PROBLEM AND SOLUTION OVERVIEW

We all struggle with waking up in the morning. When the alarm rings, our first impulse is to throw it against the wall and silence it. The problem is further compounded by the fact that many of us don’t get enough sleep in the first place. As a result, we often ignore the alarm and end up being late for appointments, or else we drag ourselves out of bed with a feeling of resentment. The initial task we sought to solve for was: How can we make the process of waking up more successful and enjoyable? Following our contextual inquiry and task analysis, we expanded our task definition to include going to sleep earlier and creating a healthy long-term sleep routine. Our current application idea going forward is a mobile app that solves for these tasks by incorporating a social element to sleeping and waking up: customers can see sleep indicators among a shared social group, and are greeted by voice recordings of their social group in the morning. We realized that part of the problem is that sleeping is a solitary activity; with technology, we can make it social.

CONTEXTUAL INQUIRY: CUSTOMERS & INDIVIDUAL RESULTS

We interviewed 3 subjects. Our goal was to understand the tasks they performed while waking up in the morning and how to help them achieve those tasks. Although we were instructed to sample from the larger population and avoid using Stanford students, we decided that the intimate nature of the tasks we were observing lent itself better to using people that we knew and who would feel comfortable letting us observe them in their bedrooms. Rather than simply interviewing strangers about their sleeping habits, we thought it was worth the tradeoff to observe people in their natural environment as they actually woke up, so that we could use the master-apprentice model of observation.

Michael. College student, 22 years old. He was observed in his room while waking up in the morning and subsequently interviewed. We chose Michael as an interview subject because he fit the profile of our target audience perfectly. He chronically oversleeps and has difficulty getting up in the morning. Michael has a class at 11 am each morning, so his strategy is to set 2 alarms for 8:07 and 8:15. After each alarm rings, he hits the snooze button multiple times for about 1.5 hours before he wakes up, then he stays in bed for about an hour before getting up because he feels “lazy.” Michael states that he only gets up on time if he “has something I deem very important.” In those cases, he will set multiple alarms to go off at 5-minute intervals. As part of his morning routine, sometimes he will check his phone or Facebook, which helps him wake up and be more alert. When we mentioned some of our ideas for wake up strategies to
him, he was intrigued by the idea of getting wake-up calls, but only from people he knows (not strangers).

Jennifer. Former finance professional, 36 years old. She was approached and subsequently interviewed at Stanford Shopping Center on a weekday morning. We chose Jennifer as an interview subject in order to experience diverse viewpoints beyond the typical college student, although we were not able to observe her waking up in her natural environment. Jennifer formerly worked in finance, but is not currently working. She lives with her partner and her daily activities include job searching and working on a house, so her schedule is very self-directed. Jennifer typically goes to sleep around midnight and wakes up at 8 am each morning. She does not use an alarm, and naturally wakes up around 8. Jennifer states that this routine helps her wake up and that she has “trained her body” and regularly gets enough sleep. She admits that previously, when she worked in finance, she found it harder to get up in the mornings because she often went to sleep late; even with her routine now, she occasionally oversleeps if she was up late the night before. When we mentioned some of our ideas for wake up strategies to her, she had a strong negative reaction to the idea of using penalties such as paying through Venmo or posting to a Facebook wall, saying this would cause her to delete the app. She responded positively to ideas such as playing a game or the phone reading a curated news feed aloud, saying that it would be positive and “adds something to the day.” She also liked the idea of a wake-up call.

Jack. College student, 20 years old. He was observed in his room waking up in the morning and subsequently interviewed. We chose Jack as an interview subject because he is a rare example of someone who wakes up consistently at an early hour, regardless of how late he went to sleep the night before. We were interested in observing the successful strategies that he uses. Jack has optimized the time he needs to get ready and go to class in the morning, so that it is consistently 20-23 minutes. Therefore, if he needs to be at class at 9 am, he will set an alarm for 8:40 and get up immediately when the alarm goes off because he knows he needs exactly 20 minutes. Jack uses a bird sound for his alarm, which he has been using for the past 8 years. He is accustomed to this routine, and does not deviate from it. While Jack is successful in regularly waking up on time, he stated that one thing he desires is to get more sleep. He frequently wants to take naps, and wishes he could go to sleep at an earlier hour, since he always gets up early and thus often does not get enough sleep. He wishes there were an app that would tell him when to go to sleep.

CONTEXTUAL INQUIRY: COMMON THEMES & GROUP RESULTS

After interviewing all 3 subjects, we noticed several common themes emerging:

- **Routine:** Both Jennifer and Jack mentioned routine as an important tool that helped them get up early. After repeatedly practicing a certain strategy for getting up on time, they were able to adjust their body’s natural rhythm.

- **Sleep earlier:** Even among those who typically woke up on time without difficulty, they expressed a desire for more sleep. In addition, we realized that the challenge of getting up early is intrinsically linked to the idea of getting more sleep, and thus going to sleep earlier. Without going to sleep earlier, getting up earlier was hard to achieve.
• **Solitary versus social:** For the people we interviewed, waking up is a solitary task. However, interviewees also expressed the desire for more social engagement: Michael checks Facebook sometimes and likes the idea of a wake-up call from someone he knows; Jennifer also likes the idea of a wake-up call or playing a game with another person.

We also got some useful feedback from specific interviewees:

• **Multiple alarms:** Michael uses multiple alarms going off at different times to help him wake up. From this, we inferred that the repetition of stimuli is important in helping a customer wake up; ten alarms is better than one. We took this into account when brainstorming ideas.

• **Punitive measures:** Jennifer had a negative reaction to the idea of Venmo or Facebook wall, stating that those made her feel stressed out and would detract from her enjoyment of waking up in the morning. We realized that while some of our initial brainstorming ideas focused on “brute force” measures to help people wake up, ultimately it would be more innovative and helpful to focus on positive reinforcement rather than punishing people.

These insights informed our task analysis and were ultimately used to help direct our brainstorming of potential application ideas.

**TASK ANALYSIS: STANDARD QUESTIONS**

In this particular case, the tasks being analyzed are extremely basic, straightforward, and universal. However, our contextual inquiry results showed that the devil is in the details: even with such basic tasks, performing them successfully is difficult to attain and customers use a variety of strategies to help them.

**Who is going to use the system?** Our original idea was that our app would be targeted toward people who have trouble waking up in the morning. After our contextual inquiry, we realized that the underlying problem is that people don’t get enough sleep or set a consistent routine. Therefore, we revised our target population to focus on people who have inconsistent sleep schedules.

**What tasks do they now perform?** Our customers currently have a very basic set of tasks that they perform: (a) go to sleep (b) wake up. Customers like Jennifer and Jack may also have an ultimate goal (c) to create a long-term routine for waking up. We can expand the definition of “task” slightly to include strategies for waking up, in which case we have observed that current tasks include setting an alarm (Michael), setting multiple alarms for important occasions (Michael), and minimizing time to get ready in the morning (Jack).

**What tasks are desired?** Customers expressed a desire to go to sleep earlier. Customers also expressed a desire to incorporate more social engagement into the process of waking up.
**How are the tasks learned?** Other than (a) and (b), the tasks are learned through daily trial and error. Over time, customers tried different strategies to wake up, learned which ones were most helpful, and then stuck with those strategies. Overall, however, customers were not sophisticated and devoted a low amount of time to developing strategies for waking up, and stuck to common methods like setting an alarm and getting enough sleep.

**Where are the tasks performed?** In bed.

**What is the relationship between customer and data?** In this case, we defined “data” as the success rate of getting up on time each morning. Under this definition, customers use data to help them successfully refine their strategies for getting up. For example, Jack has found that the bird alarm and minimizing his morning routine helps him wake up on time, so he has used the same method for 8 years.

**What other tools does the customer have?** Customers mostly used alarm clocks to help them get up. Other strategies included checking Facebook (Michael), relying on natural light (Jennifer), and putting a watch on the bedside table to indicate what time it is (Jennifer). Although none of the customers we interviewed currently use this method, another strategy is receiving wake-up calls (either from a person you know, or arranging it with a stranger through a mobile app).

**How do users communicate with each other?** One way users may communicate with each other is to talk about sleep strategies that worked for them and share those strategies with their friends. However, none of the customers we interviewed do this. Furthermore, we observed that waking up is currently a solitary process, and that people mostly depend on themselves to develop strategies. Even Jennifer, who lives with her partner, stated that they wake up individually and do not really converse in the morning. In addition, Jack has a twin sister who also gets up consistently in the morning, but they do not share sleep strategies or converse with each other.

**How often are the tasks performed?** Twice a day: going to sleep at night and then waking up in the morning.

**What are the time constraints on the tasks?** There is no time constraint in the evening. In the morning, the time constraint for waking up is dependent on whether the customer has a commitment in the morning that he or she needs to be at on time. For example, Michael stated that he will get up promptly if he knows there is somewhere important he needs to be.

**What happens when things go wrong?** When customers don't wake up successfully, they oversleep and may be late for appointments. For example, Michael says he often sleeps through his 11 am class. When customers don't go to sleep successfully, they often end up not getting enough sleep. Jack says that he often goes to sleep late but still wakes up for his 9 am class, then feels tired throughout the day.

**TASK ANALYSIS: OLD & NEW TASKS**
Based on the results of our contextual inquiry and task analysis, we identified the core tasks ("old tasks") that customers currently perform:

1. Go to sleep
2. Wake up
3. Repeat behaviors to create a consistent sleep routine

Based on the stated desires of the customers and our observations of how they behaved, we decided that our application would focus on helping them perform these core tasks better ("new tasks") as well as add one more new task:

1. Go to sleep earlier: make the sleeping process “enjoyable” and effective
2. Wake up on time: make the wake up process “enjoyable” and effective
3. Help customers create a long-term unbreakable sleep routine
4. Incorporate elements of social engagement into the sleep and wake up process

In addition, we focused on several criteria while brainstorming potential ideas:

- The sleep process should be **engaging**: interesting enough to pull them away from studying, surfing the net, chatting, whatever they are doing when they are supposed to go to sleep, but it also needs to be **relaxing**: at the end of the process, they should feel ready to fall asleep.
- The wake up process should be **engaging**: something valuable or interesting enough to pull them away from sleeping in, and **active**: at the end of the process, they should feel alert and awake.
- The wake up mechanism should also be **sustained**: something that cannot be easily dismissed or ignored like a single alarm.
- Both sleep and wake up processes should incorporate some measure of **social engagement**.
- Both sleep and wake up processes should be something that lends itself to being repeated daily, in order to create an **unbreakable routine**.

**APPLICATION IDEAS**

Based on the result of our brainstorming and the criteria above, we chose our three best application ideas.

**Social gaming.** Customers can set a desired sleep time and wake up time. At night, they receive a push notification from another customer saying “[X] has challenged you to play a game now!” The social element and the immediacy of the game is engaging enough to pull them away from whatever they were previously doing. The game is a simple casual game that is designed so that after finishing the game, the customer feels soothed and ready for sleep. (One example we came up with: A game to feed fish in an aquarium and watch them swimming around.) In the morning, they receive another push notification from another customer challenging them to a game. The excitement of playing the game is enough to rouse the customer from sleeping. This game is more active and designed to get them awake and alert,
such as Tetris or an action-oriented game. Over time, the desire to play the game creates a
routine for the customer.

**Curated news feed with voice over.** Customers can choose one of two modes: news or social feed. In the news mode, they indicate which websites they like to read, what topics they are interested in, and vote up or down on some example headlines. Based on this information, the app curates a feed of news stories they might be interested in, focused on those with attention-grabbing headlines (e.g. “Ebola discovered in Minneapolis! Airports shut down this morning!”). In the social feed mode, customers indicate which social or messaging apps they use (e.g. WhatsApp, Skype, Facebook) and link our app to those accounts. Based on this information, the app puts together a feed of unread messages from friends (such as messages sent overnight from friends in different time zones) and notable items from Facebook (friends who just got engaged, status updates with 100+ Likes, photos posted from exotic locations). In the morning, at the customer’s desired wake up time, the app will read the news feed or social feed out loud. This idea is appealing because it’s personalized, curated, and adds valuable information to help the customer start their day. For this idea, there is no corresponding component at sleep time.

**Sleeping as a social activity.** The goal of this idea is to incorporate group dynamics into the activity of sleeping and waking up, in order to encourage healthier behavior as a group and make the process fun. In this app, the first step is for customers to form a “cloud,” a shared social group that participates in sleeping and waking up together. In the evening, as each member of the “cloud” goes to sleep, he or she taps a giant red button saying “drop off.” The “cloud” continually receives notifications as more and more members drop off, and the status of the group is indicated through some visual method such as an animation or a dimming light that is connected to the phone. These social cues help encourage a customer to go to sleep, and the visual cues pull them away from whatever they are doing at the moment. In the morning, as each member of the “cloud” wakes up, he or she records a short voice message or greeting (e.g. “Hey guys! Rise and shine!”). As members of the “cloud” wake up, they hear all these voice messages played in succession (“Dude, wake up.” “Seriously dude, I know you’re still sleeping.” “I’m hungry. Breakfast?”). This provides an engaging and social stimulus to help people wake up. It also mirrors the natural dynamics that occur when a group wakes up together, for example when people go camping, travel together, or have sleepovers. To keep things interesting, after a few days, instead of members just recording a voice greeting, the app will introduce “questions of the day” that members will record answers to and that are played to the group (e.g. “What’s your favorite food?” “What music are you listening to right now?” “Snap a picture of what’s outside your window.”). Although this app idea is a little out there, it is also compelling because it extends already existing behavior: people already incorporate social activity into their wake up routines by checking Facebook and relying on wake up calls from friends and family; we provide a way to scale that behavior using a technology platform.

Below, we ranked our app ideas on several criteria. In addition to the ones mentioned in the homework spec, we also rated the ideas on level of innovation as that factor contributed to our interest level.
<table>
<thead>
<tr>
<th></th>
<th>Significance</th>
<th>Feasibility</th>
<th>Interest</th>
<th>Level of innovation</th>
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</thead>
<tbody>
<tr>
<td><strong>Social gaming</strong></td>
<td>MEDIUM: Helping people sleep &amp; wake up better is a daily activity that has significant health benefits</td>
<td>LOW: Hard to create the perfect game, involves many little details, hard to do as a quarter-long project</td>
<td>MEDIUM: It would be fun to create a game</td>
<td>MEDIUM: Many social games already exist but this is a novel application</td>
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<tr>
<td><strong>Curated social feed</strong></td>
<td>MEDIUM: Same as above.</td>
<td>HIGH: Easy to create a first pass prototype that just pulls in selected news stories or social feeds</td>
<td>MEDIUM: Universally appealing idea with high chance of success</td>
<td>LOW: Many news and aggregation apps already exist, this just sets it to a particular time</td>
</tr>
<tr>
<td><strong>Sleeping as a social activity</strong></td>
<td>MEDIUM: Same as above.</td>
<td>MEDIUM: The technical implementation is straightforward but we need to hammer out lots of details</td>
<td>HIGH: Innovative and a little out there, interesting UI challenges</td>
<td>HIGH: A novel way of making sleeping and waking up into a social activity</td>
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Ultimately, we chose to pursue the app idea of **sleeping as a social activity**. This idea fulfills all of the criteria we have listed above: the activities are engaging, sustained, and incorporate social elements, and in the long-term it has the potential to create an unbreakable routine. Furthermore, the team is excited about pursuing this idea since it is innovative and presents interesting UI challenges to work on: how would customers define their groups? how would the group feed be represented and through what mediums (visual, audio)? what kind of prompts would we give customers in the morning? Finally, as stated above, the app uses technology to augment behaviors that already exist, so it is a compelling idea and we are excited about the potential for it.
Interface #1. Customers can define what people they want in their “cloud.” They make voice recordings when they wake up, which are played to other members of the “cloud.” The app also shows a performance summary to the group.
IF YOU FALL BACK TO BED AFTERWARD...
- Motion sensor/wearable can detect this
- Friends on your cloud will be alerted!

SWIPE

performance Overview

SWIPE and see historical data

Wow, WHAT A LOSER!
Interface #2. In the evening, customers push a button indicating they are going to sleep, and other members of the “cloud” receive notifications and a visual animation. In the morning, customers record voice messages which are all played at the same time so they get louder and louder in real-time, as if they are having a virtual conversation.
MORNING:

When you wake up

8:04 AM

YOU'RE AWAKE!

8:04 AM

HOLD TO RECORD

everyone else in "cloud"

8:10 AM

Hey girl, it's a beautiful morning!

8:15 AM

what's up handsome?

8:17 AM

I know you're still sleeping!! wake up

8:18 AM

what are you working on today?

Hi!!!!

I love you all. Today is AWESOME
Interface #3. We create a special power adapter than any lamp can plug into and which connects the lamp’s level of power to our mobile app. When customers wake up in the morning, they indicate they are awake, causing the lamp to grow brighter.
Interface #4. Compete to see who goes to bed first. Sleep time is tracked by a wearable device.