Using Product, Processes and Gamification to Motivate users for Positive Habit Formation

by

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Abstract

Mental health issues have been increasing at an alarming rate, with 35 percent of the world dealing with stress daily. Stress is one of the many other mental health issues that we face and practicing mindfulness has proven to be a strong contender in dealing with these issues. Still, it has not been easy for millennials to form a habit of carrying out this preventative measure. To test the hypothesis, we first explored drive and expectancy theories, concluding with the understanding that users take actions to solve their needs. User behavior is driven by internal and external incentives, which leads us to understand the critical role products and processes play in guiding their motivation. A product forms the basis of the initial trigger to start a habit formation journey, leading to action, which gets enhanced by rewards to foster adoption. A new habit formation model has been developed that considers user motivation, product, processes, and gamification. We propose a unique combination of a hand-held device (hardware) and an app to assist users in forming a habit to practice mindfulness.

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Chapter 1

Introduction

We regularly face stress in different forms in today's world, be it work, studies, or personal life. Thus, the American Psychological Association found that 55 percent of Americans are stressed daily, with this number being 35 percent globally. This is just one of the many mental health issues that we regularly face, with the problem just worsening. In the multiple ways that we can deal with these issues, practicing mindfulness has proven to be a strong contender. Still, it has not been easy for millennials to form a habit to carry out this preventative measure to increase their mental health wellness, which inspired the direction of this thesis.

"Repetition of the same thought or physical action develops into a habit which, repeated frequently enough, becomes an automatic reflex."

- (Norman Vincent Peale, Brainy Quotes, 392303)

In this thesis, we will explore the tools and techniques that we can use to motivate users to form positive habits, from the lens of driving adoption for increasing their mental health wellness.

Psychologists define habit in the following way - Habits are associations between the context and behaviors that develop as people continuously experience intrinsic and extrinsic rewards for their given action in a given context (Mazar and Wood, 2018). In simpler words, these are actions and reactions that are triggered by

multiple motivations. We will explore how products and processes can lead to positive habit formation toward practicing mindfulness when designed using human-centered methods. To make these habits stick with users and further drive their motivation, we will also explore the use of gamification to tap into users' intrinsic motivation to engage them emotionally.

"Gamification is Design that places most emphasis on the Human Motivation in the process. In essence it is Human Focused design."

- (Yu Kai Chou, 2015., pp. 8-10)

"Gamification is not just about applying technology to old engagement models, like awarding pins. Gamification creates entirely new engagement models, targeting new communities of people and motivating them to achieve goals they may not even know they have" (Burke, 2014., pp. 11-12). Gartner defines gamification as : "the use of game mechanics and experience design to digitally engage and motivate people to achieve their goals." (Burke, 2014., p. 13) We will understand this definition in detail and also analyze the various levers at work that make gamification a successful tool for our application.

The above tools and techniques will then be used as a guide to solve our core problem of lack of habit formation for practicing mindfulness. "Mindfulness is a practice in which you focus on being intensely aware of what you're sensing and feeling in the moment, without interpretation or judgment. Practicing mindfulness involves breathing methods, guided imagery, and other practices to relax the body and mind and help reduce stress" (Pruthi, 2020., para. 2). We will also seek to understand how users currently form habits to practice mindfulness and whether these methods have been successful.

We will synergize our knowledge to design an experience for a product to drive motivation and habit formation for users to be able to practice mindfulness regularly for better mental health wellness.

This thesis will start with exploring motivation theories and why users take specific actions. We will then explore what role products and processes play in driving the motivation of these users, ultimately leading to the initial trigger to start their habit formation journey. To enhance and complement habit formation, we will understand what role gamification can play in this journey, finally leading to our user research and solution exploration.

Chapter 2

Motivation

Before we elaborate on the problems and solutions, it is essential to understand what drives user actions and motivations deeply. We will do this by exploring motivational theories and the drivers of emotional motivation, ultimately linking these to what products and processes are needed to trigger initial adoption.

2.1 Motivational Theories

In psychology, motivation is defined and analyzed from the lens of the user's internal drives. Psychologists describe this drive as our inner motivation to achieve a particular goal or desired state in our lives. Motivation can thus be conceptualized as user behavior responses with a desire to attain their goals by comparing their current state to their desired end state. This is an attempt toward a process to reduce drive and attain goals. (Lawrence, Carver, and Scheier, 2002). Drive theory and expectancy theories describe a user's motivation using two different approaches.

2.1.1 The Drive Theory

Humans have two types of drives, primary and secondary. Primary drives relate to our most basic human needs for survival like hunger, thirst, and breathing. Secondary drives are acquired drives that we pick up through our lives, like the need for success,

money, and approval, among others. What drive theory states is that our drives motivate us to respond to our desires in ways which help reduce the level of these desires and help us attain our goals. For example, we are motivated to reduce our primary drive of hunger by eating food.

Drive theory of learning and motivation was developed and studied by Clark L. Hull, through multiple studies of rat behavior. The main conclusion from these experiments was that the more times the animal was rewarded, the more likely it would form a habit of carrying out the action for that reward. We will be using this concept to develop our human-centered designs. Another conclusion was that drive and habit equally contribute to the performance of whichever behavior is instrumental in drive reduction. (Hull, 1943)

So why are we talking about drive theory? This theory successfully combines motivation, learning, and habit formation to explain our behaviors. It shows us where the drive comes from through our desires, what behavior change and motivation is linked to reducing these drives, and how all of this leads to habit formation.

2.1.2 Expectancy Theory

This theory has a different mechanism underlying motivations, compared to the drive theory. While drive theory explains the "why" of our motivations, expectancy theory explains the motivation to attain goals contingent on an assessment of the relationship between one's own effort, performance, and satisfaction. According to the theory, the user's motivation to put in more or less effort is the result of a rational calculation in which they evaluate their current situation by asking themselves the following questions (Porter and Lawler, 1968; Vroom, 1964):

    - The expectancy question - will my effort lead to the desired performance?

    - The instrumentality question - Is my performance related to subsequent rewards that I will receive for my efforts?

    - The valence question - Will I be satisfied with the reward after my performance?

If an individual is satisfied with their answers, they will be motivated to put in more effort towards achieving their goal or a reward.

The expectancy theory is key for us to understand what the users seek in a solution as their reward. These rewards will be further explored in our implementation of gamification theories in Chapter 4.0.

2.2   Emotional Motivations of Consumers

Having understood the drives users have and the resulting motivations, one of the most critical determinants of what drives the purchase decisions of users is motivation. It helps to deeply understand consumer motivations, the resulting decision-making and purchasing processes, which makes the communication of relevant products and services effective. Our main aim with our product will be to sustain behavior to create positive habits; however, these behaviors cannot be sustained without adequate motivation. Motivation is the driving force behind consumer's lives, it gives them a sense of purpose and reason to act. (Wang, 2017).

Emotion is a human state that is a result of the appraisal of a situation or event. It consists of the subjective experience, physiological reactions and expressive behaviors that occur when we interpret the significance of something in terms of our needs and desires. Emotions are closely related to motivation because they push us to accomplish a goal to satisfy our need. This is the basis for emotional motivation, where users are driven through their emotional needs to achieve an outcome. Mental health wellness is an emotional need and being motivated to improve on that brings us satisfaction.

Cognitive motivation theory states that out behavior is the result of our brain carefully studying, processing, and interpreting the information that we receive. This is the opposite of our behaviors being driven by mechanisms involving drive, needs or reactions, which are primarily a part of emotional motivation. We will concentrate on emotional motivations as these are stronger drivers of user adoption for mental health

wellness. Typically, a user would not have the cognitive perception of their wellness state, and practicing mindfulness will help develop this perception in the users. Our product's goal is to fulfil the needs of our user for better mental health wellness and tap into their drive and emotional motivation to practice mindfulness to achieve their goal.

2.2.1   Consumption Motives

The result of having strong motivation now is action towards a goal. Having understood users' emotional motivations and drives, we now seek to go deeper into these actions and goals. Ernest Dichter was famously known as the "father of motivational research". His principal works revolved around solving consumer problems by getting to the root cause of the behaviors of people and using psychoanalysis to understand the reasons behind these behaviors.

Motivation is a crucial factor in the process of goal achievement. A person purchases a product to fulfill a need or desire - a motive. According to Dichter, product consumption is driven by 12 key motives, and each of these motives translates into different product choices.

The 12 motives are power, masculinity-virility, security, eroticism, moral purity/cleanliness, social acceptance, individuality, status, femininity, reward, mastery over one's environment, disalienation (a desire to feel connected to the world around us) and magic-mystery. For our solution domain pertaining to mental health wellness, we will consider the following motives in our solution design:

- Security

- Moral cleanliness

- Individuality

- Reward

- Mastery over one's environment

The other motives like power, masculinity-virility, eroticism, status, feminity, disalientation and magic-mystery have little or no link to mental health wellness related product choices. The above selected motives directly affect a user's mental health wellness. With better security and moral cleanliness, users have stronger feelings of their individuality. Enhanced by rewards, users will be further driven to practice mindfulness, making them feel better mentally and have mastery over their environment, i.e., have more control over their thoughts, as described in chapter 5.0.

2.2.2   What Drives Our Actions?

To further explore how motivations drive our actions as consumers, we go back to Clark L. Hull and his experiments with rats, where he proposed the Global Theory of Behavior, describing what drives actions.

Hull's theory emphasized the importance of drive and incentive as sources of motivation for taking action, which we have also understood from drive theory. According to Hull, if an organism is pushed toward a goal by an internal need or state, this is drive. So, as we understood in section 2.1.1, hunger is a primary drive which motivates us to eat, for example. Hull theorized that this type of behavior is determined by the reaction potential, which is the amount of energy available for our action taken. The higher the reaction potential, stronger is our drive towards achieving the desired goal.

In 1948, psychologist Neal E. Miller performed an experiment where he tested the behavior of rats when they were both fed and hungry. He found that hungry rats successfully learned to press levers when food was the reward, but satiated rats did not. However, when Miller introduced electric shocks as a trigger, the satiated rats quickly learned to avoid the triggers by pressing levers when food was offered as a reward. Miller added to Hull's theory. He stated that behavior is driven by internal and external "incentives." Learning from the environmental cues was the major backbone of this addition, which will also be the key to our solution design.

This concept will be used in Habit Formation in chapter 3.0 to drive the initial triggers.

2.3   The Role of Marketing

The area where marketing plays an important role is to deeply understand user motivations, their decision-making and purchasing process to be able to communicate relevant products and services effectively. With behaviors, motivations, and actions, the question for our next step is how do we develop our product messaging to target initial adoption? The field of marketing plays a crucial role in developing the strategy for reaching out to our target users. Communication to potential users needs to be able to clearly showcase functional and emotional value propositions of the product, aligned with fulfilling their needs. In the following sections, we will connect relevant concepts of marketing with theoretical concepts of user behavior and motivation.

2.3.1   Maslow's Hierarchy of Needs

Maslow's (1943, 1954) motivational theory is based on what he termed as a hierarchy of needs. These consist of five levels that range from fundamental needs to self-actualization needs. With physiological needs at the lowest level and self-actualization at the top, the theory states that each level should be satisfied before an individual moves up this hierarchy pyramid.
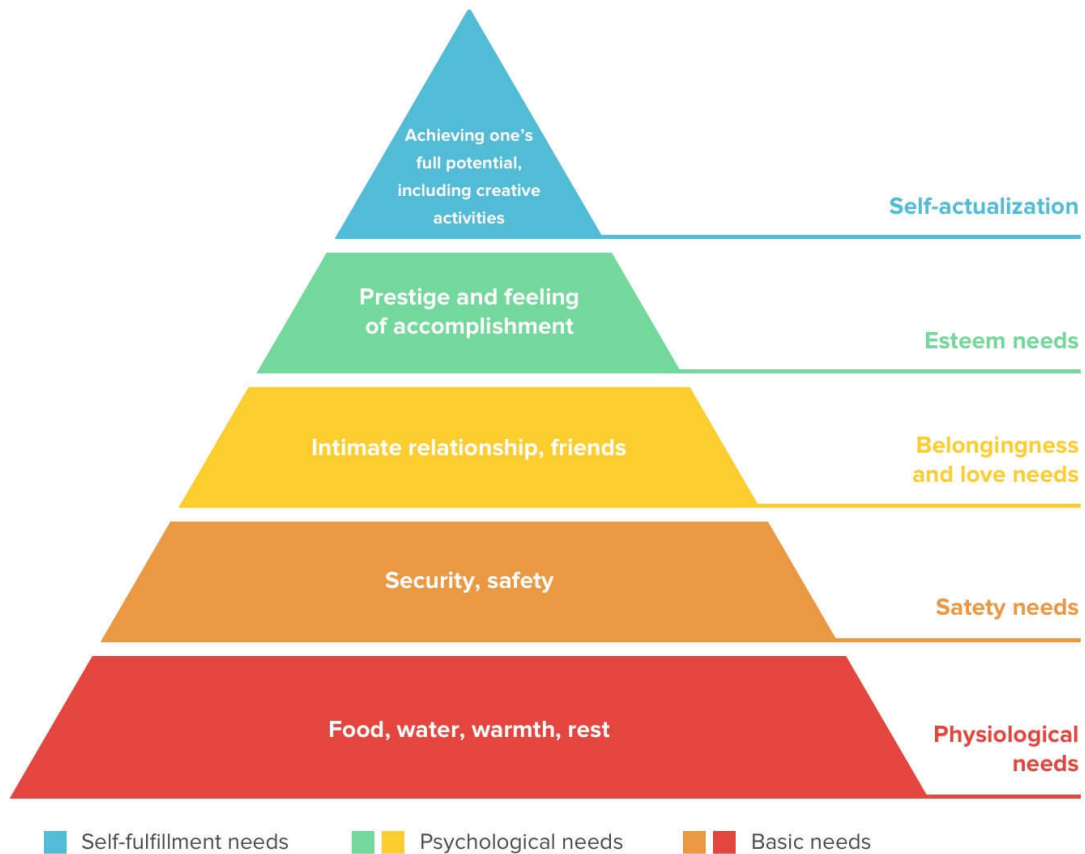
Figure 2-1: Maslow's Hierarchy of Needs

We use Maslow's Hierarchy of Needs to help us understand why we take specific actions driven by our motivations and need to achieve our goals. This pyramid shows us how we satisfy basic needs first, that eventually become satisfied once they are met, following which we seek to satisfy higher-level needs. This drives our habits as consumers.

Maslow's (1943, 1954) five-stage model has been extended to include cognitive and aesthetic needs (Maslow, 1970a), and transcendence needs (Maslow, 1970b). Cognitive and Aesthetic needs above after esteem needs. Cognitive needs expand into the following: (1) Knowledge and understanding: The ability to engage in

higher-order thinking activities such as analysis, synthesis, and evaluation. (2) Curiosity: The desire for new experiences and learning. (3) Exploration: The need to experiment with various learning opportunities. (4) Need for meaning and predictability: The inclination to seek out patterns of meaning, purpose, and order in their lives. Aesthetic needs are more about forming an appreciation for beauty, form, and other such facets, and a search for balance in these.

Transcendence states that all human beings are motivated by values that transcend beyond the personal self. Understanding and internalizing these perceptual filters that govern their perspective is essential to enhancing communication, building trust, and improving relationships with others.

Critics often assert that Maslow's hierarchy is a general framework and not an accurate prediction of human motivation. The assertion that lower-level needs must be satisfied before higher-level needs is often not true in reality. Through understanding and observing cultures in which a lot of people live in poverty (such as India), it is clear that physiological needs and safety needs take a back seat to more psychological concerns, such as love and belongingness. This contradicts Maslow's theory, since he theorized that once an individual's physiological needs are met, they must be secure in their environment before higher-order needs can be met.

Mental health wellness in theory can be a part of each level in the pyramid, as user would need to be satisfied with their achievements before seeking to move up a level. The key consideration for our solution is when the user would feel the need to care for their mental health wellness and seek to solve this need. We will thus target our consumers' esteem, emotional, and aesthetic needs and explore how our developed solution will satisfy them.

2.3.2   The 7 P's of Marketing

Marketing concepts revolve around addressing user needs with the ultimate goal to delight the user with the product and service. The marketing mix comprises of a mix of controllable variables that organizations can use to deliver on user needs. This concept has been around since 1960, with the original four P's being product, place, price, and promotion.

The extended marketing mix is made up of seven elements: product, price, place, promotion, people, processes, and physical evidence. This thesis focuses on the solution space making the following P's relevant to us:

Product - The product will be the core offering for users. This product will be a combination of hardware and software to cater towards habit formation for practicing mindfulness. As we will understand in Section 3.0, the product will also be the key first step towards starting the habit formation journey, forming the initial trigger.

Processes - Process will be important in the context of how our product will be presented to our users. The process will also link to the concept of motivating users to take actions and how the solution will reward them to keep them engaged. A new habit formation process will be presented in Chapter 7.0 to illustrate the importance of the entire process in helping users for a habit.

Physical Evidence - This encompasses everything from packaging to all tangible user-facing elements of our products. Care will need to be taken to make sure the messaging of the product aligns with the internal motivations of the users as well as cater to their need for solving their problems using this product.

2.3.3 Consumer Decision Making Process

The Consumer Decision Making Process is a collection of steps that a buyer goes through before, during and after making a purchase. Marketing professionals use this framework to identify and address the needs of consumers at each stage.

Awareness - The absolute first step in consumer decision making is becoming aware of a problem they need to solve or a need that they want to satisfy. This awareness can have multiple sources, such as deriving directly from Maslow's hierarchy of needs, or originating from a drive based on Hull's theory presented in section 2.2.2.

Interest - At this stage, the consumer starts looking for products or solutions that will satisfy their need. The product and physical evidence from section 2.3.2 will play an important role to drive consideration.

Consideration - Now the consumer has narrowed down his/her choices of products and/or solutions, and considers the positives and negatives of each in the context of their need. The 3 P's, product, processes, and physical evidence, discussed above will play an important role here.

Purchase - After the preceding three steps, the consumer makes a purchase decision of their desired product. Easily accessible distribution channels are an important factor for success at this stage.

Loyalty - A consumer's loyalty towards our product and solution will be enhanced using gamification. This will be described in Chapter 4.0.

Understanding why users take action and what internally motivates them to solve their problems is essential before developing solutions. Users are driven more by the need to solve their problems and less by a reward. This is a crucial insight that also drives the motivation for users to jump levels in Maslow's Hierarchy of needs. Motivation needs to be thought of as the driving force behind consumers' lives which gives them a sense of purpose and reason to act. Having the product and processes aligned with these consumer needs will ultimately drive the purchase decision and loyalty.

As iterated in the sections above, our main aim will be to sustain behavior to create positive habits, but these behaviors will not be sustained without adequate motivation. The following chapter will explore the concept of Habit Formation and the steps involved using a cyclical process.

Chapter 3

Habit Formation

The theoretical concepts learned in Chapter 2.0 all help generate insights towards habit formation for consumers, a primary goal of the thesis. This chapter will explore a habit formation model developed by Nir Eyal and understand how the various stages link back to motivation of users. We will then develop a new model to include motivation and the user's needs into the habit formation cycle.

Cognitive psychologists define habits as "automatic behaviors triggered by situational cues" (Eyal, 2014., p. 6). We described in Section 2.2.2 through Hull's experiments how animals behave when triggered by hunger and how these can lead to habit formation when repeated enough times through the same situational cues.

Nir Eyal developed the Hooked Model, which consists of four steps that cycle to form a habit for using a product or service (as shown in the Fig 3-1 below)
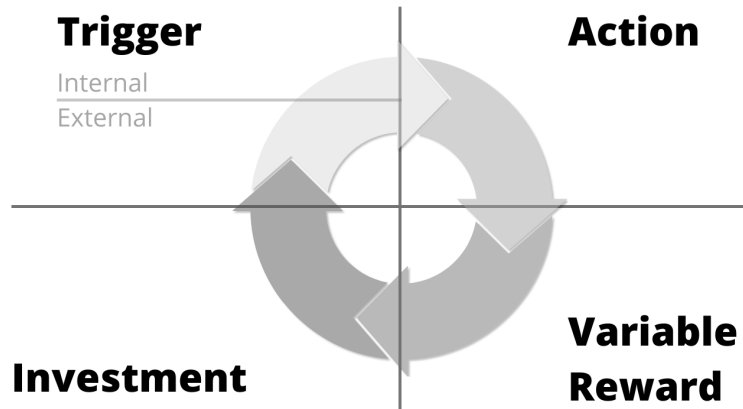
Figure 3-1: Original Hooked Model

The model consists of the following steps:

- Trigger

- Action

- Variable Reward

- Investment

We will explore each of these steps in detail and understand the dynamics at play, which contribute towards habit formation. We will also expand on these steps and create a new model for habit formation using the theoretical concepts presented in chapter 2.0.

3.1   Trigger

When a user is trying to form a new habit, they need to have a basis upon which to start developing this habit. The key role of triggers is to provide the foundation to begin a habit or initiate a habit change. These triggers come in two forms - internal and external.

3.1.1 Internal Triggers

Internal Triggers are manifestations in a user's mind. As we understood, Miller added on to Hull's theory, and stated that behavior is driven by internal and external "incentives." These incentives are what lead to the internal triggers. For example, when we are stressed, we are incentivized to get rid of this stress as we know internally that this stress is not good for us and we want to feel better. This is the internal trigger that will define our behavior to satisfy the need to feel better.

To the original hooked model presented in Fig 3-1, we will now add Situation and Incentive as the steps before a trigger is formed in the user's mind, as part of the Top Left Quadrant (Trigger). Situation will give us the understanding of reasons behind our user's needs and help us develop the use cases for our product. Incentive will form the backbone of why the user needs to solve their need in the given situation. The situation and incentive thus form the basis for the initial Trigger, and will be added before the External Trigger step as the start of the new model.

3.1.2 External Triggers

External triggers are everything that are not driven by the user's motivations or thoughts. There are several types of external triggers that can be used to initiate this habit formation cycle for users:

Paid Triggers - these are mainly driven by advertising by product companies, where they pay for advertisements in print media, digital media, or any other mediums. The main use of these triggers is to acquire new users.

Earned Triggers - these are triggers created by users, earned by a product company. A user spends time and effort to create a trigger that falls under this category, like social media posts and engagement with community. Through these posts and engagements, a product is promoted further. For example, a potential user

might notice a social media post about a product, which will act as a trigger for them to purchase and use it to solve their own needs.

Relationship Triggers - word of mouth advertising falls under this type of trigger. What users hear from the community can often influence these triggers and lead to them adopting a new product to potentially start a new habit cycle.

Owned Triggers - this trigger will be the most critical for our solution. Any product a user owns in their physical space can act as an external trigger. This product can also form the basis for repeat engagement with the user leading to stronger habit-formation. For example, a product sitting on the user's desk can light up or vibrate to remind the user to start using it, acting as an external trigger.

3.2   Action

Once the users face their triggers, their level of drive and motivation to solve their need determines the strength of their desire to take action. This has been explored in detail in Section 2.2. In short, internal triggers are the frequent, everyday itch experienced by users, but the right drives create action by offering the promise of desirable outcomes. Together, they form habits that can last a lifetime.

We will thus expand the Top Right quadrant (Action) to add emotional motivation as one of the key drivers of the action stage. As iterated, motivation is key for a user to even take an action, and will thus need to be a step before action.

3.3   Variable Reward

Once the user has taken an action by using the product, they need to be drawn to repeat this action by reinforcing their motivation. This can be done through rewards. As Nobel Prize winner Daniel Kahneman has shown in his work, people are driven more strongly by avoiding pain than by pursuing pleasure. This means that what

draws us to act is not the sensation we receive from the reward itself but the need to alleviate the craving for that reward. That is what drives our behavior. Thus, we will add Drive as a step after receiving the reward in the Bottom Right Quadrant (Reward) of the hooked model. This Drive will give users additional motivation to use the product.

Rewards can be tangible or intangible. For instance, community is also looked upon as a reward by the users. Whether it is validation from their community or friends or recognition, it is perceived as a reward that motivates users further. Users solving their need is also a form of reward which aligns with Daniel's work.

3.4 Investment

In the simplest of terms, the more someone uses a product by investing their time and effort, the more they value it. At this stage of the hooked model, an external trigger transforms into an internal trigger for the user to go through the habit-formation cycle more and more naturally. With repeated use, a user would not need an external trigger like a reminder to use a product. They would internally know how to solve their need and would carry on using the product as they have been in the past, with the expected rewards for their effort. At this stage, the user gets into a cycle, which leads to habit-formation!

The above model is a iterative cycle as shown in the overview of all the steps. In the next section, we propose an enhanced hooked model that will include users' motivation and go deeper into why they take action.

3.5   The New Hooked model

The new hooked model contains additional steps capturing the user's thought process more deeply using theoretical concepts mentioned in Chapter 2.0.
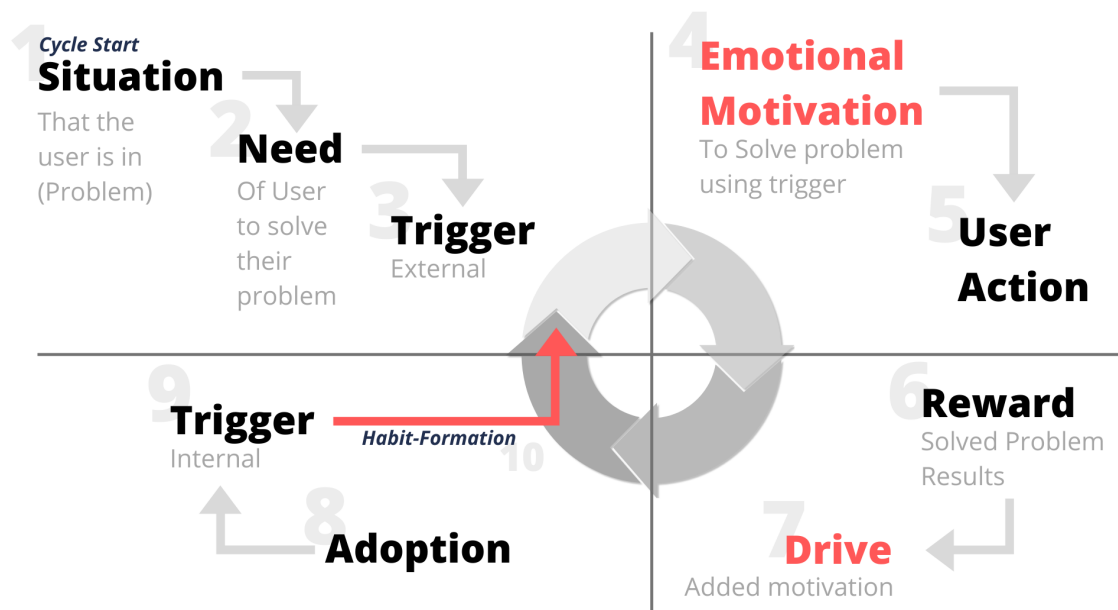

Figure 3-2: New Hooked Model

In the above proposed habit formation model in Fig 3-2, we have considered the initial situation, which is the problem a user faces which incentivizes them to look for a solution. At this point, an external trigger like product, advertising, or social media motivates the user to take action. When the user is rewarded for this action, it increases their motivation further to adopt the product and process, turning their external trigger into an internal one. At this point, the user gets into the habit formation cycle, eventually turning the use of the product into a habit.

Once the user enters into a habit, they do not go back to the first three steps of the situation, need, and external trigger. At this point, The Process takes over the Product itself, and the user naturally starts following it in their daily life. Users look for rewards to stay driven and motivated. These rewards come in the form of their

problem being solved, community validation, and any gamification system elements that will be described in detail in Chapter 4.0.

3.5.1   Steps Overview

A quick overview of all the steps in the new hooked model.

Top Left Quadrant - Trigger

Step 1 – Situation – As we discussed in section 3.1, the primary basis of a user's initial need is their situation. It is a problem that the user intends to solve for themselves.

Step 2 – Need – The problem faced by the user now manifests into a need, following which the user starts looking for solutions.

Step 3 – External Trigger – While looking for a solution, users will be subject to external triggers like advertisements, social media posts, or word of mouth to narrow down their selection.

Top Right Quadrant – Action

Step 4 – Emotional Motivation – Once the user identifies a solution to their problem, their emotional motivation drives them to act and use the solution.

Step 5 – User Action - Following step 4, the user acts to achieve the desired result by utilizing the solution.

Bottom Right Quadrant – Variable Reward

Step 6 – Reward – After user action, the desired result is achieved, along with other tangible and intangible rewards.

Step 7 – Drive - The reward leads to a more robust drive within the user with added motivation to continue using the solution to solve their problem.

Bottom Left Quadrant – Adoption

Step 8 – Adoption – When the user realizes a solution works for them, it leads to adoption.

Step 9 – Internal Trigger - The next time our user faces a similar problem, they will not need advertisements to reach the solution. Their internal thought process will remind them of the resolution, which is the point where an internal trigger is formed.

Step 10 – Habit formation – The final step following the internal trigger is habit formation. The solution becomes part of the user's daily lifestyle at this stage.

We will further detail this model with a workflow use case for our mindfulness practice solution to illustrate it in action in Chapter 7.0.

Chapter 4

Gamification

Now that we have talked about internal motivations, behavior change, and habit formation, it will be important to understand the reward system, which is a critical tool in habit formation. One popular concept that will be used as part of our solution is called gamification. Gamification is a mindset, not just technology. It's the idea that there are many avenues for engaging with people, and games happen to be an enjoyable and effective one. Gamification is about using that technique to improve engagement authentically so that people have fun and solve real problems.

Gartner defines gamification as : "the use of game mechanics and experience design to digitally engage and motivate people to achieve their goals" (Burke, 2014., p. 13).

Game mechanics are the key pieces of a gamified system that are common across different implementations, such as points, trophies, stars, and leaderboards. These are the elements that users typically "play" for and are motivated by. Experience design is the entire journey the user goes through while interacting with the product and system and how the game elements are presented to the user. It also encompasses the flow of the gameplay, the space where users spend their time, and the storyline.

The key goal for implementing gamification is to strongly engage users digitally to enable them to achieve their goals. This will in-turn motivate users to modify their behavior leading to habit formation.

4.1 The Role of Motivation

Motivation plays a vital role in the success of a gamified system, as well as helps users achieve their goals effectively. The main end-game of gamification is the rewards users gain for taking the actions. These rewards, in-turn help with sustained engagement with the system leading to habit-formation. There are two kinds of rewards that link directly with the type of motivation a user has - extrinsic and intrinsic rewards.

Daniel Pink argues in his 2009 book, Drive: The Surprising Truth About What Motivates Us, that extrinsic rewards can certainly be used to motivate people, but the motivation occurs at a transactional level. Extrinsic rewards are often used in business as a carrot-and-stick approach. In this case, the reward is the carrot and the task is the stick. The same extrinsic rewards may not be likely to motivate everyone to perform their best, but is an important element to give users something in return for their effort.

Intrinsic rewards are internal and come from the satisfaction of completing a task or project and achieving a goal. Intrinsic rewards engage users at an emotional level, and thus sustain engagement effectively (Burke, 2014) These rewards fulfill a human need, such as the need to feel like they are a part of something that is bigger than themselves. Intrinsic rewards provide meaning and purpose to what people do and why they do it. For our product, intrinsic rewards will form a stronger basis of our user's motivation and drive. As mentioned in section 2.2, emotional motivation plays the most important role for our solution, due to which intrinsic rewards will be more valuable.

4.2 Games versus Gamification

To clear up the difference between games, rewards and gamification, we need to understand what each style offers to users. When users want to be engaged on a whimsical level to be entertained, they turn to games. That is the primary goal of

games in general. To take a step beyond, reward programs compensate users and engage them on a transactional level. Gamification takes a step further and engages users to motivate them by tapping into their emotions.

The goal of driving motivation using gamification is to change a user's behavior one step at a time. This is also used as a guiding path for users to learn new positive habits and develop skills in a way that keeps them motivated. Gamification aims to provide value to incentivize users beyond tangible rewards like points and badges. It has also been observed that users place a high value on rewards that are based on self-esteem and community recognition.

4.3   Game Economy

To design an effective gamified solution to motivate and engage users, designers typically turn to the game economy. What this means is that a gamified system can have multiple outputs and triggers for users, and it is upto the solution designer to choose what elements need to be included for the specific solution.

Since users place a high value on self-esteem and social recognition, half of all the game economy elements are part of these two sections. The next priority for users is the fun aspects followed by things. The list of elements within these sections is below:

Self-Esteem: Levels, Praise, Leadership, Progression, Access, Conquest, Mastery
Social Capital: Badges, Likes, Friends, Groups, Status, Reviews, Gifting
Fun: Discovery, Excitement, Fantasy, Awe, Delight, Surprise
Things: Prizes, Rewards, Resources, Cash, Points

For creating a habit for practicing mindfulness, Self-Esteem will feature with the highest priority, followed by Social Capital. These two economy sections will be enhanced by using elements from Fun and Things to motivate users and assist them in forming a habit. To solve the mental health wellness problems faced by our potential

users, showing them progress on their personal journey through self-esteem elements will reinforce their drive to continue solving their needs. Social Capital will enhance this journey by adding in a competitive spirit as well as a community environment. As we will understand in Chapter 5.0, our connections and relationships play a major role in our mental health wellness. Elements from Fun and Things are secondary but essential to the experience as these elements will form the basis for delivering on self-esteem and social capital elements. For example, rewards and points will form the basis of competition that can help increase self-esteem.

Chapter 5

Mindfulness

This chapter will discuss the impact and use of understanding the above theoretical concepts on motivation and using the described tools and techniques in products, processes, habit formation, and gamification. Our goal is to understand the mental health wellness space and why more people aren't practicing mindfulness regularly. This chapter will help us understand the area of practicing mindfulness, understand why current solutions do not work, and seek to establish the importance of forming a habit towards this practice.

5.1   Mental Health Wellness

Mental health wellness is a very broad term that has been confusing to many. It is associated with a plethora of activities like meditating, listening to music, taking a walk, etc. The general definition in a more positive light is as follows:

Mental wellness is our internal resource that enables us to think, feel, connect, and function in life; it is also an active process that helps us to build resilience, grow, and flourish. (McGroarty, 2021)

The definition shows that mental health wellness is a process that requires conscious and active effort, along with some intentional initiative. It also recognizes

the process as an internal experience along with the following four dimensions and aspects:

The Mental Dimension - This is an internal trait of users where they think, process, and internalize information available around themselves.

The Emotional Dimension - What we feel and how we express these feelings comes under this aspect.

Social Aspect - Humans are social beings and our connections and relationships play a major role in our mental health wellness.

Psychological Aspect - The final linking of all the information and mixing those with our emotions using our internal processes, and the output of the process comes under this aspect.

Mental health wellness goes beyond not being mentally ill. It is typically assumed that mental wellness and mental illness are just two dimensions of a state, but in reality, the interaction is much more complex. Studies have shown that mental wellness can help prevent future cases of the mental illness effectively. To validate this hypothesis, Corey Keyes did an extensive survey of Americans between the ages of 25 to 74.

Mental health wellness is self-directed, personal, and subjective. In other words, the choices we make every day to nourish our mind directly impact our mental wellness and the quality of life that we experience. Like physical wellness, mental health wellness is a continuous process which never ends. This is an important aspect that we want to target and educate the users on, with our solution. This also taps into helping users understand their internal motivations and be triggered to carry out self-initiated actions using our solution.

Users also need to understand that mental health wellness is an active process with long-term benefits rather than a short-term solution. On one end, it is about

dealing with our short-term life situations like stress. On the other end, it is a process to develop a deeper and richer understanding of our minds towards a more meaningful experience. Users typically have varying actions that they take towards this journey, practicing mindfulness being one of the most popular. In the following section, we will understand the specifics of how this practice affects our mental health wellness.

5.2   Mindfulness versus Meditation

"In any one day there are moments where there is nothing going on, but we link up what is happening from thought to thought without any space. We overlook the spaciousness that it is all happening in," Gangaji (Shapiro, 2017., para. 1).

We often get confused by the difference between mindfulness and meditation. Mindfulness forms the basis of and enhances our meditation practice, while meditation is the pathway towards an expanded mindfulness experience. Mindfulness as a concept can be applied to various situations at different times, while meditation is practiced for a specific time in a day by the user. In short, our goal is to achieve mindfulness, and meditation is one way to get there.

There are different styles of mediation, from Clear Mind meditation to Open Heart meditation. Physical forms can also use the body to develop awareness like yoga, walking or sounds. The type of meditation that helps achieve mindfulness is Clear mind meditation. Meditation is the means to practice mindfulness and can have an enormous impact on one's life. Similarly, meditation is not the end itself but a process that is unique to everyone's preferences. "It is a companion to have throughout life, like an old friend we turn to when needing direction, inspiration, and clarity." (Shapiro, 2017., para. 13).

5.3   Effects of Practicing Mindfulness

Research on the positive effects of practicing mindfulness started in the 1960s, but building the correlation between practicing mindfulness and psychological well-being only began in the late 1970s. Practicing mindfulness began to be thought of as an intervention to enhance psychological well-being. Multiple studies conducted have shown positive and negative correlations between mindfulness and various psychological traits (Keng, Smoski and Robins, 2011).

Practicing Mindfulness has been positive linked to:

- Higher levels of satisfaction with life (Brown and Ryan 2003)

- Better conscientiousness (Giluk, 2009)

- Higher vitality and stronger self-esteem (Brown and Ryan 2003)

- Stronger sense of empathy (Dekeyser, Raes, Leijssen, Leysen, and Dewulf, 2008)

- Greater sense of autonomy, competence, optimism, pleasant affect (Brown and Ryan, 2003)

- Agreeableness (Thompson and Walts, 2007)

Further benefits of the practicing mindfulness are seen in several studies which show negative correlation between mindfulness and psychological traits that adversely affect our mental health wellness:

- Depression (Brown and Ryan, 2003; Cash and Whittingham, 2010)

- Neuroticism (Dekeyser et al., 2008; Giluk, 2009)

- Absent-mindedness (Herndon, 2008)

- Dissociation (Baer et al., 2006; Walach et al., 2006)

- Rumination (Raes and Williams, 2010)

- Cognitive reactivity (Raes, Dewulf, Van Heeringen, and Williams, 2009)

- Social anxiety (Brown and Ryan, 2003; Dekeyser et al., 2008; Rasmussen and Pidgeon, 2010)

- Difficulties in emotion regulation (Baer et al., 2006)

- Experiential avoidance (Baer et al., 2004)

- Alexithymia (Baer et al., 2004)

- Intensity of delusional experience in the context of psychosis (Chadwick et al., 2008)

- General psychological symptoms (Baer et al., 2006)

The list of positive effects is endless and further studies are being conducted to quantify these effects to track progress. To achieve results, there are multiple ways like guided classes and self-practice. One of the most popular mechanisms has been using apps on one's phone to be guided through these practices. In the next section, we will explore how these apps have performed over time and the gaps in user journey. It will be addressed as part of the app landscape as our solution will directly compete with these apps.

5.4   App Landscape

It has been established through the studies mentioned above that practicing mindfulness is an effective tool for mental health wellness. The main challenge for users is then to determine what delivery medium works for them and whether this medium is effective in solving their specific needs. Users typically turn to apps available as close to 84 percent of the people in the world today have smartphones. If we search "mindfulness" in the smartphone app store, 560 unique and relevant apps are identified. Even after claiming to be mindfulness-related, most of these apps are either guided meditation or some form of timers and reminders (Mani, Kavanagh, Hides and Stoyanov, 2015).

Practicing Mindfulness is more than just meditation, breathing control or relaxation. It is a habit that needs to be practiced regularly with sustained effort and understanding. Most current apps fail at this as the attrition rate of users is more than 90 percent (Blacker, 2019). We will also learn and validate this in the User Research chapter 6.0. A community aspect integrated into the app helps

motivate users to engage with the solution (Sulin and Wang, 2013). Most apps are not good at this, and thus an opportunity gap lies for further engagement and studies. Lastly, users need to be educated about the practice and benefits; however, only 4 percent of the apps studied had any program related to educating the users. (Mani, Kavanagh, Hides and Stoyanov, 2015).

In the next chapter, we will understand from the users' perspective what works for them and what their needs are, to further develop our solution and validate our hypotheses.

Chapter 6

User Research

To understand the problem deeper and develop our solution, we interviewed users to understand their mental health wellness practices and habit formation journeys. Our first hypothesis was that users want to form positive mental health wellness practices but have failed at doing so themselves or by using existing solutions in the space. The second hypothesis was that even after identifying a solution that worked for the user, they could not form a habit and dropped off their practice in a short time period. Lastly, we wanted to validate what users understand about mental health wellness and their related needs.

6.1   The Interview Structure and Questions

We conducted interviews with graduate students primarily between the ages of 25 to 35 years. Our main aim was to understand the knowledge base of this group of individuals as well as derive any latent needs they might have for mental health wellness.

Our approach was a mix of structured and conversational style interviews. We wanted to understand the user's experience in a few broad areas but at the same time treat it as a conversation about their experience and let them direct the content.

Through this technique, we managed to uncover every user's unique needs and link latent needs that were common across our user group, inspiring our solution.

Note: We used the term meditation to understand the outcome for the user in their journey for better mental health wellness through the practice of mindfulness.

The broad areas that we sought to understand were the following:

- Experience with and understanding meditation and practicing mindfulness

- Habit formation journey and previous successes and failures

Interview Questions List:

- What is your experience meditating on a scale of 1-5, 5 being advanced

- Have you tried to build a meditation practice before

- What was the longest you made your practice last

- Why did your practice fail

- What do you feel is your biggest barrier to forming a meditation practice

- What do you know about the different types of meditations

- Have you ever meditated with others

- Do you track your friends on any workout apps where you get updates if they are doing an activity

- Do you get feedback on any other apps that you really use or love

- Live meditation practice for observing how users interact with items we provided as well as understand their process and comfort

We also carried out observation sessions to understand how users mediate, the positions they choose, and any devices they interact with around them. It helped us understand the physical aspects of the practice and derive what kind of hardware would be effective for users. This part of the research is out of scope of this thesis and thus will not be discussed in detail.

6.2   Interview Results

We randomly sampled 35 individuals and interviewed them over 20-25 minutes each. We uncovered the answers to our hypotheses and validated a few other assumptions to ultimately make decisions on what our solution would be to solve the problem. Results below will be presented based on questions, and we will discuss the key insights in the following section that came up during the conversational parts of the interview process.

What is your experience meditating on a scale of 1-5, 5 being advanced

On average, users said their experience was about **2**, which was expected. Our main target user groups are users who have no experience or slight experience with meditation. This first question also gave us the filter to not deeply interview users who are at an advanced level with their practices.

Have you tried to build a meditation practice before

This follow-up question will inform our key hypothesis of users wanting to form a habit but not being able to. **26 out of 35** of our users said that they have tried to form a practice before through various means like using competitor apps, attending classes, or simply using techniques to reduce their problems like stress. The remaining said they did not try to form a practice but still occasionally mediated using competitor apps to intermittently solve their problems.

What was the longest you made your practice last

This question quantified our hypothesis that users want to form a habit but have not succeeded in doing so. The users that tried forming a habit sustained it for **5 days to 1 month** maximum.

Why did your practice fail

Users gave us multiple reasons for their habit forming journey to have hit a roadblock. Key insights will be discussed in the following section 6.3.

What do you feel is your biggest barrier to forming a meditation practice

Key insights for this question will also be discussed in section 6.3 that will inform our solution.

What do you know about the different types of meditations

In general, most of our users did not know that there were multiple styles of meditation and mindfulness practices and whether the style they were using was even optimal for their needs.

Have you ever meditated with others

Responses for this question were divided. Half of our users had always practiced alone, the other half considered the classes they attended as meditating with others. Amongst users that did practice with others, the overwhelming majority, 32 out of 35, mentioned that they had a much more positive experience compared to practicing alone. Users seeked the community to validate their practice as well as not feel alone in their problems.

Do you track your friends on any workout apps where you get updates if they are doing an activity

This question was meant as a starting point to understand if users are in general competitive and if they are motivated by this competition. Half of the interviewed users who used products that allowed them to view their friend's activities said they were motivated to push themselves extra.

6.3 Key Insights

Through our interviews, we understood the current state of meditation and practicing mindfulness that our target audience has been making use of and the opportunity gaps in the space. Our key insights have been divided according to our initial hypotheses, informing our solution presented in the next chapter 7.0.

6.3.1 Hypothesis 1

"Users want to form positive mental health wellness practices, but have failed at doing so themselves or by using existing solutions in the space"

We validated the hypothesis to be true. Based on the responses, 26 out of 35 of our users tried to form a habit that lasted from 5 days to 1 month. Most of these users were using existing solutions in the market, which did not provide any triggers to start the habit formation cycle. The initial motivation was driven by the internal needs of users, but an eventual lack of external or internal triggers to motivate users to go back to these solutions led to attrition thereby preventing habit formation.

Our insight is that users need an external trigger to pull them back into their practice, eventually converting to an internal trigger leading to habit formation. Users would also be motivated further if they see their own development progress and can track the various data associated with success, motivating them to get better at their practice.

"On occasion I tried it out. Downloaded the apps, but my mind went to too many places and found the habit to be hard. Pose is hard to sit in. Apps suggested a few practices and tried for just 1 day" - Interviewee quote.

"I did yoga a lot, got into a deep meditative space once before and has been chasing that feeling since. I have downloaded an app and tried to build a practice, but could not sustain" - Interviewee quote.

6.3.2   Hypothesis 2

"Even after identifying a solution that worked for the user, they were unable to form a habit and dropped off their practice in a short amount of time"

This is similar to Hypothesis 1, but with a critical difference in that the users have identified and selected a solution. We wanted to understand what users looked for in a solution and what motivated them initially to look for a solution to practice mindfulness. Crucially, a key learning for us is that users typically look for answers when they have a need, like being under stress. Practicing Mindfulness is more of a preventative activity. Most competitor product messaging is around problems and not educating users on the benefits of working their brain, just like going to a gym. Thus, users pick a solution from a place like an app store that aligns with the problem they are trying to solve. This action also aligns with Hull's theory and experiments presented in chapter 2.0.

"I tried using apps and basic meditation music on YouTube, but have never successfully done it for the long term. Tried doing a daily practice that lasted only 4-5 days" - Interviewee quote.

"Not having the immediate feedback is my biggest issue. I anchor my day to specific locations and events. I find it easier to get into habits when anchored- first thing in the morning I listen to a Spanish podcast when brushing. With the solution, I didn't have the anchor. My routine is anchored to specific locations. Going to the living room doesn't trigger that I should meditate." - Interviewee quote.

6.3.3   Validation

"What users understand about mental health wellness and their related needs"

Building on Hypothesis 2, in general, users are more reactive to solving their problems instead of forming a habit to practice in the long term. The outcomes are

short-lived, like temporary stress reduction, which thus creates an irregular cyclical adoption pattern. Users also in general, do not understand what practice they actually need based on their problems and do not even have a general understanding of different styles of practices and their benefits. An education component in the solution would be key to making sure users set their goals according to their needs and are motivated to achieve them, increasing the likelihood of leading to a positive outcome for them.

"I do not know so much about the families of thought about mindfulness and meditation - I just know the breathing exercises and some other types." - Interviewee quote.

"The solution was generalized approach and generalized content - I had so many thoughts that I felt it was ineffective- felt I was missing out, too many thoughts. I felt calmer but wasn't sure what goal I was trying to achieve" - Interviewee quote.

Chapter 7

Our Solution

After understanding user needs, we linked the key insights to theories of motivation and habit formation while applying gamification techniques to come up with the requirements.

7.1 High-Level Requirements from Insights and Interviews

Some of our key understanding of mentioned needs as well as a few latent needs lead us to the following high-level requirements for our solution:

Education - From our research, we realized that our user group does not have a deep understanding of their latent needs and steps that should be taken towards solving their problems for mental health wellness. An education component within the solution would be key to drive tangible adoption and goal setting, ultimately motivating users to move further in their journey.

Right messaging - The solution and product needs to present with the right messaging to appeal to the user's problems. In our case, the product should present how and why the solution solves our user's problems rather than presenting the solution itself.

Initial Trigger - Our exploration of the current solutions available and understanding user's practices lead us to conclude that there needs to be a trigger to start the habit formation journey. This trigger needs to be an external trigger placed in the user's environment to enable easier adoption of the practices ultimately converting to an internal trigger. As we learned before, this is also the key first step to get into the habit formation cycle as well as initiate the user's motivation.

Gamification - This will be the key reward system to maintain engagement and motivation as time passes. The gamification system will also cater to achieving key milestones, goals and learning objectives rather than simple points and badges. Results should be for the benefit of the user to further keep improving in their practice.

Community - In Maslow's hierarchy of needs, belongingness and love needs as well as accomplishment needs drive the user's motivation to improve in a community setting. A community connection also encourages users to further engage with the product and have their friends and family engage with the product as well. An integrated community aspect in the solution would motivate users to form a habit with the product ultimately helping them grow along with their friends and family, while providing the validation that users seek as an extrinsic reward. We will also include this Social Capital as one of the elements in the gamified system.

Customizable - Each user will have their own needs and goals for using the system, and thus the solution needs to work for the user. The user should not be constrained by the system's journey, and be able to take their own path. This will help them solve their problems and keep them motivated to continue using the solution for their benefits.

7.2 Solution Overview

The high-level requirements finally led us to our solution concept, which will be a combination of hardware, software, and data analytics based products.

A crucial decision was made to include a hardware product as this will form the external trigger in a user's environment. A physical product that can be interacted with further enhances user engagement and provides a path to the user to start their habit formation journey. Software will be a key provider of the intersection between the hardware, data, and gamification systems. Lastly, data analytics will be a large part of our solution as key metrics and progress reports will need to be provided to the users. This will help them continuously improve their practice and keep them engaged. Data will be pulled from the hardware product and software interactions, and displayed to the user through the gamification system as their extrinsic reward. This reward would satisfy multiple aspects of the user's needs like learning, self-improvement, motivation to solve their problems and community aspects.

The following sections will provide an overview of the various elements of the hardware, software and data analytics solution.

7.3   Hardware

As Mark Matteson said in short, "habits are hard to form and easy to break". Technology can help us make changes in our lives, but it often fails because it isn't a natural extension of ourselves. To make a well-rounded device focused on improving one's mental health, we are creating a tech-enabled hardware that is unique and engaging to our users who will use it in their habit formation and is designed to fit seamlessly into some existing habit of their daily life, like keeping it on their desk or their nightstand. It also provides a haptic experience through touch and feel contributing to sensory stimuli.

Shape: By creating a unique and engaging shape we hope to build a form that can be engaged with by all users and that feels good in their hands.

Haptics: The hardware consists of a suite of electronics to remove the friction to enjoyable mediation, like vibrations to signal breathing time, and a speaker for directional sound.

Feedback: Metrics and feedback are important to our users who want direct feedback on their progress. We are looking to provide heart rate monitors and sensors which measure degrees of stress or discomfort.

Community: To develop a community we will encourage users to build a community and the device will have a soft glow light to inform and invite them to join their network when they meditate.

7.3.1   Inspiration

We started looking at existing physical objects that are currently used for meditation activities. These range from the Tibetan sound bowl to a bead necklace and meditation balls. Physical objects like these have been used for centuries to center one's energy and provide a pathway to direct the minds while practicing mindfulness.

Figure 7-1: Existing Meditation Devices

We intend to design a device that a user would hold during their session and this device would gather telemetric data as well. For this reason, the most important aspect of this device is the shape and size, since the user will need to hold the device in their hands. Further development and plan will be detailed in the future work chapter.

7.4   Software

Since 84 percent of the world's population owns a smartphone, it will be a missed opportunity to not have an app that the users can access easily. This app will also form the main basis of interaction between the hardware and gamification systems, enhancing the community connection through internal social networks and provide actionable information to users through data analytics. Furthermore, the entire education component will be contained within this app as it will be the easiest medium of delivery of such information to the users. The following features will be key for the software side of our solution:

Education - As discussed above, educating our users to make sure they take the right path to work for them in mindfulness is the most important aspect to motivate users and keep them engaged.

Gamification - A gamified system will further keep users motivated and engaged and form the reward system within the enhanced hooked model for habit formation.

Community - Connecting with friends and family and going on a journey together enhances the user's motivation and gives them a support system to solve their needs. It can also act as a competitive element to push users to achieve their goals effectively.

7.5   Habit Formation Cycle concept

A critical component of the software will be the process for habit formation. The enhanced hooked model presented in the Habit formation chapter 3.0 forms the basis of this and will be detailed in a simple use case for a user who knows they want to start practicing mindfulness. The below modified model presents the cycle for a user who would have purchased our hardware and starting their first steps towards forming a habit for practicing mindfulness.
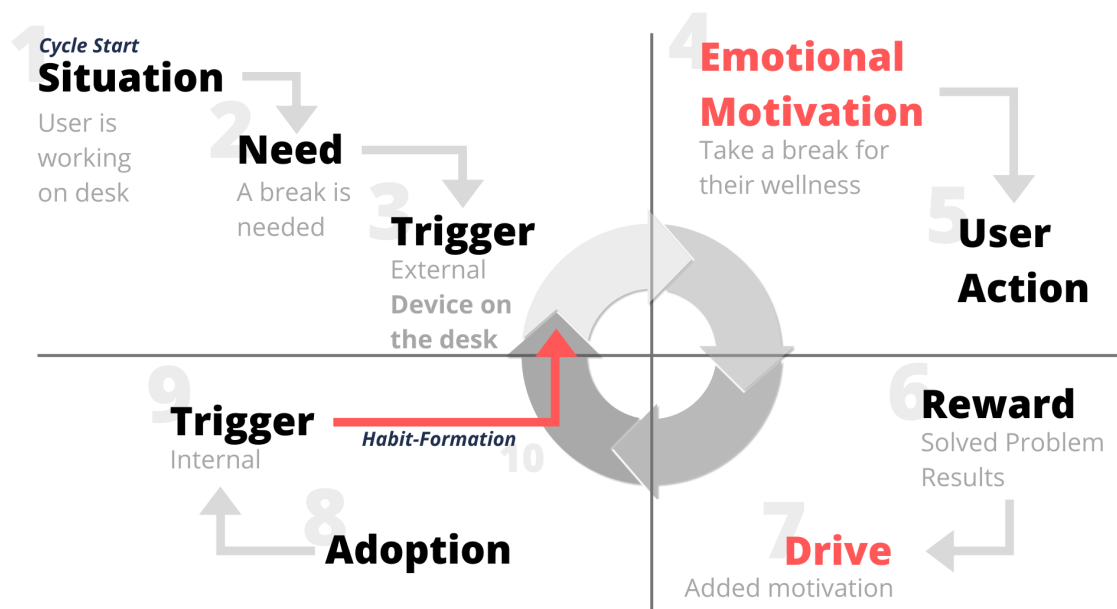

Figure 7-2: New Habit Formation for Mindfulness

Step 1 - Situation

In our use-case, the situation is that a user is working on their desk with the hardware present in front of them amongst their regular use items. Their current Work-life introduces stress, which creates the internal drive for our user to reduce this stress.

Step 2 - Need

Driven by the desire to reduce stress, the need of the user now is to take a break for their mental health wellness. After having gone through our education module when the product was initially activated, the user knows and understands how to solve this need for themselves using our product.

Step 3 - External Trigger

Now the user notices the hardware on their desk and this acts as the external trigger inviting the user to pick up the device and use it to take a break for mental health wellness. The device is also configured in a way where the user ca just pick the device up and practice their preferred action, meditation in this use case.

Step 4 - Emotional Motivation

This is a sub-step where the user solidifies their motivation, fueled by their drive to reduce stress, to take a break to practice mindfulness using our device. This motivation is driven by their initial situation and need, pushing the user to take action to solve their problem.

Step 5 - User Action

Following the motivation, the user starts using the device and does one session using our solution. The action starts at the point when the user picks up the device to use, goes through one pre-set session, and puts the device back in place.

Step 6 - Reward

This is a key step to present the user with the result of their action. The first reward for the user is the result of the meditation session, where the user feels calm and has reduced their current stress. The next reward will be the one from the solution's gamification system. The last one would be the community reward, if the user attends a session with their friend or family through the system. These rewards together add to the motivation of the user to take further actions in the future when they are under a similar situation feeling stressed.

Step 7 - Drive

The drive here is a result of the user seeing positive results and positive impact on their life after using the solution. This creates further motivation leading to adoption in the user's daily life.

Step 8 - Adoption

In this step, the user has adopted the solution and understood the ways it can cater to their needs. They have also started including this process in their daily life.

Step 9 - Internal Trigger

In this phase, the external trigger of the product acting as the initiator to solve the user's problem turns into an internal trigger, where the user will think of using the product by themselves, without the need for any notification, or the need for the device to be visible in their space. At this point, the user has learnt about the ways they can solve their problem and a process that works for them.

Step 10 - Habit Formation

Now that the external trigger has transformed to an internal trigger, the user gets into a habit of using the solution. Moving forward, they will not need steps 1 to 3, but will still require rewards to create advanced levels of drive to become experts.

Through all of the steps above, the user will be shown their progress and development with their mindfulness practice using data. This will be critical to keep them engaged and informed so that actions can drive the desired results. The next section will give an overview of what kind of data analytics will be included.

7.6   Data Analytics

Data will be collected from the hardware and software from the user's practice on a regular basis. Telemetric data like heart rate, skin conductivity, vibrations and time will be pulled to generate metrics on session effectiveness and progress with the user's mindfulness practice. These metrics will also form the basis for the gamification system to reward users for their progress. This will keep them engaged and motivated, as well as informed and educated about their practice. Further research needs to be done to develop quantifiable metrics to provide to the users using the data that we gather.

More details on future work are provided in the next chapter 8.0.

Chapter 8

Future Work

To develop the solution further into a product, the following will be accomplished post submission of this background research: Hardware development will be carried out to develop the final design and validate feature priority with users.

- Filing a patent for hardware design, which is pending.

- Software systems will be designed and developed to create the app.

- Gamification systems will be tested and validated with users to understand the response and effectiveness of different concepts.

- The education system will be designed and developed in partnership with healthcare networks to have credibility in the system and make it useful for the product users.

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