Bridging Behavioral Theory and Design Practice: A Taxonomy-Driven Framework for Design Ideation Grounded in the Fogg Behavior Model

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Design thinking has become a widely adopted approach to innovation, yet its ideation phase frequently depends on intuition and loosely defined heuristics, particularly when creating services intended to shape user behavior over time. To address this gap, this study operationalizes the Fogg Behavior Model (FBM)—which conceptualizes behavior as the convergence of Motivation, Ability, and Prompt—into a set of actionable design taxonomies. We conducted a systematic qualitative analysis of 28 widely used digital applications across health, productivity, and finance domains to identify recurring strategies demonstrating how FBM's constructs are applied in practice. The resulting framework comprises three taxonomies that specify concrete patterns of motivational strategies, ability dynamics, and prompting mechanisms. Building on these insights, we developed a structured ideation framework that guides designers in applying the framework to generate and refine behaviorally informed concepts during early-stage design. In doing so, this work advances the integration of behavioral theory into design thinking practice, providing a replicable approach to bridge the gap between theoretical models and practical design decision-making.

Keywords: Fogg's Behavior Model, Design Ideation Framework, Taxonomy, Design Thinking

1 Introduction

Design thinking has long provided a foundation for innovation across disciplines, but its ideation phase frequently relies on intuition and loosely defined heuristics (Brown, 2009; Johansson-Sköldberg et al., 2013). This reliance can be limiting when designing digital services, where success depends not only on attracting attention but also on sustaining behaviors—such as building habits, managing finances, or maintaining learning routines—over time (Eyal, 2014). In such settings, where designers must look beyond short-term engagement and focus on shaping recurring user actions, many face the challenge of creating experiences that are both motivating and practical. To address these demands, insights from behavioral science can complement intuition by drawing on established behavioral frameworks and models that explain how a person's motivation to act, ability

to perform the action, and external prompts or nudges interact to shape behavior.(Fogg, 2009; Oinas-Kukkonen & Harjumaa, 2009).

Several influential frameworks have been developed to describe these dynamics, including the Hook Model (Eyal, 2014) and Persuasive Systems Design (Oinas-Kukkonen & Harjumaa, 2009). While these models have been effective in explaining why people adopt certain behaviors, few have been translated into practical ideation tools that help designers systematically generate and evaluate concepts aimed at fostering sustained engagement. Another well-established approach is Fogg's Behavior Model (FBM), which defines behavior as the convergence of Motivation, Ability, and Prompt (expressed as its formula Behavior = Motivation × Ability × Prompt) (Fogg, 2009). According to FBM, behavior occurs when individuals are sufficiently motivated, capable of acting, and prompted at the right moment. Although FBM originated in persuasion research and consumer behavior contexts, where it has been used to understand habit formation and response to marketing interventions (Fogg, 2009; Oinas-Kukkonen & Harjumaa, 2009), it has also been adapted to support the design of digital services seeking to encourage long-term engagement (Eyal, 2014). However, despite its conceptual clarity, FBM often remains at the level of abstract principles and has primarily been applied to retrospective analysis of behavioral outcomes, rather than proactively guiding early-stage design ideation. As a result, designers frequently lack structured guidance for embedding behavioral strategies in ways that are both theoretically grounded and practically adaptable across diverse service contexts.

This study aims to extend FBM into design thinking practice by demonstrating how it can be transformed into a practical framework that supports evidence-informed concept development. To operationalize this approach, we systematically analyzed 28 widely adopted digital applications spanning health, productivity, and finance. These services, selected for their sustained engagement and measurable impact (as detailed in the Methods section), offered concrete examples of how design decisions can influence user behavior in practice. Using FBM as an analytic lens, we examined how each application activates motivation, adjusts ability demands, and deploys prompts, organizing these observations into a set of detailed taxonomies that define clear, actionable strategies for shaping user behavior. These taxonomies can serve as a resource for design ideation by providing structured references to inform early-stage concept development. Building on this foundation, we further propose an ideation method that guides designers in applying the taxonomies as a systematic framework for generating and refining behaviorally informed design ideas. This approach aims to bridge the gap between theory and practice, supporting a transition from intuition-driven exploration to evidence-informed creativity.

Our research was guided by the following questions:

RQ1. How can the components of the Fogg Behavior Model (FBM)—Motivation, Ability, and Prompt—be observed and characterized in widely adopted digital services?

RQ2. How can these strategies be operationalized into a structured ideation framework that supports designers in generating evidence-informed concepts during early-stage design?

Taken together, our contributions are twofold: first, we provide a taxonomy empirically derived from real-world digital services, translating FBM's core constructs into clear, practice-oriented strategies; and second, we introduce a structured ideation framework that leverages this taxonomy to guide designers in systematically generating and refining concepts grounded in behavioral theory. This work advances current understandings of design thinking by showing how evidence-informed methods can complement intuition, enabling designers to generate concepts grounded in behavioral insights. Beyond supporting practice, the framework invites further exploration of how design thinking can evolve to integrate empirical approaches, interdisciplinary perspectives, and digital transformations—core priorities within the IASDR community.

2 Fogg's Behavior Model

Fogg's Behavior Model (FBM) is one of the most widely cited frameworks for understanding how specific behaviors emerge in digital environments (Fogg, 2009). According to FBM, behavior occurs only when all three elements are present at the same moment: the user feels motivated, perceives the behavior as sufficiently easy, and receives a clear prompt to act. This relationship is captured in the formula:

Behavior = Motivation × Ability × Prompt

This formulation implies that if any component is missing—if motivation is too low, the action too difficult, or the prompt absent—behavior is unlikely to occur.

Due to its clarity and simplicity, FBM has become influential in fields such as persuasive technology (Oinas-Kukkonen & Harjumaa, 2009) and habit-forming product design (Eyal, 2014). Researchers have applied the model to analyze why users engage with apps, adopt health behaviors, or respond to digital interventions. For example, Chatterjee and Price (2009) used FBM to evaluate engagement in health informatics tools, and Eyal (2014) discussed how motivation and prompts combine to drive habitual use in consumer applications.

A more detailed definition of FBM's three core components—Motivation, Ability, and Prompt—are provided in the following sections.

2.1 Motivation

Motivation refers to an individual's desire or drive to perform a behavior. Fogg (2009) identifies three core motivational dimensions:

1. **Sensation (*Pleasure–Pain)*:** the immediate and automatic responses driven by physical pleasure or pain (e.g., hunger, discomfort, or bodily satisfaction).

2. **Anticipation (*Hope–Fear*):** the mental responses connected to hope or fear about future outcomes (e.g., the fear of financial loss, the hope of finding a partner).

3. **Belonging (*Social Acceptance–Rejection)*:** the social motivations related to acceptance or rejection by others (e.g., wanting to be seen positively by peers).

Each of these dimensions can push users toward or away from an action depending on context. For example, the hope of achieving a better future self (anticipation) may motivate a user to persist in a health-tracking app.

2.2 Ability

Ability describes how easy or difficult it is for a person to perform a target behavior. According to Fogg (2009), simplicity is at the heart of ability: the simpler a behavior is perceived to be, the more likely it is to occur, even in the presence of only moderate motivation. FBM identifies six core factors that contribute to user ability:

1. **Time**: The amount of time a behavior requires. If individuals perceive that a target behavior demands more time than they have available, it will not feel simple.

2. **Money**: The financial cost associated with a behavior. For people with limited financial resources, any behavior requiring payment may feel difficult or unattainable. Conversely, those with greater resources may simplify their lives by using money to save time or reduce effort, such as hiring services to manage household tasks.

3. **Physical Effort**: The level of exertion needed to complete the behavior. High physical effort increases the perceived difficulty of a task.

4. **Brain Cycles**: The mental effort or cognitive load required. If performing a behavior demands substantial thinking, problem-solving, or learning, it can feel complex.

5. **Social Deviance**: The degree to which a behavior violates social norms. Even if an action requires little time, money, or physical exertion, it may feel complicated if it risks social disapproval.

6. **Non-Routine**: Whether the behavior is part of an established habit. Non-routine behaviors, such as switching to a new bank or adopting a novel procedure, often feel more difficult, leading individuals to default to familiar patterns even if they are less efficient.

From a design perspective, ability is not simply a matter of individual capacity but an outcome shaped by how services structure and present tasks. This perspective emphasizes that simplifying behavior can be as powerful as increasing motivation when the goal is to drive sustained engagement. To facilitate simplicity in user ability, Fogg's work "Creating Persuasive Technologies" (2009) specifies three strategies in facilitating user ability, which are outlined below:

1. **Train people to increase their ability:** providing opportunities for users to build new skills that increase their competence to perform the target behavior. Because training demands considerable investment and cognitive effort, it is generally recommended only when absolutely necessary, as most users prefer to act intuitively without formal instruction.

2. **Provide a tool that makes behavior easier to do:** offering resources or aids that make the desired behavior easier. For example, providing cooking videos to guide meal preparation or including assembly tools with furniture can reduce perceived difficulty.

3. **Scale back target behavior:** streamlining the steps required to perform an action or breaking complex behaviors into smaller, more manageable habits. This may involve reducing the number of form fields in a survey, minimizing the clicks needed to complete a purchase, or eliminating unnecessary friction that inhibits action.

Taken together, these illustrate that ability is not merely a static attribute of the user but an outcome shaped by design decisions, contextual resources, and the ways services scaffold or complicate action.

2.3 Prompt

Prompt refers to the cue that initiates a behavior when motivation and ability are in place. According to FBM, behavior requires a prompt to occur, and the model distinguishes three types depending on the user's state:

1. **Trigger:** Used when motivation is low, triggers remind users why the behavior is valuable or emphasize the benefits of the action. For example, health apps may highlight risks—such as the likelihood of illness without a flu vaccination—to increase urgency. Triggers can also leverage positive emotions, like anticipated enjoyment or social approval.

2. **Facilitator:** When motivation is high but ability is limited, facilitators make the behavior quicker and faster by reducing friction or simplifying execution. One-click purchasing in platforms such as Amazon exemplifies this approach, helping users act with minimal effort.

3. **Signal:** Signals prompt action when both motivation and ability are sufficient. They function mainly as reminders delivered at the right moment. Examples include notifications about

expiring coupons or subtle micro-nudges in social media feeds that prompt users to re-engage.

The effectiveness of any prompt depends on matching it to the user's current motivation and ability. A signal will fail if motivation is too low, and a trigger alone cannot overcome significant barriers to ability. Selecting the appropriate prompt type is essential for designing interventions that reliably drive action.

3 Method

This study conducted a qualitative artifact analysis of 28 widely adopted digital services based in Korea, employing the FBM as the primary theoretical framework. Our objective was to translate FBM's three determinants of user behavior—Motivation, Ability, and Prompt—into a structured taxonomy that clarifies how these constructs are implemented in real-world applications and can serve as actionable guidance for the design ideation framework.

3.1 Service Sample Selection and Data Collection

Digital services, particularly mobile applications, generate rich behavioral evidence and provide accessible artifacts to examine the mechanisms that sustain engagement. To build a robust and diverse sample, we applied three selection criteria: (1) active usage—each app reported a minimum of 110,000 monthly active users (MAU), or where MAU figures were unavailable, over 10,000 downloads; (2) explicit behavioral targeting—apps had to be designed to engage users in clearly defined goal-oriented behaviors such as saving money, exercising, or learning; and (3) domain diversity—to maximize transferability, we included apps spanning finance, health, productivity, and lifestyle domains. Drawing on app-store rankings from March to May 2024, this process yielded a final sample of 28 applications (listed in Appendix A).

Four researchers independently reviewed each app's primary user flows to identify relevant behavioral touchpoints. For this analysis, we defined the unit of observation as any discrete user interface element or interaction sequence explicitly designed to elicit a target behavior (Kurniawan, 2004). Each instance was documented with a screenshot and accompanying descriptive annotations. This procedure resulted in a dataset of 155 annotated screenshots capturing how user behaviors are operationalized in practice.

3.2 Analysis Process

To systematically analyze the dataset, we developed an initial codebook specifying operational definitions for each determinant in the FBM. In a pilot coding phase, the four researchers

independently applied this codebook to a subset of the data to refine category definitions and ensure shared interpretation. In this process, *Behavior* was defined as the specific action a user is asked to perform, and *Motivation* as the incentive or rationale provided to prompt that action. Initially, *Ability* was conceptualized along two dimensions—(1) the subtasks required and (2) the facilitative features provided. However, the pilot coding revealed a third, previously under-documented dimension: (3) hurdles encountered during execution. This insight led us to expand the final codebook to capture barriers that potentially undermine the ability. Finally, *Prompt* was defined as any cue designed to trigger the targeted behavior.

In the main coding phase, all four researchers independently coded the complete dataset of 155 screenshots using the refined FBM codebook, resulting in 339 initial codes. We then conducted an affinity diagramming session to synthesize and organize the codes. During this session, all codes were collated on a shared digital workspace (FigJam) and clustered through silent sorting. These clusters were further refined via iterative in-person discussions to clarify category boundaries and terminology until full consensus was reached. This analytic process combined systematic categorization with interpretive synthesis, in line with established thematic analysis practices (Braun & Clarke, 2006; Ritchie et al., 2013).

Within Motivation, 111 instances were distilled into 23 types, organised into three top-level and seven sub-level clusters. The Ability category's 147 instances were cast as 41 types and, according to the three ability facets—required subtasks, facilitative features, and hurdles—grouped into 14 top-level and 34 sub-level clusters. For Prompt, 81 instances yielded 16 types arranged into five top-level and 12 sub-level clusters.

This process culminated in a set of taxonomies describing practiced motivational strategies, ability dynamics, and prompt mechanisms. Together, these taxonomies, presented in the next section, offer a structured resource for translating behavioral theory into design practice.

4 Behavioral Strategy Taxonomies Grounded in FBM

Our findings translate the abstract constructs of the FBM—Motivation, Ability, and Prompt—into real-world principles that can serve as actionable design guidance. Through a systematic analysis of 28 widely adopted digital services, we identified recurring strategies that illustrate how each component of FBM is operationalized in practice. Here, we introduce a set of three corresponding taxonomies—one for each FBM dimension—that specify concrete patterns of motivational strategies, ability dynamics, and prompt mechanisms. Each example in the taxonomies is referenced with a bracketed service number (e.g., [1, 4, 5]), which corresponds to the full list of analyzed services provided in the Appendix. In the following sections, we detail these behavioral strategy taxonomies and describe how current service designs effectively engage and sustain user behavior across these dimensions.

4.1 Taxonomy of Motivational Strategies

We identified three overarching types of motivation in practice, where the categories correspond to the three sources of motivation described in FBM: (1) Belonging: motivation arising from social interaction, (2) Anticipation: motivation rooted in constructive aspirations for the future, and (3) Sensation: motivation triggered by immediate outcomes within the service. The following sections describe each category and its specific subtypes in detail (Organized in Table 1).

Belongings: Motivation Arising from Social Interaction	1. Motivation Through Social Comparison
	2. Motivation Through Social Communication and Self-Presentation
Anticipation: Motivation Rooted in Constructive Aspirations for the Future	1. Motivation to Grow and Develop
	2. Motivation to Improve Daily Habits
Sensation: Motivation Triggered by Immediate Service Outcomes	1. Motivation to Experience Achievement
	2. Motivation to Obtain Tangible Rewards
	3. Motivation to Enjoy Visual Pleasures

Table 1. The overview of taxonomy of motivational strategies

4.1.1 Belonging: Motivation Arising from Social Interaction

Many services leverage users' desire for social connection and recognition to strengthen motivation. This corresponds to the **Belonging** dimension in the Fogg Behavior Model, which emphasizes how social acceptance and the avoidance of rejection can drive behavior. We identified two main strategies within this category:

1. **Motivation Through Social Comparison:** Services often encourage users to compare their performance or participation with others, which activates motivation through mechanisms such as FOMO (Fear Of Missing Out). Observing peers' activities can heighten anxiety about being left behind, thereby prompting engagement. For example, stock trading communities display other users' transactions and discussions, fostering a fear of missing market opportunities [7, 18]. Social comparison also manifests through competitive ranking or progress visibility, motivating users to participate to maintain or improve their standing relative to peers [12, 16, 19].

2. **Motivation Through Social Communication and Self-Presentation:** The desire to communicate and share achievements with others further reinforces motivation. This includes connecting with existing social networks (e.g., friends and family) [17-19, 21-23] and forming new relationships within online communities [14, 21, 27]. Users often feel encouraged to act when they anticipate social support or recognition. Additionally, the opportunity to showcase personal achievements—such as sharing milestones on social media—can strengthen self-expression motives and sustain engagement [6, 15].

4.1.2 Anticipation: Motivation Rooted in Constructive Aspirations for the Future

Beyond social drivers, users are motivated by the aspiration to improve their lives. This category reflects the **Anticipation** dimension of FBM, encompassing both hope for positive change and fear of stagnation or loss. We identified two main types of future-oriented motivation:

1. **Motivation to Grow and Develop:** Many users are driven by the desire for self-improvement. This includes fears about remaining stagnant and hopes of becoming a more capable version of themselves. Examples include learning new skills or languages [1, 2, 28], tracking and reflecting on experiences to enhance self-awareness [15, 16, 18, 20, 21], setting and achieving personal goals [13, 15, 19], and managing finances to build wealth [4-6, 10].

2. **Motivation to Improve Daily Habits:** Other users are motivated to transform irregular or unproductive routines into healthier, more purposeful lifestyles. This motivation encompasses forming structured habits [15, 14, 27], adopting practices that improve physical and mental health [9, 12, 13, 19], cultivating responsible financial behaviors [5, 10], and engaging in fulfilling hobbies [5].

4.1.3 Sensation: Motivation Triggered by Immediate Service Outcomes

Lastly, users are often motivated by expectations of immediate rewards or sensory satisfaction, which relate to the **Sensation** dimension in FBM. We identified three strategies that services use to engage this motivation:

1. **Motivation to Experience Achievement:** Users derive satisfaction from reaching milestones and attaining recognition within the service. This includes progressing through levels or rankings [2, 9, 13, 15, 16, 27], completing attendance challenges [1, 8, 11, 19, 21, 24, 26], collecting badges or certifications [41, 12, 13, 15], nurturing virtual pets or characters [22, 23], and solving quizzes to gain intellectual satisfaction [8].

2. **Motivation to Obtain Tangible Rewards:** Anticipating economic or practical benefits can also drive engagement. Users may be motivated to earn virtual currencies or points [8, 11, 14, 24-28], which can later be exchanged for tangible goods or financial incentives [8, 13, 18, 22, 23, 27, 28]. Similarly, mechanisms that help users grow their assets—such as savings

accounts offering interest [4, 6, 7]—encourage sustained participation. Additionally, the desire to avoid monetary loss can be a powerful motivator, such as forfeiting pre-committed funds when failing a challenge [4, 8, 13] or feeling compelled to use a paid app to justify the expense [21].

3. **Motivation to Enjoy Visual Pleasures:** Finally, many services incorporate visually engaging elements that stimulate users' desire for sensory enjoyment. Examples include dynamic character visuals that evolve with progress [2, 5, 6, 20] and customizable environments or avatars that create a sense of ownership and aesthetic pleasure [17, 21].

This categorization in motivational taxonomy highlights how diverse motivational strategies—ranging from social comparison to the anticipation of future growth and immediate rewards—can be purposefully combined to drive user behavior in digital services.

4.2 Taxonomy of Ability Dynamics

In the Fogg Behavior Model, Ability refers both to the level of skill or effort a target behavior requires from users and to the conditions that facilitate its execution. In other words, FBM conceptualizes ability along two dimensions: the specific competencies or subtasks users must perform, and the features or design elements that help lower the difficulty of those actions. Building on this foundation, our analysis extended this perspective by systematically identifying not only required actions and facilitative strategies, but also hurdles— characteristics in services that actively impede users' capacity to act. This broader taxonomy offers a more comprehensive account of how digital services can shape, support, or undermine ability in practice.

Required User Abilities	1. Ability to Act for Personal Growth	
	2. Ability to Establish and Maintain Habits	
	3. Ability to Earn Rewards	
	4. Ability to Access Enhanced Features	
Facilitative Features for Enhancing Ability	Reducing Negative Engagement	1. Improving Access
		2. Minimizing Complexity
		3. Alleviating Fear of Failure
		4. Reducing Intrinsic Difficulty

	Amplifying Positive Engagement	1. Enhancing Enjoyment
		2. Diversifying Reward Paths
		3. Supporting Personalization and Ownership
Observed Hindrances to Ability	1. Entry Barriers	
	2. Execution Barriers	
	3. Reward Barriers	
	4. Disruptive Advertisements	

Table 2. The overview of taxonomy of ability dynamics

4.2.1 Required User Abilities

1. **Ability to Act for Personal Growth:** Services often require behaviors intended to support users' personal or financial development. For example, many apps required users to save money or invest regularly [4, 5-7, 10, 12, 19]. Others asked users to document personal data—such as daily weight, calorie intake, or reflections in journals—to encourage self-awareness and track progress over time [12, 14, 16–21].

2. **Ability to Establish and Maintain Habits:** A second common requirement was the ability to create and sustain structured habits. This included setting and adhering to daily routines [11, 12, 13], waking up early [9, 11], engaging in regular exercise [11, 14, 15, 27], and consistently completing learning tasks such as memorizing vocabulary [1, 2, 28]. These behaviors were designed to help users internalize desired routines.

3. **Ability to Earn Rewards:** Many services demand behaviors directly linked to rewards. For example, users were prompted to check in daily [8, 11, 14, 17, 23, 25-28], complete quizzes [4, 5, 23], or nurture virtual assets such as plants or characters to unlock incentives [22, 23]. Some apps also required users to verify achievements, such as reaching a step goal or completing a lesson [18].

4. **Ability to Access Enhanced Features:** Finally, some services require higher levels of commitment to unlock additional benefits. Examples included paying for premium access [2] or pre-committing funds as deposits to strengthen follow-through on goals [13].

4.2.2 Facilitative Features for Enhancing Ability

We identified seven facilitative strategies, which can be grouped into efforts to reduce negative engagement(reducing barriers to engagement) and amplify positive engagement (amplifying drivers that encourage active involvement).

4.2.2.1 **Reducing Negative Engagement:**

1. **Improving Access:** Services streamlined access by synchronizing experiences across devices [19] and simplifying navigation structures [12, 13]. For example, habit apps offered preconfigured templates so users could bypass manual setup and begin more easily [8].

2. **Minimizing Complexity:** Reducing complexity made tasks easier for users. Some services supported this by offering one-click actions [8, 12, 19, 21, 22, 24–26, 28], while others automated repetitive processes such as saving or tracking [4–6, 20]. Integrated dashboards also centralized related functions to avoid context switching.

3. **Alleviating Fear of Failure:** Features such as partial rewards for incomplete participation [3, 4, 7, 17] or forgiving missed check-ins [8, 19, 21] mitigated anxiety. Allowing immediate retries reframed failure as part of the learning process [4, 13, 18].

4. **Reducing Intrinsic Difficulty:** Services adapted difficulty by offering gradual levels [8, 18], step-by-step guides [2, 7, 15], or partial credit for incomplete tasks [12, 13], helping users feel capable even when facing complex goals.

4.2.2.2 **Amplifying Positive Engagement:**

1. **Enhancing Enjoyment:** Gamification and social features reframed behaviors as playful rather than burdensome. For instance, users could compete in rankings [1, 2] or collaborate with friends [17, 22], making repeated engagement more intrinsically rewarding.

2. **Diversifying Reward Paths:** Multiple incentive channels maintained novelty and anticipation. Apps varied reward types and frequencies [14, 23, 27], occasionally offering surprise bonuses to sustain curiosity and effort [11, 28].

3. **Supporting Personalization and Ownership:** Allowing users to define their own goals [5, 10, 13] and customize interfaces [5] fostered a sense of autonomy. In learning apps, the ability to create and share custom challenges increased engagement by aligning activities with personal aspirations.

4.2.3 Observed Hindrances to Ability

We also systematically documented factors that reduce perceived or actual ability—hurdles—across three stages of use:

1. **Entry Barriers:** Initial steps, such as mandatory check-ins or locating hidden functions, increased friction [4-6, 24]. For example, requiring users to manually claim rewards created extra effort that discouraged continued participation.

2. **Execution Barriers:** Tasks that imposed long wait times [1, 22], daily limits [21], or frequent high-effort actions (e.g., uploading photos) [6, 13, 17, 23–25, 27] fragmented experiences and led users to disengage.

3. **Reward Barriers:** When rewards were perceived to be too small in comparison to their action or difficult to redeem—such as requiring extra authentication to cash out points [1, 11, 14, 15, 27]—the effort-benefit balance often turned negative, reducing motivation and persistence.

4. **Disruptive Advertisements:** Finally, pervasive advertising disrupted attention and depleted cognitive resources across all phases of use [14, 15, 17, 23, 25, 27].

4.3 Taxonomy of Prompting Mechanisms

Our analysis identified five distinct types of prompts: (1) Trigger, which amplifies motivation to perform a task; (2) Signal, which reminds users to complete a task; (3) Facilitator, which simplifies the execution of the behavior; (4) Information, which provides relevant information; and (5) Affirmation, which reinforces success through positive feedback. The first three types—Trigger, Signal, and Facilitator—align directly with the categories originally defined in Fogg's Behavior Model. Notably, the fourth and fifth types emerged as new prompt categories that extend FBM by capturing additional strategies observed in our analysis.

Trigger: Amplifying Motivation to Perform a Task	1. Visual Rewards
	2. Summarized Outcomes
	3. Progress Visualization
	4. Fear of Loss
	5. Social Comparison

	6. Social Reinforcement	
Signal: Reminding Users to Perform a Task	1. Delivering Notification-Based Reminders	a. System-Generated Notifications
		b. User-Configured Notifications
		c. Peer-Generated Notifications
	2. Providing Embedded and Persistent Reminders	a. Widgets
		b. Banners and pop-ups
Facilitator: Facilitating Easier Action	Providing Shortcuts	
Information: Supplying Necessary Information	1. Delivering Information Before Task Execution	
	2. Delivering Information After Task Execution	
Affirmation: Reinforcing Success Through Affirmation	Delivering Congratulatory Notifications	

Table 3. The overview of taxonomy of prompting mechanisms

4.3.1 Trigger: Amplifying Motivation to Perform a Task

Several services employed prompts designed to increase users' motivation to engage in a target behavior. This corresponds to Fogg's **Trigger** category, which addresses situations in which motivation is initially low and requires external stimulation. Six specific subtypes were identified:

1. **Visual Rewards:** Some services leveraged visual assets—such as collectible character stickers [18], dynamic character changes based on progress [4, 20], or badge rewards [15]—to evoke curiosity and drive continued engagement.

2. **Summarized Outcomes:** In some cases, displaying personalized outcomes motivated further action. For example, running apps showed cumulative records to inspire record-breaking efforts [15], and educational services provided summary reports of completed tasks to reinforce motivation [17].

3. **Progress Visualization:** Several applications presented visual progress trackers, such as stamp collections [15, 18], to encourage consistent participation by making advancement tangible.

4. **Fear of Loss:** Certain strategies in these services emphasized potential negative consequences of inaction—for example, notifications that breaking a learning streak would forfeit progress [1], missing a deposit would result in losing high interest rates [18], or inactivity could downgrade earned badges [12].

5. **Social Comparison:** Community-based features, including rankings and scoreboards [2, 9, 16], motivated users by highlighting their relative performance and progression within peer groups.

6. **Social Reinforcement:** Social feedback mechanisms—such as receiving "likes" after completing a task [12, 13, 17, 19, 21], or notifications about peers' achievements [12, 19, 21]—served to amplify motivation via social reinforcement.

4.3.2 Signal: Reminding Users to Perform a Task

Among all prompt types identified in this study, reminder prompts were the most frequently observed strategy employed to encourage task completion. This finding corresponds closely to the **Signal** category in Fogg's Behavior Model, which describes prompts intended for situations where users already possess adequate motivation and ability but require a timely cue to translate intention into action. Within this category, we identified two primary subtypes.

1. **Delivering Notification-Based Reminders:** The most prevalent form of reminder was notification-based prompts, typically implemented as push notifications. These were further classified into three distinct approaches

    a. **System-Generated Notifications:** These are automated alerts triggered by the application itself, either to highlight potential rewards available upon task completion [8, 9, 23, 28] or simply to remind users of pending tasks at contextually appropriate moments [2, 4, 6, 8, 11, 12, 16, 22, 24].

    b. **User-Configured Notifications:** In this approach, users proactively schedule reminders according to their preferred times, thereby exercising control over when they receive cues to act [12, 13, 17, 19, 21].

    c. **Peer-Generated Notifications**: Some services supported collaborative or shared activities, enabling participants to send reminder notifications to peers who had not yet engaged in the task, thereby promoting collective participation [17].

    Together, these variations illustrate how notification-based signals can accommodate different user preferences and social contexts while maintaining consistent behavioral salience.

2. **Providing Embedded and Persistent Reminders:** Beyond push notifications, services also implemented embedded or persistent reminders designed to keep the intended behavior salient throughout the user's interaction with the service.

    a. **Widgets:** One common example involved home screen widgets that continuously display relevant information about pending tasks, thereby combining ambient awareness with motivational cues [1, 12, 13, 17, 21, 28].

    b. **Banners and pop-ups:** Additionally, several applications placed reminders in high-visibility interface locations, such as banners at the top or center of the main screen [18, 22, 25] or employed pop-up overlays immediately upon app launch [26]. These interface-integrated prompts ensured that users encountered behavioral cues organically during regular app engagement, rather than relying solely on external notifications.

Together, these approaches illustrate how embedded and persistent reminders can seamlessly integrate behavioral cues into the broader user experience. By combining ambient prompts (e.g., widgets), strategically placed interface elements (e.g., banners and pop-ups), and moment-specific notifications, services maintain continuous awareness of target behaviors without requiring explicit user effort. This layered prompting strategy reinforces engagement at multiple touchpoints, ensuring that cues to act remain salient across both passive exposure and active interaction.

4.3.3 Facilitator: Facilitating Easier Action

Several services implemented prompts designed to help users perform target behaviors more easily. This type of prompt aligns with the **Facilitator** category in Fogg's Behavior Model, which describes mechanisms that provide a "bridge" enabling users to carry out a desired action more effectively.

Providing Shortcuts: Some services offered shortcuts, such as widgets, that enabled users to act quickly and conveniently without needing to open the app itself. For example, in routine and schedule management apps, widgets displayed upcoming tasks or to-do lists, and allowed users to mark them as completed directly from the widget interface [12, 19].

4.3.4 Information: Supplying Necessary Information

We identified a new type of prompt strategy, which we term an **Information** prompt. Unlike other prompts that directly nudge users to act in the moment, this strategy stimulates motivation by surfacing timely, relevant information that helps users feel more prepared and confident to engage in a behavior. In many cases, simply making pertinent information visible increased the likelihood that users would follow through.

1. **Delivering Information Before Task Execution:** In some services, prompts supplied users with information needed to perform a task, thereby encouraging engagement. For example, apps sent push notifications announcing the start of challenges [13], quizzes [14, 27], or time-limited events [22]. In fintech apps, alerts about stock price increases or decreases were used to prompt trading behavior [7].

2. **Delivering Information After Task Execution:** Other prompts supplied information after a behavior was completed, often to sustain positive motivation by providing clear feedback about progress and reinforcing a sense of accomplishment. Examples included notifications specifying the rewards earned (such as in-app currency) [11, 13, 15] or confirming whether quiz answers were correct [8]. In addition, some services encouraged reflection by prompting users to review their progress in a constructive way. For instance, fintech apps sent evening reminders to check daily spending [10], while routine management tools offered prompts inviting users to reflect on whether they completed their planned activities [12]. While these prompts are not built to require immediate action and are prompted after user behavior, they contribute to providing a sense of reflection that could increase the likelihood of re-engagement over time.

4.3.5 Affirmation: Reinforcing Success Through Affirmation

Services analyzed in this study employed prompts that highlighted and celebrated task completion, reinforcing a sense of accomplishment and laying the groundwork for sustained behavior. This **Affirmation** prompt type, along with the "Information" prompts described in Section 4.3.4, emerged as a novel category beyond those defined in the original FBM.

Delivering Congratulatory Notifications: Many services delivered congratulatory messages when users completed a task, thereby strengthening feelings of achievement and supporting ongoing engagement. For instance, when users earned in-app currency (e.g., cash, points, tokens) or monetary rewards, services provided explicit messages displaying the amounts obtained [8, 11, 14, 27]. Other examples included notifications celebrating prize draws [27], alerts recognizing first-time or repeated task completion [5, 8], and updates informing users when their rank had improved within the service [9].

5 Structured Design Ideation Framework and Implementation

5.1 Design of the Workshops Using Our Framework

To translate the taxonomy we developed into actionable design practice, we created a structured group ideation (recommended 3-4 participants for each group design workshop) framework composed of five sequential phases. This framework builds directly on the FBM-grounded taxonomy

and integrates theoretical foundations with practical exercises, enabling designers to systematically generate service ideas informed by behavioral principles.

1. **Understanding FBM (10 minutes):** Participants receive a concise introduction to FBM, including its three core components—Motivation, Ability, and Prompt—and examples of how these elements shape user behavior in digital services.

2. **Experience Reflection and Mapping (15 minutes):** Participants individually recall digital services they had used that successfully influenced their behavior. This phase is used for a better understanding of the FDM concept by applying their real-world experiences.

    a. **Worksheet Exercise (5 minutes):** Each participant completes a B-MAP worksheet to map the Motivation, Ability, and Prompt elements in their selected example.

    b. **Group Sharing (10 minutes):** Participants share and discuss their reflections, surfacing patterns and differences across services.

3. **Ideation with B-MAP Taxonomy Cards (60 minutes):** This phase focuses on generating new service concepts using the "Behavioral Strategy Taxonomies" proposed in the previous section.

    a. **Warm-Up and Brainstorming (15 minutes):** Participants consider a target user, the desired behavior, and relevant motivations, recording early ideas on sticky notes or worksheets.

    b. **Individual Ideation Session (30 minutes):** Each participant develops a service concept by exploring guiding questions, such as:

        i. What is the service?

        ii. How can it make the behavior more enjoyable or easier?

        iii. How might it effectively prompt the behavior?

        Participants refer to B-MAP cards outlining taxonomies of Motivational Strategies, Ability Dynamics, and Prompt Mechanisms to inspire and structure their thinking. Visual sketches and written descriptions are encouraged to articulate ideas concretely.

    c. **Refinement (10 minutes):** Participants revisit the taxonomy to identify any elements they may have overlooked and deepen their taxonomy tagging of their concepts. In this step, they refine their service ideas to ensure closer alignment with the

behavioral principles underlying the framework and to make their designs more theoretically grounded.

4. **Iteration (20 minutes):** Participants select one concept to develop further, focusing on refining the specific prompts that would drive behavior. During this phase, moderators encourage deeper consideration of how Motivation and Ability could be enhanced or supported by the Prompt.

5. **Sharing and Voting (10 minutes):** To conclude, participants briefly present their concepts to the group. Each person then cast votes to recognize:

    a. The idea they would most likely use (red dot)

    b. The idea they found most engaging (yellow dot)

    c. The idea they found most original (green dot)

This structured approach was designed to help participants move beyond intuition by systematically exploring how FBM elements can be translated into actionable design strategies in the concept development.

5.2 Overall Reflections on Utilizing Our Workshop

To explore the practical application of the framework, we conducted three group design workshops (One pilot workshop and two main workshops) in which participants—including both the authors and external professional designers—generated concrete service concepts informed by the taxonomy. We began with a pilot workshop involving the four authors, which allowed us to test and refine the ideation methodology. Next, we ran a workshop with three experienced external designers to assess the method's clarity and usability beyond the research team. Finally, the authors reconvened for an additional workshop to experience the fully refined process.

In each workshop, participants followed the structured ideation process described above, engaging in approximately 60 minutes of focused concept development. Across all workshops, each participant produced between 2 and 4 distinct service ideas (mean ≈ 2.91). This volume of output compares favorably to established benchmarks in design ideation and concept development (e.g., IDEO, 2015; Sanders & Stappers, 2008), which typically consider 1–3 well-developed concepts per participant to indicate productive engagement.

Our workshop revealed that the proposed framework supported participants in generating more actionable and concrete service ideas by encouraging step-by-step thinking with clear goals, such as increasing user motivation or sustaining engagement. We also found that having a basic

understanding of the B=MAP model helped them balance the consideration of motivation, ability, and prompts during ideation.

However, we also want to note that the framework could constrain creativity or lead to predictable combinations of ideas. To address this, we suggest integrating more freedom in ideation or divergent phase, to promote broader exploration. The framework comes particularly useful during the convergent phase of ideation, helping to refine and organize ideas into actionable directions grounded in behavioral principles.

While these workshops were not intended as formal evaluations of effectiveness, they offered valuable preliminary insights into the framework's practical relevance. Notably, participants were able to use the taxonomy-driven guidance to articulate value propositions, user scenarios, and behavior change mechanisms with clarity and specificity within a constrained time frame. This exploratory exercise suggests that the framework holds promise as a structured resource for early-stage concept development, supporting designers in systematically integrating behavioral principles into ideation processes and advancing design thinking beyond intuition-led practices.

6 Limitations and Future Works

This study has several limitations that highlight opportunities for further research. First, the analysis was based on digital services predominantly used by Korean users. However, while our observations and analyses were conducted within the Korean context, focusing on digital services widely used by Korean users, the findings are not confined to this specific cultural setting. Because the study examined design features and behavioral mechanisms at the level of app functionalities, rather than culture-specific content, the resulting insights and taxonomy maintain a degree of generalizability across contexts. Nevertheless, future research could further explore how cultural norms and locally familiar services shape user engagement patterns and behavioral responses, offering comparative insights into the universality and adaptability of the proposed framework.

Second, the selected services spanned a wide range of domains, including health, productivity, finance, and entertainment. Although this breadth allows us to identify common behavioral strategies, it also means that the findings may not fully capture the specific needs or constraints of individual domains. Further studies might explore how the framework can be adapted or extended within particular sectors to offer more tailored guidance.

Third, while the framework synthesizes evidence-based design strategies, this study did not empirically evaluate the impact of using the framework on the quality, feasibility, or originality of ideas generated by designers. Establishing a clear foundation for the framework was an initial step, but additional research—such as controlled workshops or field studies—will be needed to assess its effectiveness in practice.

Overall, while these limitations suggest areas for further exploration, the study contributes an initial approach for integrating behavioral principles into design thinking. We hope it can serve as a foundation for continued development and adaptation in varied contexts.

7 Conclusion

This study explored how the Fogg Behavior Model (FBM) can be translated from an explanatory framework into a practical resource for design ideation. By analyzing 28 widely adopted digital services, we identified recurring strategies that operationalize Motivation, Ability, and Prompt in ways that sustain user behavior. Building on these insights, we developed a structured ideation framework to help designers move beyond intuition and systematically generate behaviorally informed concepts.

Overall, this work contributes to the ongoing conversation about how behavioral insights can strengthen design practice. By offering a systematic approach to embedding behavioral principles during the early stages of concept development, the framework provides a foundation for advancing evidence-informed design thinking and supporting the creation of services that more effectively engage and motivate users.

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Acknowledgement: This study was supported by the NH Investment & Securities, Platform UX Division, UX Lab. The authors would like to express their sincere appreciation to the UX Lab team for their support, constructive feedback, and close collaboration throughout the execution of this project.

Appendix

*Table 4. Monthly Active Users (MAU) Metrics for Selected Services. (*If a specific in-app program is the unit of analysis, it is indicated in brackets (e.g., [Program Name]). ** For services where MAU is not specified, the number of app downloads is used instead.)*

	Service Name	MAU (Monthly Active Users)
1	Duolingo	130.2 million
2	Sayvoca	1.56 million
3	Speak	240 000
4	Kakao Bank [26-week installment savings]	14 million (Kakao Bank) *exceeds 20 million accounts
5	Kakao Bank [Record Savings Account]	14 million (Kakao Bank)
6	Kakao Bank [One-Month Installment Savings]	14 million (Kakao Bank) *exceeds 8 million accounts
7	Toss Securities	3.84 million
8	Toss Bank [Stocks Attendance Event]	19.10 million (Toss Bank)
9	Toss Bank [Miracle Morning Challenge]	19.10 million (Toss Bank) *exceeds 1.1 million people
10	Banksalad [Receive allowance]	1.7 million
11	Monimo	5.24 million

12	My Routine	4.5 million
13	CHALLENGERS	1.09 million
14	Geniet	1.8 million users
15	RunDay	300 000
16	Yeolpumta	1.8 million
17	SumOne	3 million
18	NAVER Blog [Weekly Diary Challenge]	2.92 million
19	ToDoMate	600 000
20	Book Towers	110 000
21	MOODA	unknown *** 10,000+ downloads on the Google Play Store*
22	Market Kurly [My Kurly Farm]	3.07 million
23	Ohouse [Gardening Game]	3.47 million
24	Zigzag [Attendance Check Event]	3.7 million
25	Dr. Now [Point market]	1 million
26	Let's Get Rich [Attendance Rewards]	unknown *** 10,000+ downloads on the Google Play Store*
27	CashWalk	6 million
28	CashVoca	Unknown *** 10,000+ downloads on the Google Play Store*