment to yourself regarding what you expect to deliver as result at the end of your project (1 sentence). As you graduate as an industrial design engineer, your assignment will start with a verb (Investigate/Design/Validate/Create) a (what will be the deliverable → prototype/roadmap/process/ intervention /approach/guideline/strategy/...) to (what should it do →create/understand/evaluate/validate/ improve/execute/ analyse/...) (the objective → experience/value/process/product/...) for (whom → target group/client/...) In (what context).

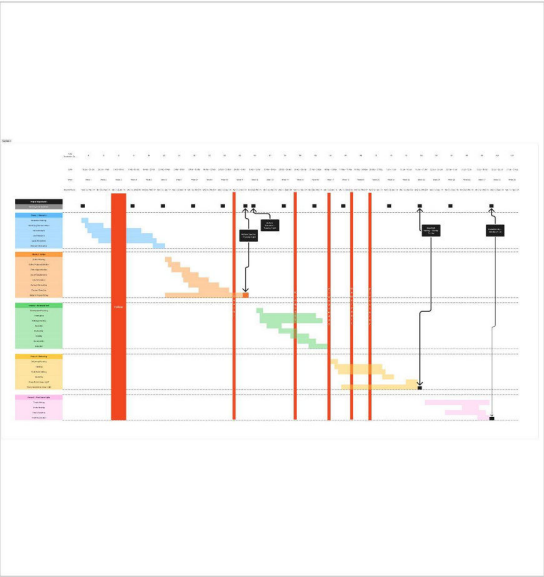
Design a scalably manufacturable desktop tool that utilises interaction design and cognitive ergonomic principles to distribute mental load over time and facilitate flow states for desk workers.

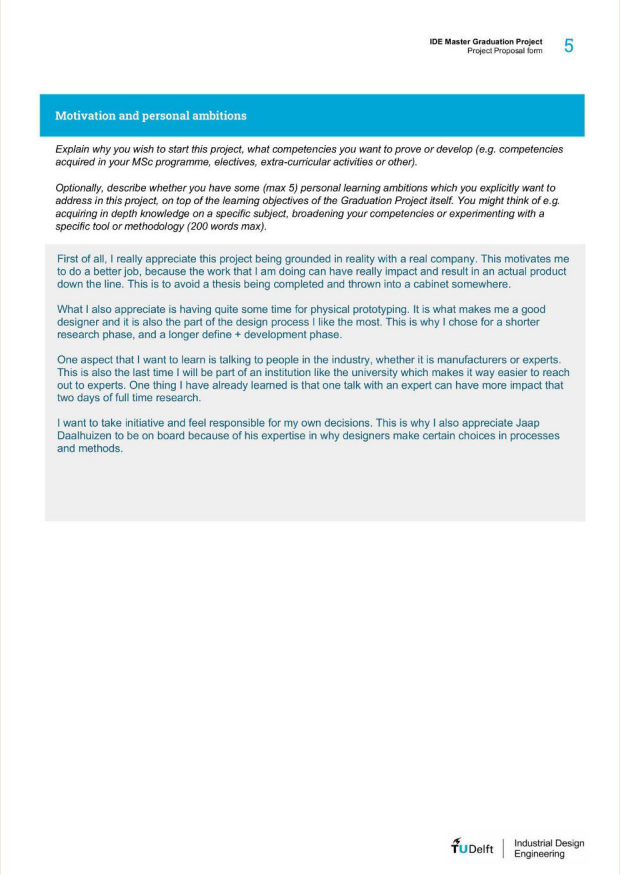
Explain your project approach to carrying out your graduation project and what research and design methods you plan to use to generate your design solution (max 150 words).

Approach: The project will follow an Integrated Product Design approach, iterating through four specific lenses:
Cognitive Analysis: I will investigate desk behaviours and cognitive challenges using task analysis to define what method the tool should use.
Look & Feel: I will use iterative prototyping to determine the visual, physical and tactile components of the product that can communicate with the user.
Production Definition: For this project, one requirement is the physical component, for the interest of the company. I will explore design-for-manufacturing techniques to ensure the sophisticated tactile feel can be scalable. With the Research through Design method, researching along as I create models and prototypes.
Future Of Work: This will be done with a light ViP Method, to make the project a statement and form a specific positioning.

Project planning

To make visible how you plan to spend your time, you must make a planning for the full project. You are advised to use a Gantt chart format to show the different phases of your project, deliverables you have in mind, meetings and in-between deadlines. Keep in mind that all activities should fit within the given run time of 100 working days. Your planning should include the **Kick-off**, **Midterm Evaluation**, **Green Light** and **Finalisation** (ceremony). Please indicate periods of part-time activities and/or periods of not spending time on your graduation project, if any (for instance because of holidays or parallel course activities). Add (an image of) the planning in the box below. If it is not readable, you can add the planning as an attachment to My Case along with this Proposal.





Appendix B - Interviews about Sleep Rituals

De Hardware: Heb je een fysieke wekker of gebruik je je telefoon als alarm?

Emma: Heeft een kleine fysieke wekker en gaat er gelijk uit, want hij heeft een hard geluid en wil niet dat haar huisgenoten wakker worden.

Wekker als haar vriend er is betekent sluimeren om nog even te kunnen knuffelen.

Ze heeft ook een wakeup light, maar dat is een cheap knockoff die eigenlijk het echt helemaal niet doet.

Puck: Gebruikt een designer wekker, en ze sluimert 2-3 keer.

Rosalie: Gebruikt haar telefoon, en wilt eigenlijk niet dat ze dit doet.

Milou: Heeft een wakeup light van bol.com. Ze heeft het gevoel dat ze niet ervan wakker wordt, maar dat het onbewust haar in een lichtere slaap zet.

Roisin: Gebruikt haar telefoon, heeft voor elke 5 minuten een mogelijke wekker staan.

Huidige Gewoontes: Wat zijn je gewoontes rondom naar bed gaan en opstaan?

Emma: slaapt binnen 2-5 minuten, ze heeft een korte ochtend en avond routine, omdat ze een druk leven heeft.

Puck: Ze doet haar avondroutine, eet haar ontbijt op bed en sluimert een aantal keer.

Ideale Gewoontes: Welke gewoontes zou je willen hebben (je ideale ritueel)?

Puck: Eigenlijk zou ze willen stoppen met sluimeren, maar vind de transitie wel moeilijk.

Telefoongebruik: Hoe ziet je telefoongebruik in bed eruit, zowel vlak voor het slapen als direct bij het wakker worden?

Puck: Ik scroll eigenlijk gelijk.

Milou: Ik heb de regel met mezelf dat ik pas na het douchen op mijn telefoon mag kijken.

Emma: Ik heb mijn fysieke wekker omdat ik dat vergeet dat mijn telefoon bestaat.

Rosalie: Ik zit best vaak gelijk op mijn telefoon.

Roisin: Ze gebruikt haar telefoon als prikkelmachine. Meer slaap is beter dan piekeren en gedachtenstromen die niet stoppen.

De Winterdip: Is het voor jou in de winter veel lastiger om op te staan dan in de zomer, en hoe merk je dat?

Emma: Niet zoveel last van.

Puck: Ja, ik heb wel echt veel aan dat het licht nu in mijn kamer schijnt.

Transitie (Avond): Hoe lang duurt het gemiddeld voordat je echt in slaap valt?

Transitie (Ochtend): Hoe lang duurt het voordat je je na het opstaan echt 100% wakker en scherp voelt?

Emma: Ik begin al wel met dingen doen, maar dat is allemaal op auto-piloot, als je dan iets aan me zou vragen, dan zou ik niet kunnen antwoorden.

Gedachten: Lig je wel eens wakker door gedachten? Zo ja, hoe ga je daar op dat moment mee om?

Emma: Ligt wel eens wakker door stress, maar ook niet zo vaak.

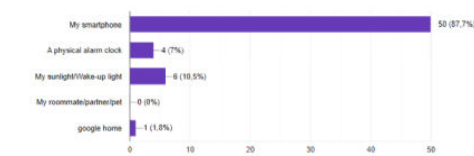
Er is ook een hesitancy naar de fysieke wekker, omdat die het ook opeens niet meer kan doen, dat gevoel is er.

Milou vind het pulserende een minder goed idee, omdat je minder dat biologische hebt.

Appendix C - Survey

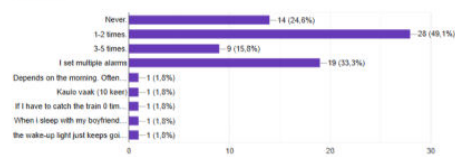
What is your alarm?

57 antwoorden



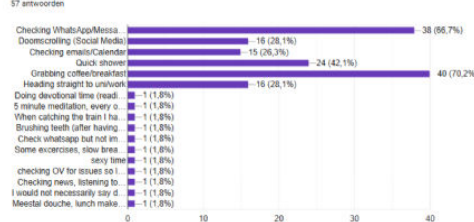
The Snooze Struggle: How many times do you hit snooze?

57 antwoorden



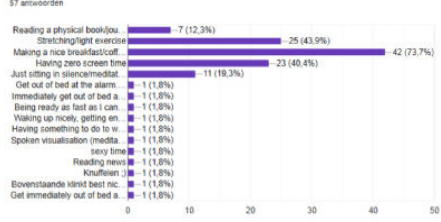
Current Morning Routine: What are things that are actually in your routine right now? (Select all that apply)

57 antwoorden



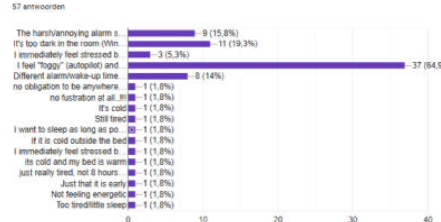
Aspired Morning Routine: What would you ideally want to do in the first 30 mins of your day? (Select all that apply)

57 antwoorden



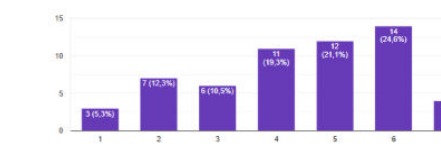
What is your BIGGEST frustration with waking up right now? (Select all that apply)

57 antwoorden



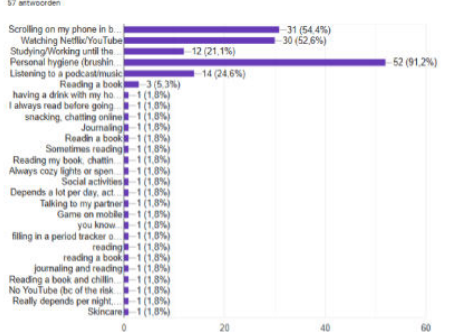
How does the winter season affect your wake-up routine?

57 antwoorden



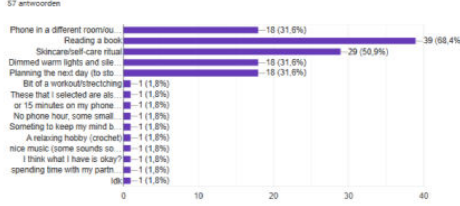
Current Night Routine: What does your last hour before sleep look like? (Select all that apply)

57 antwoorden



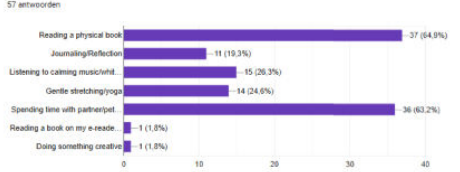
Aspired Night Routine: What would your *ideal* wind-down ritual look like? (Select all that apply)

57 antwoorden



Which of these non-digital activities would you MOST likely commit to replacing phone scrolling with before bed?

57 antwoorden



Appendix D - Questionnaire User Tests

Preliminary questions before the interaction test:

On a typical night, how difficult is it for you to leave your smartphone in another room or out of reach? Why?

What is your most common “excuse” or reason for keeping your phone next to your bed? (If there are more, state them all.)

Questions after the Interaction test:

How explicitly or implicitly would you want the product to block your phone?

What functions would you use the most as a substitute habit? Are you missing any?

Do you see the added benefit of this device? What would you change?

Person 1:

On a typical night, how difficult is it for you to leave your smartphone in another room or out of reach? Why? If I intend to read before I sleep it is not difficult, but if not and I am bored it is hard not to be on my phone for 30-60 minutes before sleeping.

What is your most common "excuse" or reason for keeping your phone next to your bed? (If there are more, state them all.) having an alarm, watching one final video, no intent in leaving it somewhere else.

How explicitly or implicitly would you want the product to block your phone? I would like the product to block my phone in a harsh way to really keep it out of site.

What functions would you use the most as a substitute habit? Are you missing any? I think to winding down and reflecting on your day is a positive note. movement would be nice yoga or stretching.

Do you see the added benefit of this device? What would you change? If used intentional and with the purpose of having better sleep quality, I see the added benefit

Person 2:

On a typical night, how difficult is it for you to leave your smartphone in another room or out of reach? Why? Not difficult, I've been keeping my phone somewhere on the other side of my room for 2 years.

What is your most common "excuse" or reason for keeping your phone next to your bed? (If there are more, state them all.) If I am receiving an important call that I really can't miss (e.g. sick family member) *(Side margin note: very rarely happened maybe ones)*. Dubbele wekker

How explicitly or implicitly would you want the product to block your phone? I wouldn't need the product to do that, but can imagine for other users it might be nice to have to put their phone away.

What functions would you use the most as a substitute habit? Are you missing any? I would use the wind down lamp and the 'connect' questions most. (I wouldn't listen to a podcast) I would probably use it as a reading light. Meditation would be nice. Would not be a substitute for me but extra.

Do you see the added benefit of this device? What would you change? I see the added benefit mostly in the lamp dimming. So it feels like you see the sun go down.

Person 3:

On a typical night, how difficult is it for you to leave your smartphone in another room or out of reach? Why? Difficult, other room is difficult because I live in a studio, out of reach is difficult because I like to scroll on social media before bed and I am to lazy to put the phone away after

What is your most common "excuse" or reason for keeping your phone next to your bed? (If there are more, state them all.)

lazy - logical place right after scrolling before bed.

Not a designated logical space for phone

How explicitly or implicitly would you want the product to block your phone? I think putting it away is enough. I would not want it locked up or something. I like the idea of reaching for it when 'necessary'.

What functions would you use the most as a substitute habit? Are you missing any? I think a podcast would kind of mimick the effect of scrolling. But, I do not see myself listening to it.

Do you see the added benefit of this device? What would you change? I am not sure. I set my alarm on my alarm clock right before sleeping. So it feels like I would post-pone my sleep. So I would really need intrinsic motivation to use the device before the intended time to sleep.

Person 4:

On a typical night, how difficult is it for you to leave your smartphone in another room or out of reach? Why? Quite difficult, because I want to be reachable online for my long distance boyfriend & others

What is your most common "excuse" or reason for keeping your phone next to your bed? (If there are more, state them all.) My phone is my alarm, I want to be reacheable, I sometimes whatch a series before bed to fall asleep.

How explicitly or implicitly would you want the product to block your phone? I want to do things intentionally. Communicate online, whatch 1 video I picked out beforehand, or look at my agenda for tomorrow

What functions would you use the most as a substitute habit? Are you missing any? Agenda, send one last goodnight message

Do you see the added benefit of this device? What would you change? I like the podcast feature. I think it's better than whatching a video actually. I did find the lights to be bright when setting the device. Maybe put them on after setting it, or in less intensity. (or cover them up with a diffuser)

Person 5:

On a typical night, how difficult is it for you to leave your smartphone in another room or out of reach? Why? Very difficult, because I feel that I need sensory stimulation to get tired. And also reading a book seems boring (even though I know it isn't).

What is your most common "excuse" or reason for keeping your phone next to your bed? (If there are more, state them all.) ↑ reading a book is boring, "I need to check something", I need to put on my alarm, Scrolling makes me tired.

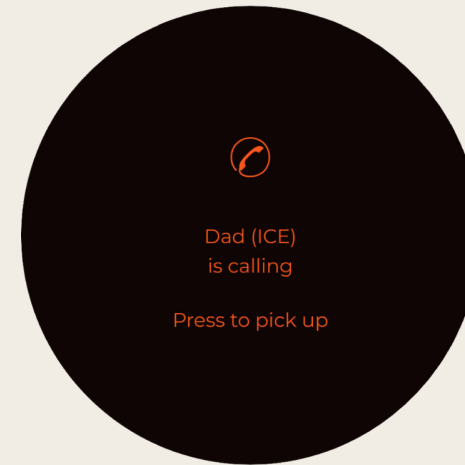
How explicitly or implicitly would you want the product to block your phone? If I would really want it to work, very explicitly would be best, but if I want a gentle (maybe less annoying at times) reminder, implicitly would be best. I think the option of choosing would be best (so you can start softly and then increase the 'difficulty').

What functions would you use the most as a substitute habit? Are you missing any? podcast, music, + guided meditation maybe? alarm, ↳ how is the music chosen? What type of music? how do you chose the podcast?

Do you see the added benefit of this device? What would you change? I think intentionally being aware of a winddown is the best feature, and when you want a winddown I would see the added benefit.

Appendix E - All UI Elements





Appendix F - Bill of Materials & Sources

Component	Unit cost	Source
Wood base (CNC cut, sourced in China) †	€10.00	Made-in-China.com
Plastic internal support (injection moulded) †	€3.00	ILCPCB Injection Moulding
One 40mm full-range speaker *	€3.40	AliExpress — \$3.67/unit
Round OLED display *	€15.60–25.60	AliExpress — \$16.88–\$28.21/unit
Custom PCB (Bluetooth, USB-C, BMS included) †	€15.00	ILCPCB PCB Assembly
CNC anodised aluminium dial ring *	€9.25	Made-in-China.com — \$10.00/unit at 10–499 pcs
18650 Li-ion battery †	€0.80	AliExpress
Dial ring mechanics (rotary encoder with click) *	€4.00	AliExpress — \$0.89/unit for encoder; remainder covers housing and spring
Extra electronics	€2.00	estimate

components †		
Acrylic diffuser plate †	€1.00	AliExpress
LED ring (WS2812 addressable) *	€0.82–1.82	AliExpress — \$0.89–\$1.96/unit
Screws and fasteners †	€1.00	estimate
Internal wiring and connectors †	€1.00	estimate
Rubber feet †	€0.50	estimate
Packaging, documentation, USB-C to USB-C cable †	€10.00	Alibaba
Total BOM	€77–88	