KAIROS

VISUALIZING CONSEQUENCE AND NURTURING CONFIDENCE

A thesis submitted to School of Design, Carnegie Mellon University,
for the degree of Master of Design in Interaction Design

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TABLE OF CONTENTS

ABSTRACT 3

1. INTRODUCTION 4

2. LITERATURE REVIEW 5

3. USER RESEARCH 15

4. SYNTHESIS 22

5. IDEATION 28

6. FINAL DESIGN 39

7. CONCLUSION 50

8. REFLECTION 51

9. ACKNOWLEDGEMENTS 52

10. REFERENCES 53

ABSTRACT

Kairos is a desktop application and web service that facilitates interaction between counselors and university students suffering from procrastination. The application employs a goal and feedback structure to help graduate students overcome procrastination. It encourages students to become more effective workers by visualizing the consequences of their actions, and through building confidence through a series of achievements. For counselors, Kairos provides management tools for multiple students' schedules, and gives timely feedback to each student about their achievements. Kairos was developed through research on behavioral and educational psychology, and through user interviews with self-identified procrastinators. BJ Fogg's behavior model (Fogg, 2009) serves as a theoretical framework for resolving the procrastination problems that the project addresses.

Through the research and synthesis phase, two types of procrastination and the core reasons — the fear of failure for decisional procrastination and avoidance as passive defiance for behavioral procrastination — were identified and because I found that these reasons are rooted in the social realm of one's identity, the suggested solution was focused on facilitating one's social interaction with other people. Two keywords—consequence and confidence — were selected as symbolic terms for current and future sources of motivation that will help people avoid procrastination.

1. INTRODUCTION

Throughout history, procrastination has hindered people from accomplishing their work in a timely manner. People often find it hard to start working on a project when it is first assigned to them. This is due to people's perception that they have "plenty of time," and because our brains are hard-wired to both avoid pain and seek comfort. Due to the lack of long-term vision — metacognition — and the desire for instant gratification, procrastinators can find it hard to persuade themselves to focus on their work. When given access to so many sources of instant gratification, such as social network services, online video services, and online gaming, procrastinators can find their own work environments — their laptop computers — becoming a source of of distraction rather than of efficiency. Therefore, it takes long time — often until the deadline looms — for a procrastinator to feel a sense of urgency that motivates him to start working. Eventually, the vicious cycle of procrastination underscores a track record of failures that reinforces the negative self-image of oneself as a "procrastinator," undermining one's confidence and self-esteem.

The intensity of the academic environment brings procrastination issues to the forefront. Graduate students, who have their own self-guided projects for multiple years, suffer greatly from procrastination because they tend to have a false sense of security at the early stages of the project. Procrastinating graduate students also actively look for ways to avoid early and direct engagement with their biggest task — a dissertation, for example — because laying the foundation of a big project is frequently perceived as the hardest part. Consequently, after a considerable amount of time passes, a procrastinator realizes that the deadline has crept up on him, and finally he becomes motivated to start working. Because he needs to cram a lot of work into a considerably smaller amount of time, he tends to sacrifice his sleeping and rest schedules, or social life, to complete his work on time. This lifestyle harms a student's physical and social well-being, and is not a sustainable behavior pattern. What if a student were able to foresee how tough the crunch time will be before the last minute has arrived? What if he could be motivated by the achievement of a goal itself, rather than through the sense of urgency created by an approaching deadline?

2. LITERATURE REVIEW

Due to the psychological implications of procrastination, much of this project's related research was done in the discipline of psychology. This research focused mainly on identifying the causes and typology of procrastination. To develop the project's framework for behavior change, I looked at HCI (Human-Computer Interaction), interaction design, and service design literature. Lastly, I reviewed project management methodologies and process theories in an effort to learn more about planning, executing, and completing project plans, as well as tracking a project's progress.

2.1 PERSPECTIVE ON TIME

2.1.1 past, present and future

Philip Zimbardo's study (Zimbardo, 2008) was relevant to this project, because it demonstrates how people's perspectives on time — across different cultures and personalities — affects their attitude toward life. This study identifies core factors that affect people's decision-making processes, which lead to their procrastination. Zimbardo asserts that despite how people live in the same absolute time, there are six different time perspective factors that affect their notion of time: past positive, past negative, present hedonism, present fatalism, future life-goal oriented, and future transcendental. If one has a high tendency towards Present hedonism, as opposed to Future life-goal oriented, for instance — most decisions one makes at the present moment will not take into consideration future implications. As a result, he will be likely to suffer the consequences of his current choice in the future. An example of this can be seen in a drug-addict indulging in maximizing pleasure at the current moment, at the expense of his physical and financial well-being in the future. Dr. Zimbardo argues that the optimal time perspective profile is moderately high in Future life-goal oriented, moderate in Present hedonism, moderately high in Past positive, and low on both Past negative and Present fatalism. He also pointed out that Past negative and Present hedonistic people tend to

sacrifice family, friends and even fun activities when they are busy — but in fact, these are the most critical elements to social and psychological health (Zimbardo, 2008). Because quite a few examples of procrastination were highly related to excessive Present hedonism, this made me reflect on how my design could help procrastinators be more oriented toward Future life-goals, helping them to realize the consequences of their current choice of action.

2.1.2 Delay of gratification

During the "Stanford Marshmallow study" (Mischel, 1972) and its follow-up study (Shoda et al., 1990), 4-year old children were given two options of eating a marshmallow at the moment, or waiting to eat it, and get another marshmallow later. The children who resisted the temptation of eating the marshmallow immediately, and gained the second piece as the reward. Later it turned out that those who were able to delay instant gratification scored significantly higher in Scholastic Aptitude Test (SAT) when they grew up (Shoda et al., 1990). This study demonstrated that people with an ability to delay immediate gratification in the expectation of gaining a greater benefit in the future performed better academically. This helped me realize that the service I designed should help people nurture this ability.

2.2 PROCRASTINATION

2.2.1 Procrastination typology

Linda Sapadin's work to identify the six types of procrastination was very influential in my designing process. The characteristics of the six types are as follows: Worriers who are afraid of the uncertainty that lies ahead, perfectionists who want everything to be perfect to the detail, Dreamers who love dreaming of big ideas, but hate the actual work of realizing these ideas, Defiers whose procrastination takes the form of defying authority figures they don't agree with, Overdoers who take more work on than they can handle, and

Crisis-makers who seek fun, avoid pain, and are motivated to engage in their work only when the deadline looms (Sapadin, 1996).

2.2.2 Decisional and behavioral procrastination

The classification of procrastination into two categories — decisional and behavioral procrastination — (Orellana-Damacela et al., 2000) was reaffirmed by Solomon's work, which identified the fear of failure and task aversion as two main factors that accounted for most of the variance (Solomon et al., 1984).

The fear of failure accounts for the main reason for decisional procrastination, whereas task aversion can be associated with the core reason for behavioral procrastination. To apply these two factors to the aforementioned procrastination typology, worriers, perfectionists, and overdoers can be considered as those with decisional procrastination, whereas Crisis-makers, Dreamers, and Defiers can be regarded as behavioral procrastinators. As Joachim Stober's work revealed, worry in the context of procrastination is rooted in perfectionism, and parental criticism and expectations (Stober et al., 2001). Worriers and Perfectionists are the flip side of the coin, because they are sensitive to the evaluation of their performance. Consequently, they hesistate to move onto the next phase of work, which is characteristic of decisional procrastination. On the other hand, behavioral procrastination — task aversion as a behavior pattern — is exemplified in the behavior of Crisis-makers and Dreamers.

Proving Voltaire's quote, "The better is the enemy of the good," having additional options induces procrastination. This notion of procrastination is underscored in Ted O'donoghue's study. This study demonstrated that people tend to procrastinate more when they pursue important goals than when pursuing unimportant ones (O'donoghue et al., 2001). This finding was applicable to the decisional procrastination personality type, who always strives to look for better options because they don't want to fail in their big,

important goals. Gordon L. Flett's work added a social dimension to this matter by identifying other-oriented and self-oriented perfectionism as the main reasons for procrastination (Flett et al, 1992). Also remarkable is Ferrari's observation that a task induced procrastination only when it was labeled as evaluative — not when the identical task was regarded as an activity for fun (Ferrari et al., 2000).

This notion of "the fear of failure" has been reaffirmed in Neil Fiore's work as the core reason of procrastination. His suggested solutions to procrastination, such as creating a "safety net" to reduce the fear of failure and help bounce back from the mistake, being realistic in goal-setting, and time scheduling that employs the "unschedule" method, affected my design process significantly (Fiore, 1988).

Quite a few scholars viewed behavioral procrastination as a subject of pathology (Akerlof, 1991). It is tied to the concept of self-handicapping, which is the process of people's avoiding effort in order to keep themselves from hurting their self-esteem (Kolditz, 1982). Joseph Ferrari was one of the first to relate procrastination with this defense mechanism of self-handicapping (Ferrari, 2000). Steel also summarized the nature of procrastination into quintessential self-regulatory failure, identifying key factors as task aversiveness, task delay, self-efficacy, and impulsiveness. From this work I encountered a concept named "hyperbolic discounting" that was very intriguing (Steel, 2007).

The term "hyperbolic discounting" originates from behavioral economics. This term refers to people's tendency to discount the future hyperbolically (Loewenstein et al., 1992). When given two rewards that are similar in value, people will show strong preference for an immediate payoff over one in the future — and they will discount the value of the reward coming later inconsistent with regular time discount rate (Frederick et al., 2002). In the context of procrastination, this explains how people overestimate their ability, and underestimate the time required for finishing the given task, thus justifying

their choice to procrastinate in lieu of starting work on the task. The concept of hyperbolic discounting is rooted in other theories called "time discounting and time preference" (Frederick et al., 2002), Picoeconomics (Ainslie, 1974), and "Intertemporal choice" (Berns et al., 2007).

George Akerlof's work also demonstrates the systematic trap people fall into when procrastinating, due to their lack of appreciation of how their current choices will affect their future behavior. Akerlof refers to this behavior as "repeated errors" (Akerlof, 1991). I found this argument to be connected with Zimbardo's work demonstrating how one's lack of vision about future consequences is due to their difference in time perspectives (Zimbardo, 2008). This again pointed to a strong need for a tool that helps people visualize the consequences their current actions.

2.2.3 The effectiveness of one's self-help

Among the literature that mentioned one's possible level of influence in eliminating procrastination, Ariely's work caught my attention. He argued that self-imposed deadlines are not as effective as externally imposed ones (Ariely, 2002). This underscores the need for external intervention in solving the procrastination problem. This is related to the "trigger element" in BJ Fogg's behavior model — an external intervention measure from the system that chimes in just in time to remind one of performing the desired behavior (Fogg, 2009).

I found positive news in Ariely's work: people who recognize and admit their weakness have higher chances of overcoming procrastination by actively utilizing available tools (Ariely, 2009). I found this argument is related to the contemplation stage in Prochaska's "Stages of Change" model. This is the moment when one realizes one's problem, and decides to improve their situation to solve the problem (Prochaska et al., 1983).

2.2.4 Design's role

After reviewing literatures related to procrastination, I came to consider what role design can play in this problem space. In order to address procrastinator's overestimation of time and ability they have and underestimation of the time and effort required to get a task done, design can dispel their wishful thinking by data visualization to help them see their actual resources. I made a conclusion that design's role is to create a systematic guidance that can counter the systematic trap in order to empower procrastinators to avoid systematic trap they usually fall into.

2.3 IDENTITY

Because of the relationship between self-esteem and procrastination (Kolditz, 1982), I examined identity theories and self-discrepancy theory (Higgins, 1987).

Self-discrepancy theory states that there are discrepancies between self-state representations that consist of the combination of one of the three domains of the self (actual, ideal, ought), and one of the two standpoints on the self (own, or significant other) (Higgins, 1987). Research showed that discrepancies between actual-self and ought-self — from the standpoint of the own — causes procrastination, and a defense mechanism manifests itself in avoidance (Orellana-Damacela et al. 2000). I found this concept of "ought-self" helpful, because often we discuss the discrepancy between our actual-self and ideal-self, but spend little time thinking about the "ought-self." The "ought-self" implies an expectation, role, duty, responsibility, or obligation imposed on oneself by the society for its benefit. Consequently, the person's avoidant reaction symbolizes their passive defiance. This is related to the "Defier" from Sapadin's six types of procrastination, which can be seen as a more intense manifestation of the defying sentiment related to the imposing of ought-self on a person who is not trained to take on that role (Sapadin, 1996).

Because the core reasons of procrastination — the fear of failure for decisional procrastination, and avoidance as passive defiance for behavioral procrastination — are rooted in the social realm of one's identity, the solution needs to come from one's social interaction with other people.
Among the behavior change theories that I researched, two were most relevant to my work: BJ Fogg's behavior model (Fogg, 2009a) and Prochaska's Transtheoretical model (Prochaska, 1983). I focused on Fogg's model as the main framework for my design.

2.4 BEHAVIOR CHANGE

BJ Fogg's model identifies three elements as the key factors of behavior change: motivation, ability, and trigger. In order for a behavior to take place, all of these three factors should be present simultaneously (Fogg, 2009). In the course of the project, I customized these factors into ones specific to the context of procrastination, such as the ability to measure the lapse of time, or the motivation to start working on a task, among others. I strongly agreed with Dr. Fogg's argument that the role of triggers has become more important as technology rapidly advances — a trigger that conveys the same message could have different forms of manifestation, such as a text message, an email, or an online video. Additionally, it could serve different functions such as a spark, facilitator, or signal (Fogg, 2009). Because inducing impulsive behavior is one of the traits of triggers (Fogg, 2009), I was able to see the crucial role it could play on people with behavioral procrastination, since these people are easily influenced by external stimuli. In many cases, those stimuli work as a counter-productive trigger. For example, email notification chimes distract people from the task they are working on, or news feeds of social network services keep them from going back to work by stimulating them with new content — thus prolonging the duration of procrastination. However, if the trigger is well-designed and persuasive, people with behavioral procrastination could be encouraged to break away from procrastination and start working on their task.

2.5 INTERACTION DESIGN

Dewey's definition of having "an experience" is as follows: an experience has a clear start, end, and a climax. The subject undergoing that experience also undergoes transformation of self on the way (Dewey, 1934). Dewey's description of experience was a great influence on the design of this product—it should provide people with an experience through which they transform into people with improved ability to overcome procrastination. It also helped me identify the current problem with people's behavior patterns when engaging in distraction. Unlike a movie or a TV show that has a clear start and end, web surfing — one of the most common forms of activity people do while procrastinating — doesn't have a clear-cut initiation and termination of the experience, so people tend to linger even when it is time to go back to the task.

The product ecology theory was a great reference for me to think about what the roadmap of my product would be. Being a theory about understanding social product use, it gave me an opportunity to think about people, product, environment, interactions and the ecology the product has that encompasses all the elements mentioned above (Forlizzi, 2007). This theory played a crucial role in my decision to create concrete context of use for my product, which came to be a service that helps interaction between the university counselors and Ph.D students suffering from procrastination issues.

Aspects of time that are emphasized in this theory also had a huge influence on me. The notion of people's changing needs over time, and the dynamic and evolving changes of each factor in the ecology of the product, helped me plan out different phases of the product that have a different "face" and "voice" toward users adapting to their evolving efficacy and changing needs (Forlizzi, 2007).

2.6 PROJECT MANAGEMENT METHODOLOGY

Edwin Locke's study on goal-setting identified the importance of specific and challenging goals in achieving great performance. Sufficient feedback regarding progress, sufficient ability of the individual, support from managers, rewards for achievements, and the acceptance of assigned goals by the individual were also crucial in realizing the goals. Most outstanding of the individual variables were the need for achievement and self-esteem (Locke, 1981). I was able to identify how these findings are related to BJ Fogg's behavior model: the need for achievement, rewards and specific goals are the motivation factor, sufficient ability of the individual is the ability factor, and sufficient feedback and manager's support are trigger factor (Fogg, 2009). The fact that one's agreeing to accept the goal and the amount of self-esteem affecting the result was also very remarkable. This implies the importance of minimizing the possible defiance or avoidance of the individual against the assignment of the goals — imposing an ought-self role (Higgins, 1987) — from the organization he or she belongs by a participatory goal-setting process.

SMART (Specific, Measurable, Attainable, Results-oriented, and Time bound goal) goal-setting (Kelleher, 2003) needed to be the service the product I design should provide. Since people suffering from procrastination initially don't have goal-setting ability, I envisioned university counselors working with them and co-design the goals.

David Allen's Getting Things Done framework (Allen, 2001) was also very influential to my design in terms of its emphasis on one's own perspective on tasks gained from periodic review on one's performance. Creating a trusted system for dumping one's to-do list items and achieving worry-free status by emptying one's cognitive cache suggested the importance of building a system that provides users with the ability to set sequential goals in advance and with just-in-time triggers when it's about time for them to take action (Allen, 2001).

David Allen has some interesting remarks on procrastination in his book Getting Things Done. In the sub-chapter called "Why Bright People Procrastinate the Most," he described how the nervous systems of creative and intelligent people are sensitive to the extent that they can respond to well-imaged thoughts as if they had happened in reality. Because their sensitivity can simulate all the possible negative experiences related to a challenging task before they actually go through it, these people are often hesitant to take "the leap of faith" to start working on this task. Many times, it's insensitive people that don't procrastinate because they don't try to be aware of what could go wrong, and just plod forward. Allen's suggested solution of "intelligently dumbing down your brain by figuring out the next action" made me think about how my product can lessen the cognitive overload of users by providing them with clear action steps (Allen, 2001).

Scrum development process (Schwaber, 2002) influenced me a lot to think about how to chop down a big goal into actionable sub-goals. Its metaphor of backlog as a pile of mini-goals, and of sprint as a process driven by limited time were very effective. I decided to find a way to apply these metaphors to my design (Schwaber, 2002).

3. USER RESEARCH

My user research session took the form of one hour sessions where participants completed qualitative user interviews and Make Tools sessions (Frascara, 2002). The interviews followed the directed storytelling method as described by Bruce Hanington (Hanington et al. 2012).

3.1 INTERVIEWS

I interviewed 6 self-identified procrastinators, recruited from different departments of Carnegie Mellon University. They were masters and Ph.D students, all of whom had a self-guided project such as thesis or dissertation to complete.

During each interview, I asked participants to relay a story about the last time they had procrastinated. After recording their emotional account on the subject matter, I moved on to asking questions generated from my literature review: What is the hardest part for you about overcoming procrastination? If you had 3 wishes for features of a product or service to overcome procrastination, what would they be? I asked these questions in an effort to capture participants' gut feeling about the problem space, similar to speed dating (Davidoff et al., 2007).

Because the university counseling service was one of the contexts I was considering for Kairos, I also interviewed one of the counselors at Carnegie Mellon University's CAPS (Counseling and Psychological Services) and performed observations there. The counselor said a lot of graduate students come to get a counseling support regarding their procrastination issues. He said his two main roles are to give them emotional relief and to set up regular meetup time with them to ensure they make progress between meetings. Among his comments about his work, I found his mentioning of his simple presence affecting the performance of procrastinators very remarkable. I also thought it would be great if a counselor could interact with procrastinators even without physical meetings through a communication channel.

I categorized my findings from the interview sessions using motivation, ability and trigger from BJ Fogg's behavior model (Fogg, 2009):

3.1.1 Motivation

"False security" prevents an early start

One of the strongest findings was that almost everyone talked about their struggles with a sense of "false security" at the beginning of a project: feeling like they have a lot of time so they don't have to start working right away. A couple of participants identified starting their work at the beginning of a project as the hardest achievement in terms of procrastination. Based on my literature review, I was able to identify hyperbolic discounting (Loewenstein et al., 1992) as the main reason for this phenomena. A possible design solution to this matter seemed to be demystifying this unrealistic belief by showing the target audience clearly the evidence that they don't have as much time as they think.

Deadline as the strongest motivation

These procrastinators tend to prioritize work according to deadlines and didn't seem to take the initiative of starting their work until the deadline is near. Therefore deadlines turned out to be the strongest motivation. However, the problem is by the time they see the deadline is near, it's already after they have idled away a big amount of time. This encouraged me to think about devising a way to give procrastinators an "early warning" for upcoming deadlines.

The benefit of starting the work early

Getting things done well ahead of a deadline was perceived as having little or no value. However, one participant mentioned that once the project gets a significant amount of momentum, it moves toward the goal almost by itself and she feels like she only takes the control of steering wheel instead of her pushing the project through toward the finish line. Therefore I came to think about how I can motivate the target user group to start their work early and enjoy the benefit of it.

Reward as deferred gratification

Participants showed a tendency to enjoy the time they have at hand now rather than enjoying it later, just like the children from the "Stanford Marshmallow Study" who ate the marshmallow at hand right away rather than waiting for the bigger reward that was promised for later (Mischel, 1972). This is where the concept of reward as deferred gratification comes in so people can start work now with the hope of enjoying the reward later. Making the reward feel tangible enough so it can motivate people seemed to be crucial part of the design.

The big goal

One effective method used by participants to stop procrastinating and get back to work was to think about their big goals. Because they all made their own choice to come to graduate school, at one point they were very passionate and ambitious about academic achievement. However, it seemed that their passion became lukewarm as they stayed at school for more than a year. If their passion about their big goals could be rekindled, it would serve as a great source of motivation.

3.1.2 Ability

Emotional relief

From the expert interview, I learned that students who suffer from procrastination often have serious emotional issues. Because they don't have the ability to become "unstuck" from their situation and get out of the vicious circle of low self-esteem by themselves, my design should be able to provide this support. Since this job of emotional relief has been done best by counselors and the technology isn't there yet to provide support matching that quality, I decided to include counselors as the providers of my service at the beginning of the customer journey (Zomerdijk, 2009).

Training for keeping focus

Even after participants got to work on their task, they had a hard time dealing with distractions that tempted them to take breaks. However, what they didn't realize was that a lot of the activities they think of as "break" or "play", such as surfing the web, are in fact distractions, not rest. The fact that they continue to use their laptops for both work and play hindered them from getting a complete separation from the work at hand. This gave me two thoughts; the first one was that I could give the users of my product a reminder to take a break regularly, away from the computer, and the second one was that my product could be placed within the computer's desktop UI — desktop widgets or menu bar apps for example — so it can reach out to the users while they are engaging in a source of distraction such as web surfing.

Even though they tend to fall for distraction easily, most of the participants have tried to keep themselves from the temptation of distraction by using different tools and methods. The most common method used was the Pomodoro technique (Cirillo, 2006), a technique to structure work time into a series of two modules : work module for 25 minutes and break module for 5 minutes. I responded strongly to this idea of creating a rhythm in the work process by implementing a regular sequence of work and break module. However, some participants complained that getting an alert to take a break every 25 minutes disturbed them and broke momentum. This made me think about either making the work module much longer than 30 minutes or giving users the flexibility of changing the length of work module.

Milestone-setting

Surprisingly few participants set up a plan before starting a project. One participant said he prefers "going with the flow" than having a plan for his work. Another participants said he doesn't keep a to-do list, but tries to memorize all the things to do, and as a result a lot of mistakes were made.

Even though some participants tried to make a detailed plan for their project, it turned out that many times they are troubled by the difference created

between the original plan and the actual execution along the course of the project. Because a lot of times there are unexpected events making their way into participants' daily schedule, plans that are set up in very detail usually didn't get abided by and a lot of work got postponed to days later. This discrepancy seemed to cause a lot of stress to participants and deters them from making any plans if this happens repeatedly. It also seemed to lower their confidence in managing their schedule significantly.

This is where the Scrum methodology (Schwaber, 2002) might come into play. Its sprint and milestone structure would provide the target audience just enough constraints to structure their work, but would still give them flexibility in executing the plan because it lets its users control their own pace as long as they get the work done within the given milestone (Schwaber, 2002).

I deemed bringing the concept of milestone to planning helpful for the target audience with perfectionist procrastination (Sapadin, 1997) who usually takes too much time at one phase of the project and doesn't move on to the next step.

3.1.3 Trigger

Persuasive trigger

Many participants got notifications or advice from either an app or their loved ones, but they seemed to become resentful of the manner in which these messages were delivered to them. As observed in my literature review phase, behavioral procrastination is a manifestation of defiance against others' imposing an ought-self on the person who procrastinate (Higgins, 1987), therefore there is the need for persuasive triggers that persuade them into get back to work while their egos still remaining intact. I found this is why visualizing consequence in a very neutral tone and manner rather than approaching them with an imperative rhetoric would the best because it will bypass the danger of imposing them an unnecessary burden of ought-self

(Higgins, 1987) and entice them into paying attention to the consequence out of their own will.

Community support

I was able to reaffirm the argument in the literature that self-reward or self-imposed deadlines didn't seem to work very well for most people (Ariely, 2002). Interestingly, one participant said that she got over her procrastination by working with her friend to police one another and cross-check their work performance frequently. Again this verified my hypothesis that the solution needs to come from one's social interaction with other people due to the fact that the core reason of procrastination are rooted in the social realm of one's identity.

3.2 MAKE TOOLS SESSIONS

Using colored pens and a sticker sheet that has keywords generated from the literature review, participants were asked to make their own mental model of procrastination. Most participants made a visualization of their work process, but a couple of them created a static diagram. The ones that represented their typical work process showed a very similar pattern. To highlight the word sticker they used, most of them start their project by setting up a "goal" and "plan", and instead of starting their work "right now", they feel they have a lot of time so they decided to start their work "later". It's the moment when the "deadline" looms that they realize that it's about time to start working. While they work, "distraction" comes in and they give in to indulge in it. Later when they realize they spent too much time engaging in the distraction, they start developing "anxiety" and worry about "criticism" from self or others. This process eventually undermines one's "self-esteem".

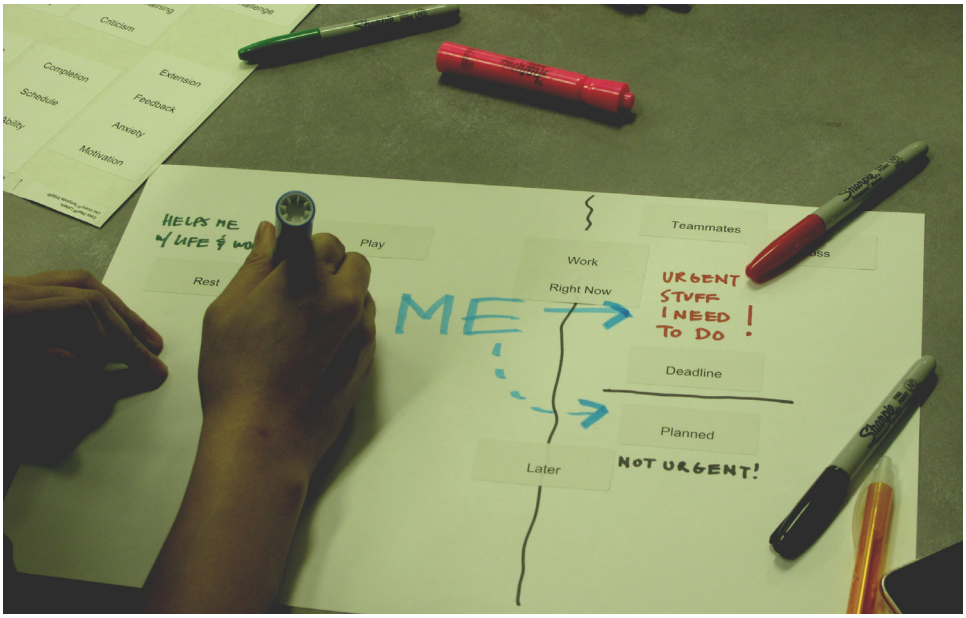


Figure 1. A participant making a collage using give Make Tools (Lee, C. 2012)

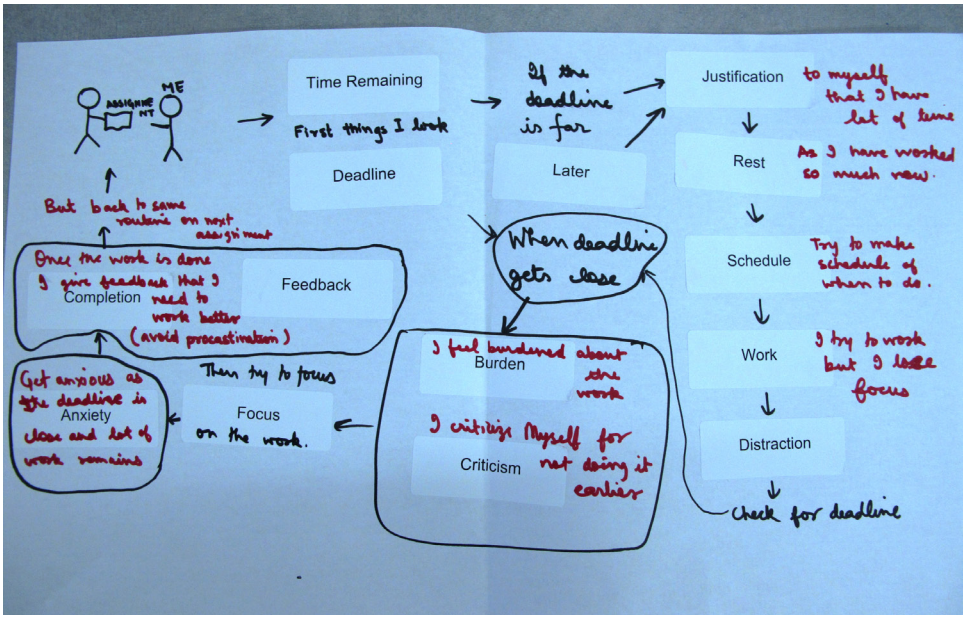


Figure 2. An example of collages generated by partcipants (Lee, C. 2012)

4. SYNTHESIS

4.1 TYPOLOGY

Based on Sapadin's six types of procrastination (Sapadin, 1997), Fogg's Behavior Model (Fogg, 2009) and my user research, I made a typology map of procrastination types as below. Because I was able to identify four procrastination types clearly, I placed the actual quotes from the participants that showed the characteristic of dreamer, perfectionist, crisis-maker and worrier. At this point I decided to design personas for each identified type and set them as my main target user groups.

Figure 3. Procrastination typology (Lee, C. 2012)

4.2 CONCEPTUAL MODELS

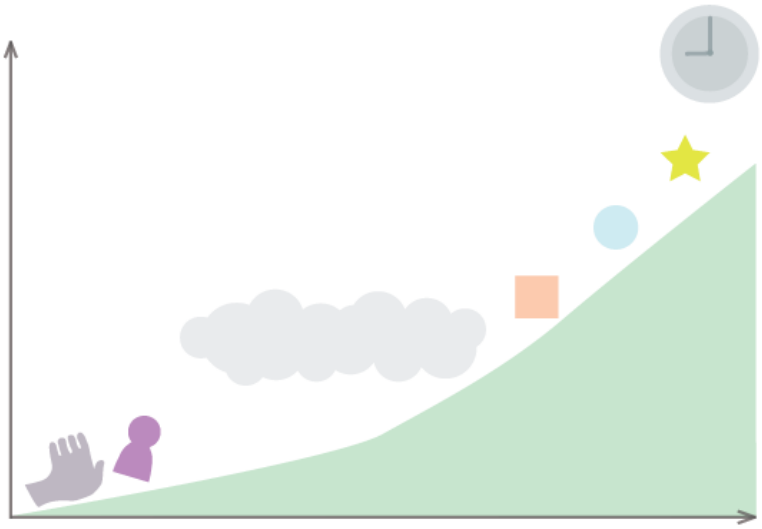


Figure 4. Current state conceptual model (Lee, C. 2012)

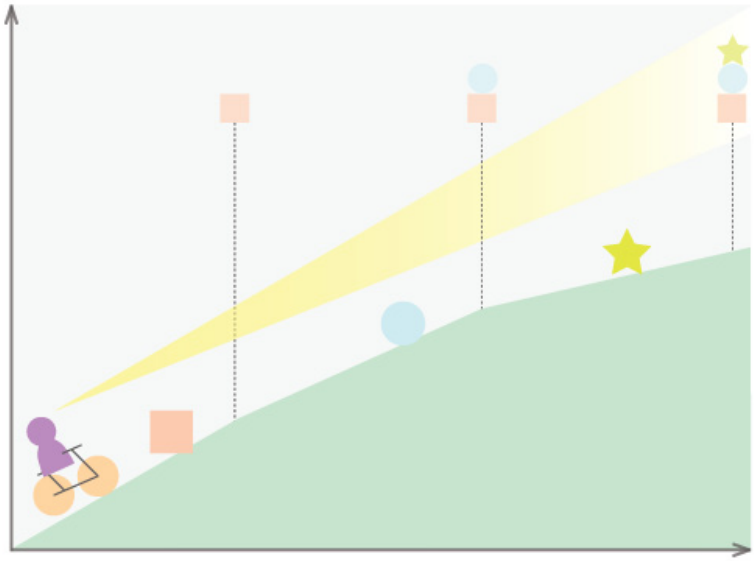


Figure 5. Future state conceptual model (Lee, C. 2012)

As a part of the synthesis process, I created the conceptual models of the current and ideal state of the problem space as follows.

The current state is characterized as a "lack of control and vision". People with procrastination issues feel like they are doing their work out of coercion from an outside authority, not out of their own will. Their biggest motivation to start work is the wake-up call moment when they realized that the deadline is very near. Their wishful thinking — represented as a dark cloud and the steepness of slope that is moderate at the beginning — distorts their ability to see the reality of how much time they have to do their work. Procrastinators don't perceive the final outcome as an accumulation of multiple milestones, not to mention that they are not ready to appreciate the benefit of iteration. When the big wake-up call comes, they hurriedly start working on their task but the amount of work is excessively huge, therefore they work very hard to the extent of reaching their physical and mental capacity, just like having to climb up the steep hill at the end of the project.

The future state is characterized as "reinstated feeling of control and vision". Procrastinators will be able to overcome their procrastination by using the product I design and they will be able to see the whole project as the sum of multiple milestones. The milestones will also serve as mini-deadlines to space out the sense of urgency through the project process rather than coming as a big explosion of urgency at the end. They will also indicate the clear distinction between each phase of the project that will prevent them from lingering on one phase too long. As for the workload, it will be distributed relatively equally, therefore the steepness of the slope will have a regular increase rate. In terms of motivation, people will be motivated by seeing the clear vision of the final outcome along with the vision of the next step to take. Eventually people will transform into active agents that makes a difference in every moment throughout the project rather than saving up the work until they can't stand it.

4.2 MY ARGUMENT

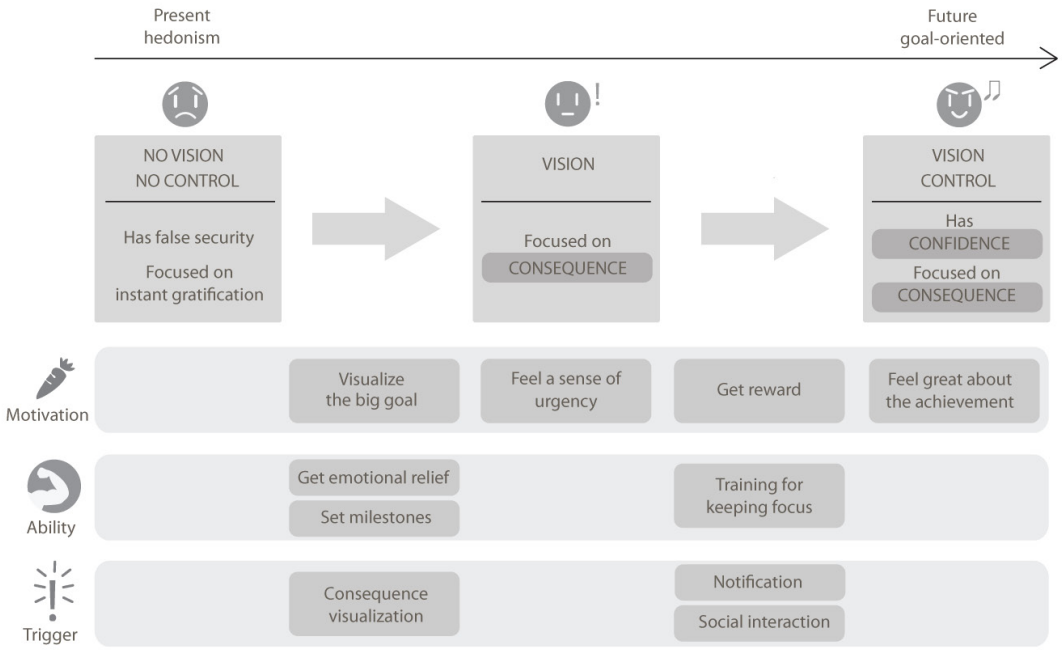


Figure 6. My argument diagram showing the framework and opportunity areas (Lee, C. 2012)

People suffering from procrastination are in the first state of no vision and no control. They are driven by motivation to linger on false security and instant gratification. They are present-hedonistic (Zimbardo, 2008) and passive agents. I identified an opportunity to design a service that leads procrastinators toward future goal-oriented activity. The service will involve two phases : visualizing consequence and nurturing confidence.

First, the service will provide them a counseling service for controlling anxiety and emotional breakdowns. Then it will rekindle their passion about what they wanted to achieve by reminding them of the big goal. It will help them set long-term goals to their work process can have a structure. Then it will provide them with just-in-time reminders to start work by visualizing future consequences of their current action. At this point, they will be able to develop a sense of urgency by envisioning the consequences of their action that will motivate them to start work early. This is when they come to have a perspective toward the future through envisioning consequences.

The next phase is about nurturing confidence. After users of my service start working on their task, they will be motivated by receiving rewards such as break from work or validation from other people, and it will be facilitated by the triggers such as notification from the system or social interaction features. A series of these interactions will nurture their ability to manage distraction to defer gratification after achieving a milestone. At the moment of achievement, they will receive positive feedback celebrating their achievement from the service and will be given an opportunity to broadcast their success. This part is very crucial in translating the positive momentum from their work achievement into the construction of positive self-image.

Repeating this process will train users and nurture their ability to confront procrastination and will give them control over their time and resource management. They will eventually transform from a passive agent into an active one, thus reaching vision and control state by building up confidence.

4.3 OPPORTUNITY AREAS

Below is the summary of opportunity areas identified from my argument :

1. Motivation
- Visualize the big goal
- Feel a sense of urgency
- Get reward
- Feel great about one's achievement

2. Ability
- Get emotional relief
- Set milestones
- Training for keeping focus

3. Trigger
- Consequence visualization
- Notification
- Social interaction

5. IDEATION

5.1 PERSONA DEVELOPMENT

After the initial brainstorming of ideas without context, I wanted to build up more concrete context for my target user group and the environment of use. I decided my target user group to be graduate students in master's or Ph.D program who suffer from procrastination on their thesis or dissertation. I took Alan Cooper's Persona method (Cooper, 2007) to design personas of those that my product will serve. I created four personas each one representing a procrastinator type I identified during the user research phase.

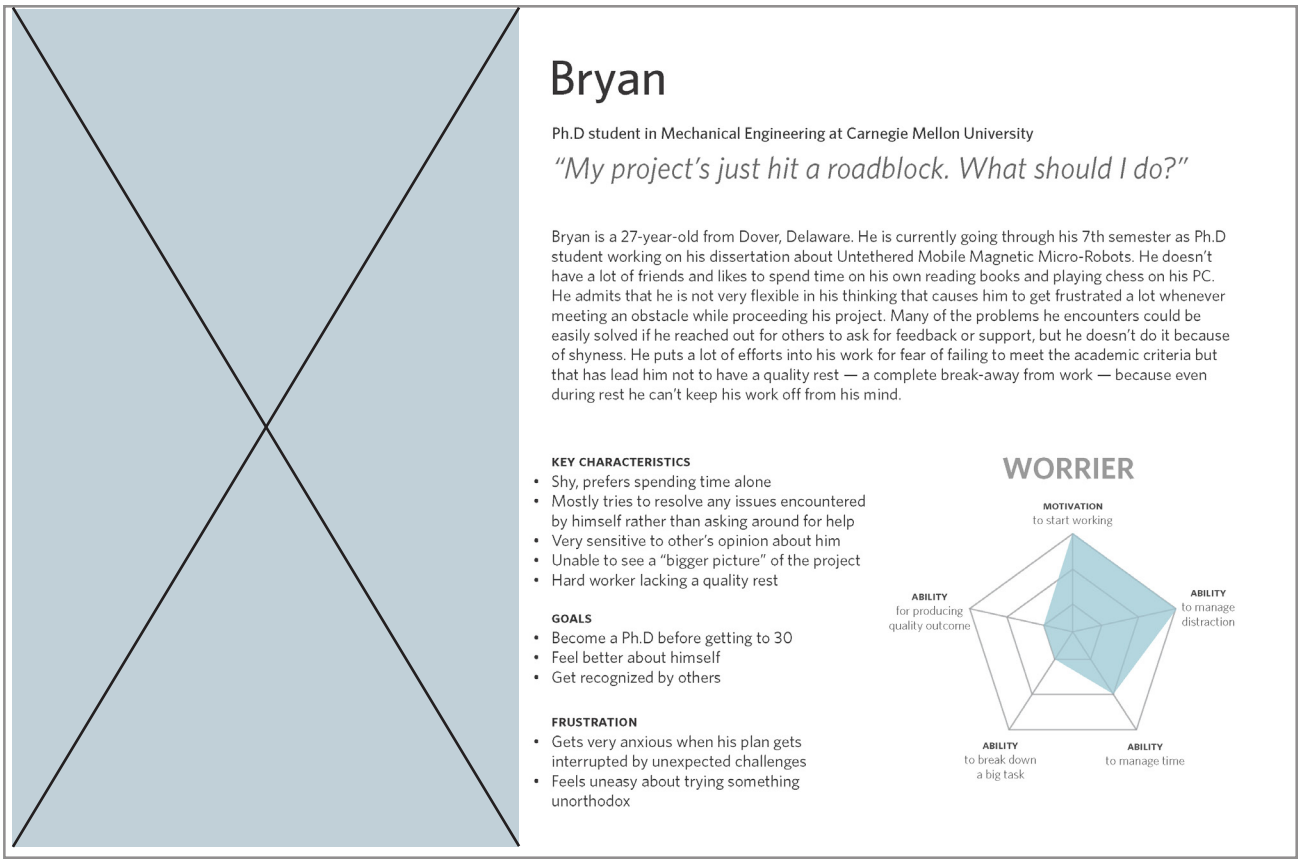


Figure 7. Worrier procrastinator persona (Lee, C. 2012)

Caroline

Master of Fine Arts student in Drama Directing at Carnegie Mellon University

"I follow excitement, be it work or play."

Caroline is 25-year-old from Gainsville, FL. Her undergraduate major was drama and she pursued acting career in New York City's Broadway for two years before coming back to school for master's degree. She is very outgoing and has a lot of friends around her. Every weekend she makes sure she doesn't miss any party in her social circles. She believes in serendipity when it comes to finding a creative solution to her problems. This belief has affected her work style in such a way that she doesn't want to go through a step-by-step process or schedule in order to get to the final outcome of the project. Instead, she would wait until last minutes and use the time pressure and tension to fuel her to get through the crunching time till the deadline. In most cases this approach has worked well and that made her to rely on this even more. However, recently she realized that this lifestyle is not sustainable so she wants to bring more of a structured process to her work. Currently she is working on her Directing thesis production project.

KEY CHARACTERISTICS

- Outgoing, Seeking for fun and excitement
- Doesn't respect a rigorous process required for achieving outcomes
- Able to get things done very quickly when focused
- Generally impatient in many occasions

GOALS

- Get master's degree and leave school
- Become a director of Broadway musicals
- Get healthier lifestyle

FRUSTRATION

- Keeping a monotonous schedule
- Not being able to hang out with friends

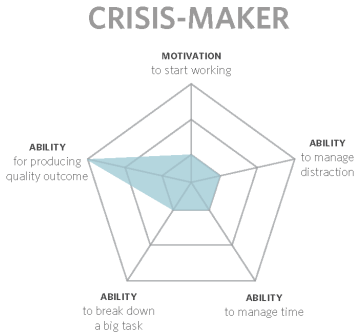


Figure 8. Crisis-maker procrastinator persona (Lee, C. 2012)

Monica

Ph.D student in Biomedical Engineering at University of Pittsburgh

"My work should be judged by its quality, not by how fast I got it done."

Monica is 25-year-old from San Antonio, TX. She majored in Biomedical engineering at University of Michigan before coming to University of Pittsburgh. Very meticulous by nature, she is a great fit for the type of work required in her field. However, her pursuit of perfection to every detail oftentimes leads her to miss the deadlines she had set with her advisor. In spite of that, she still prefers turning in her high-quality work late rather than turning in mediocre one on time. She doesn't like working on multiple project at once because she hates losing momentum while switching between works. She is good at reaching out to her advisor and classmates for help when hit a deadend during the course of project. Her thesis topic is Automated Analysis of the Subcellular Location of Proteins in NIH3T3 and CaCo2 Cells Using Fluorescence Microscope Images.

KEY CHARACTERISTICS

- Meticulous, realistic
- Impose a high quality standard on her own work
- Often wonders where all the time have gone after having got immersed in her work

GOALS

- Publish her work in the Science journal
- Maintain a good relationship with her advisor

FRUSTRATION

- Having deadlines for her work
- People complaining about her missing deadlines

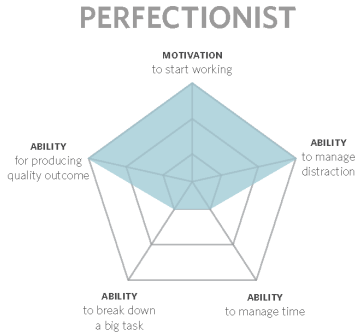


Figure 9. Crisis-maker procrastinator persona (Lee, C. 2012)

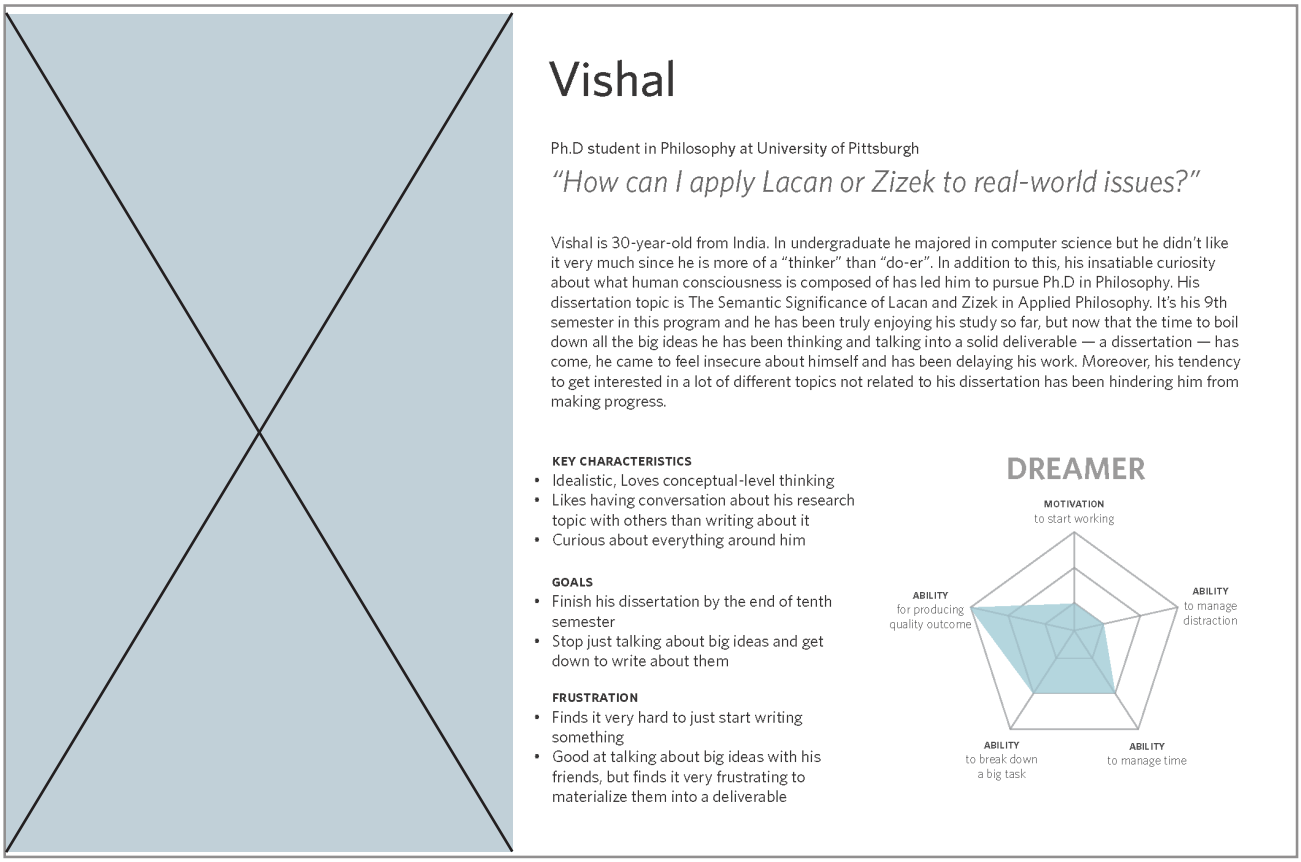


Figure 10. Dreamer procrastinator persona (Lee, C. 2012)

Each persona has his or her own concrete context of personal background, motivation and frustration. In an effort to integrate my synthesis result into each persona, I developed a synthesis chart showing their amount of motivation and multiple aspects of ability. The motivation part simply showed the motivation to start working and the different aspects of abilities I chose to show were the ability to manage distraction, to manage time, to break down a big task, and for producing a quality outcome.

5.2 CONCEPT GENERATION

Finally, I developed ten concepts were created that cater to the needs of the four personas introduced above.

Figure 11. Concept 1 : You vs. Your daily goal (Lee, C. 2012)

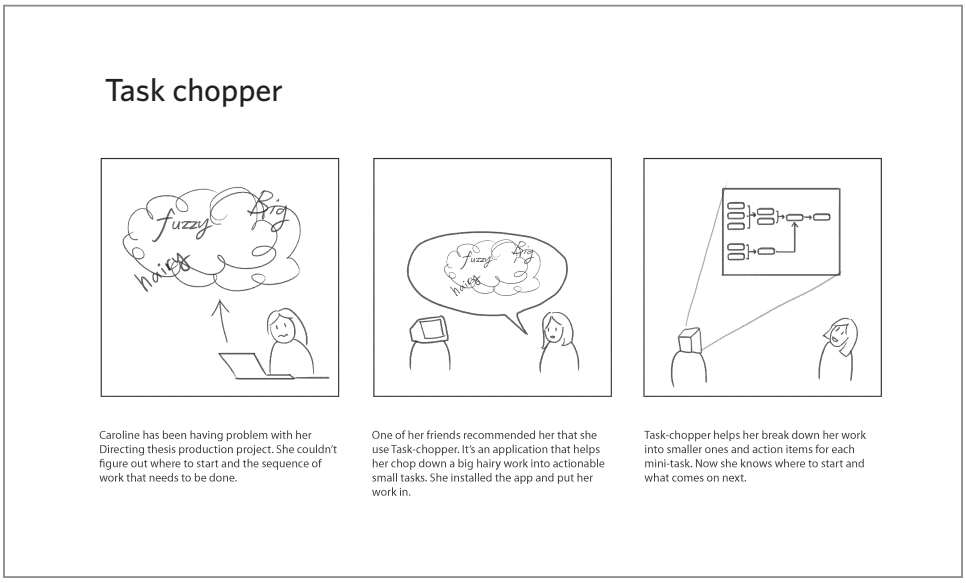
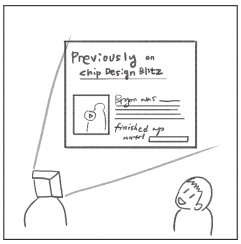


Figure 12. Concept 2 : Task chopper (Lee, C. 2012)

Mission briefing

It's Monday, and a new work has been assigned to Bryan from his advisor. As usual, he started to get worried about what lies beyond. Moreover, he was hesitant to ask around because he doesn't want to look clueless about his work.

He uses his new app called MbPR (Mission-briefing / Preview / Recap). He types the goal for his assignment and the resources he has (time, his past research he can use for this project, available support from others etc.) and constraints (deadline, resources he cannot tap into etc.).

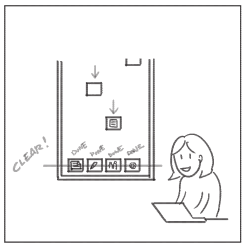


The application turns the information into a mission-briefing style movie. It shows the preview of what he's going to do each day. Whenever he leaves off from the task and comes back, it shows a brief reminder of where he was and what he needs to continue doing in order to accomplish the work.

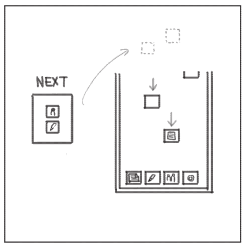
Figure 13. Concept 3 : Mission briefing (Lee, C. 2012)

Work Tetris

After having a blast at a party, Caroline got back home to resume her work on thesis project. As she just got back from the fun with friends, she is not motivated to resume her work at all. But the deadline is just a couple of days away.



Here comes a new productivy-boost game called Work Tetris. It turns the work she has to do into blocks and lets her play Tetris with them. Work blocks advance toward the bottom slowly as they approach each of their own deadline. Blocks gets erased when filling up a line.

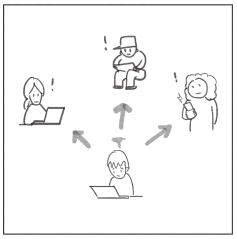


The "Next" panel gives her a good heads-up on what to work on next. The Work blocks falls down on her just like Tetris blocks, one line per day.

Figure 14. Concept 4 : Work Tetris (Lee, C. 2012)

Community trigger / support

Bryan has been struggling with his project recently. It just hit a roadblock and doesn't proceed. He is exhaused from dealing with stress. His motivation has ran out so he indulges in a little bit of distraction like playing games on Facebook.
However, he didn't want to start work even after the time he originally planned to resume work came. He completely lost momentum.

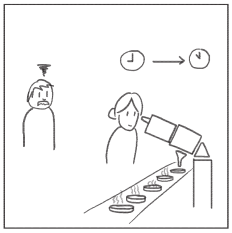


The system recognizes that it's been a while since he made a progress in his project.
Then it automatically sends a notification to his girlfriend Jane, his buddy Tommy, and his mom Susan. The notification says, "Bryan seems to need some cheer-up!"

About an hour later, Bryan gets different types of cheer-up from his loving ones.
He feels much better and now he wants to resume his work.

Figure 15. Concept 5 : Community trigger / support (Lee, C. 2012)

Auto submission



Monica needs to finish up her weekly inspection report on Group B stem cells by tonight. Her advisor is supposed to give her feedback on it. However, last two weeks she didn't turn in her report on time because she was taking too much time on examining unnecessary details.

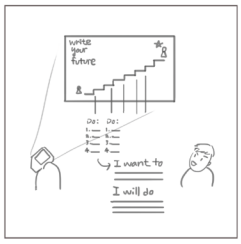
This time she doesn't want to let down her advisor again, so she tries out Auto-submission feature of her word processor. When the deadline comes, it automatically emails the most recent saved version of the document to the designated recipient, in this case her advisor.

Because she knows that the deadline is no-joke, she makes a great amount of effort to finish it up on time and actually made it.

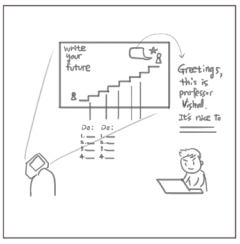
Figure 16. Concept 6 : Auto submission (Lee, C. 2012)

Write your future

Vishal has fallen into his daydreaming trap again. He has been engaged in wishful thinking about what kind of person he wants to be. However, looking back to himself in reality, he gets discouraged because he is so different from his ideal-self.



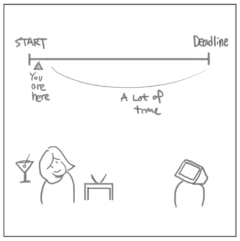
Here comes Write Your Future. It helps him envision what steps are necessary for him to become his ideal future-self, and lets him log his progress and write about what he needs to do.



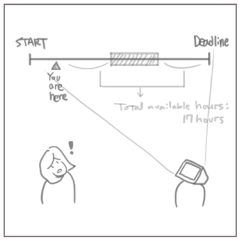
It even lets him assume he already became that successful future-self and write a fictional diary or open announcement letter to his friend and colleagues.

Figure 17. Concept 7 : Write your future (Lee, C. 2012)

Actual available time calculator

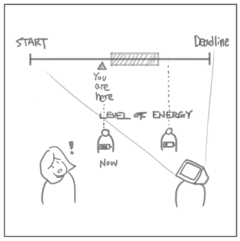


Caroline got her Theater direction assignment today, but she doesn't feel like starting working on it because the deadline is next week



Then the AATC/R (Actual Available Time Calculator / Reminder) shows her that she only have total 18 hours to accomplish her goal because she signed up for volunteering for CMU Drama School Alumni event. She totally forgot about counting that in.

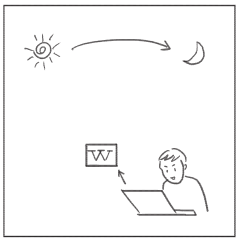
The AATC/R also reminds her that an hour out of that 18 hours has passed. That makes her start working on her project.



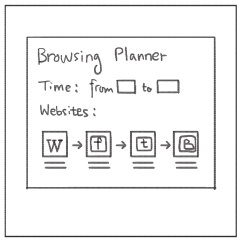
She got much of her work done and was going to resume it after that Alumni event, but the AATC/R advises her that after that event her level of strengh and attention will have gone down low so she might as well work more today.

Figure 18. Concept 8 : Actual available time calculator (Lee, C. 2012)

Web browsing planner



Vishal always had problems with getting lost in Wikipedia, reading his favorite topics in philosophy and following links after links.

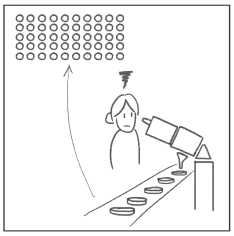


He realized he shouldn't do it anymore if he wants to finish up his first draft of Ph.D dissertation, so he started using Browsing Planner. Using this, he plans his web-browsing ahead, including time and sequence.

When he wants to get off the track from his browsing plan, the Browsing Planner gives him a gentle reminder.

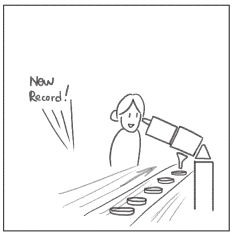
Figure 19. Concept 9 : Web browsing planner (Lee, C. 2012)

Time attack!



Monica doesn't really enjoy her morning routine — checking out the activity status of stem cells of pigs. Even though she acknowledges that the success of her dissertation research is contingent upon this morning routine, she gets very stressed out because she has to examine a 0.05-nanometer-big cell, 50 of them in a row, which is very repetitive and demanding attention to extreme details.

One day, from the Biomedical Engineering researcher commmunity's website, she reads about Time-attack Your Research!, an application that measures time taken for finishing up the task and challenges the user to break the record next time. She decides to give it a try.



The application helped her to engage in her monotonous work in more of a fun way. It rewards her with congradulatory messages and unlocking new features such as iteration counter that encourages people to have more iteration cycle than just one cycle within the same timeframe. Her morning routine became less of an hassle now.

Figure 20. Concept 10 : Time attack! (Lee, C. 2012)

In the course of generating these concepts, I learned the importance of having concrete context for each idea; for example, one of the concepts called Time attack! is about the system's encouraging one's finishing repetitive work fast by measuring time taken for finishing that task and notifies them whenever they break their own record. I designed this concept for Monica, one of my personas who is a Perfectionist procrastination type Ph.D student in Biomedical Engineering so this can help her get motivated to finish the monotonous work she routinely does. However, if this concept didn't have any context, it would have raised questions about ethical issues since this could be used as a scheme for a company to exploit factory workers by encouraging them to shorten the time to complete their job.

One of the directions I deliberately chose not to pursue was creating a distraction management tool that blocks the access to the website or desktop application that work as the source of distraction, because there are already a lot of web, desktop or mobile application that claim to do this job effectively and also because I thought a sense of urgency if created properly would override the target audience's desire for indulging in distraction.

I noted that a lot of concepts generated along the process had many traits of gamification (Deterding et al., 2011); for example, 1) motivating users by showing them the clear vision of the big reward of reaching higher status — in game's term, "level-up" — and small rewards scattered along the process and 2) Helping users build up their ability to achieve the desired behavior by providing them with repeated challenges.

5.3 NEEDS VALIDATION ("SPEED DATING")

I recruited 5 participants from my target audience group and tested my 10 concepts using the Speed dating method (Davidoff et al., 2007).

The most popular themes were Consequence visualization, Milestone-setting, and Big goals reminder. There were also a couple of remarkable findings related to the sense of urgency and the reward areas.

5.3.1 Consequence visualization

Most participants picked this concept as their favorite. They liked the consequence simulation of their current choice affecting their future state; for example, if they don't start the task now, it would be harder and take longer to finish the same task later due to so-and-so factors involved in the schedule. They liked the fact that the system subtly shows the future consequence rather than nagging them with irritating reminders.

5.3.2 Milestone-setting

Concepts related to this theme received good feedback in general. They liked the idea of having mini-deadlines so they can keep the level of urgency throughout the project. A concern about the concepts related to milestone-settings was that even though they acknowledge that it would help them a lot if they have a tool to chop down their big fuzzy goal into actionable milestones, they don't necessarily know how to do that, otherwise procrastination wouldn't have happened in the first place. Therefore it became clear that external support from counselors who are trained in goal-setting and tracking was necessary for this theme to work.

5.3.3 Big goals reminder

Participants liked to be reminded of their big goals in their life to refresh their passion about their field of study. They also liked the concept that would visualize how the achievement of their daily goals would affect there bigger goals.

5.3.4 Sense of urgency

Concepts intended to create sense of urgency — Time attack!, Auto submission and Work Tetris — got mixed feedback. They didn't like the anxiety those concepts would create, but they liked concepts about reframing work as fun activity as in Work Tetris. This was the confirmation of one of my findings from the literature review that procrastination doesn't take place when the task is regarded as an activity for fun (Ferrari, 2000).

5.3.5 Reward

Quite a few participants mentioned that they would be strongly motivated by making rewards clearly visible. Some participants said that a reward would make them more willing to use concepts they otherwise did not like. One participant said she would like to have an option to add her own reward for each milestone, in that way she can defer her desire to get instant gratification to the moment of milestone achievement.

6. FINAL DESIGN

I came up with the final design and named it Kairos — the Greek word for qualitative time, as opposed to Chronos, which stands for chronological or sequential time. Kairos also means the opportune moment in which something special happens. I wanted my service to help users turn wasted time into productive time by helping them focus and build a daily habit of spending at least two hours doing their most important work.

Figure 21. Kairos in the context of use (Lee, C. 2012)

Kairos enables graduate student procrastinators to interact with counselors at university counseling service. They receive emotional support and reminders to stop procrastinating and start working. Just-in-time and human feedback from counselors plays a very crucial role in motivating students to continue using this service. Eventually, they feel better about themselves and form a long-term habit of studying regularly while keeping focused.

6.1 SYSTEM DIAGRAM

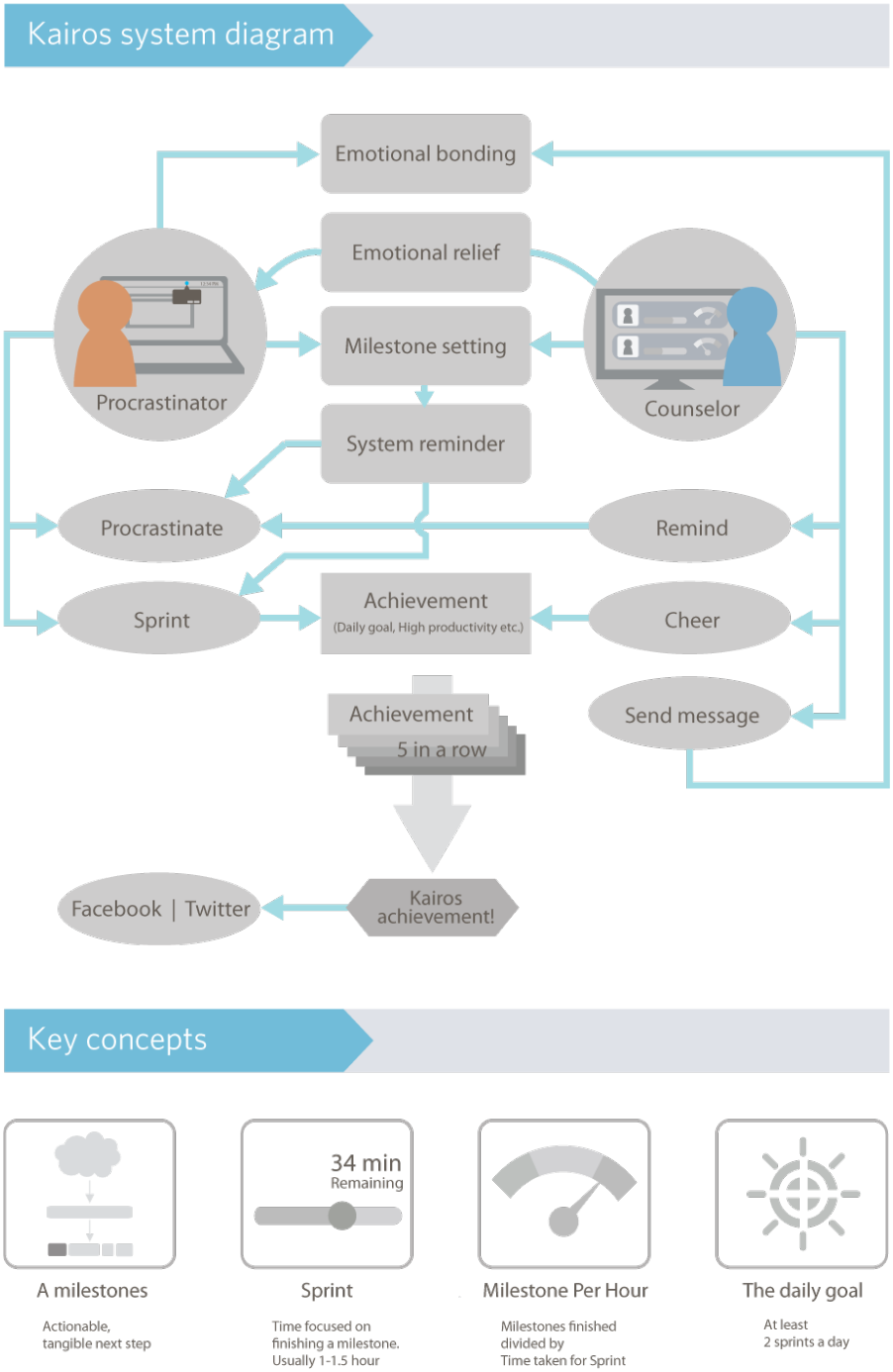


Figure 22. Kairos system diagram (Lee, C. 2012)

6.2 KEY CONCEPTS AND FEATURES

6.2.1 Units of time and work

The most important concept of Kairos is the unit it employs to quantify the amount of work and time the user needs to do to accomplish the work. **A "milestone"** is a unit for measuring work. For example, if the work that needs to be done is to write a thesis, it can be divided into smaller tangible and actionable milestones such as 'Write the introduction paragraph', 'Get all screenshots for user test section' and so on. User research showed that procrastinators don't have the ability to chop down a big goal into smaller actionable milestones, so they need support from counselors to set and plan their goals (Patterson, 1994).

A "sprint" is the unit used to track the user's time and effort. Inspired by the Scrum methodology sprint concept (Schwaber, 1995), I made it flexible, so it doesn't always correspond to a fixed amount of time. It is about one or one-and-a-half-hour long depending on the user's extension, and it's designed to be enough time to achieve one milestone. During the sprint, the user can select Finish or Retire on the interface. If there are a lot of interruptions, it's better for the user to retire and retry the milestone next time. Most importantly, when the time remaining hits zero but the user hasn't hit the finish button yet, he will be automatically retired, making the time spent till then in vain. Therefore he would naturally drag the control handle toward left to extend the sprint time when there is not enough time. In this way Kairos creates a sense of urgency.

6.2.2 Achievement metrics

Kairos is a time and task tracking tool which measures the productivity of a user by **MpH (Milestone per Hour)**. As mentioned above, the average productivity of most people will be 0.6 to 1 MpH (approximately 1 milestone done in 1 or 1.5 hour). Productivity will be displayed by **a speedometer** in the interface. From left to right, it has red, yellow and green zones. Red is least productive, from 0 to 0.5 MpH (i.e. no productivity to taking more than 2 hours to finish a milestone), yellow is 0.5 to 1.0 MpH (i.e. 1 to 2 hours) and green is most productive at 1.0 to 1.5 MpH and higher (i.e. 1 hour or less). To be counted toward the speedometer, the minimum requirement is two sprints per day.

The daily goal is to keep the speedometer in the middle or on the right side, in the yellow or green zone. Simply finish two milestones within three hours and it's all good. Once the daily goal is complete, a notification will appear, rewarding the user with a satisfactory feeling.

6.2.3 Two interfaces

Kairos has two interfaces for two different user groups. Students use the Kairos service through their desktop menu bar app. Counselors, who are both part of the service and internal users of the application, use the web interface. This view is a dashboard that shows the activity feed of each user.

Through the menu bar app, users get reminders when it's time to start working on their milestones. The app initiates sprint mode and keeps track of time, while also serving as a communication channel between the user and their counselor. A counselor's message, or other feedback like a cheer or reminder, shows up directly on the user's screen. From the screen, the app can efficiently remind users of things they need to do. To stay motivated long-term, the user can place **a big goal** next to the menu bar icon. For example, if the user's goal is to get a Ph.D and graduate in Summer '13, that goal can always be displayed next to the app's icon, keeping the goal in sight.

Through the web interface, counselors can see each individual's performance at a glance. They can cheer on achievements or give gentle reminders to those who haven't been productive for multiple days in a row.

6.2.3 Rewards

To motivate the user, I created rewards for both external social recognition and internal self-esteem building. Feedback from the counselor caters to the user's need for approval from others, while the speedometer contributes to the user's awareness of his or her own progress. The user can track the number of hours worked and the daily goals completed, also improving self-esteem.

I also designed a meta-achievement named **Kairos**, which can be obtained after completing five daily goals in a row. In pursuit of Kairos, the user will build the daily habit of working at least two hours toward their goal every day.

Once Kairos is achieved, a Facebook post button and Twitter tweet button will be displayed so the user can broadcast the achievement to friends. This process will also contribute to building a healthier self-image for the procrastinator. By achieving Kairos and broadcasting successes frequently over social networks, the user proves he has dedicated time and effort to his important work and is no longer a procrastinator.

6.3 PERSONA AND SCENARIO

6.3.1 Persona

For the student procrastinator, I made a new persona Anna, a Ph.D student in Decision Science at Carnegie Mellon University who is crisis-maker type procrastinator. For the counselor persona, I made "Jim Dawson," a Ph.D in psychology working at Carnegie Mellon University's CAPS (Counseling and Psychology Service).

6.3.2 Scenario

1. The service entry

Anna, a Ph.D student at Carnegie Mellon University, comes to the school's counselling service after feeling distressed from procrastination on her dissertation. Jim, the counselor first focuses on "unsticking" the student from her current mindset, giving her emotional relief. Using goal-setting counselling skills, he helps the student set milestones. Then he introduces Kairos, a desktop menu bar app linked to the school's counselling system. It provides her with milestone reminders and time-tracking tools.

2. Consequence visualization

A notification appears, reminding Anna about a work milestone. The notification also showed up yesterday, but she pushed it back to today. This time she wanted to do the same, but Kairos asks her if she's ok with lowering her MpH from 1.0 to 0.9, since she hasn't met the goal of two sprint sessions a day for two days. She knows that if the speedometer keeps lowering, Jim will be notified. Since she doesn't want that to happen, she decides to start working.

3. Social interaction

Anna works hard to raise her speedometer level towards the green zone. She does two sprints. After achieving her daily goal, she hears a cheering sound from her laptop speaker and the Kairos message window appears. Jim just sent her a cheer, celebrating her achievement.

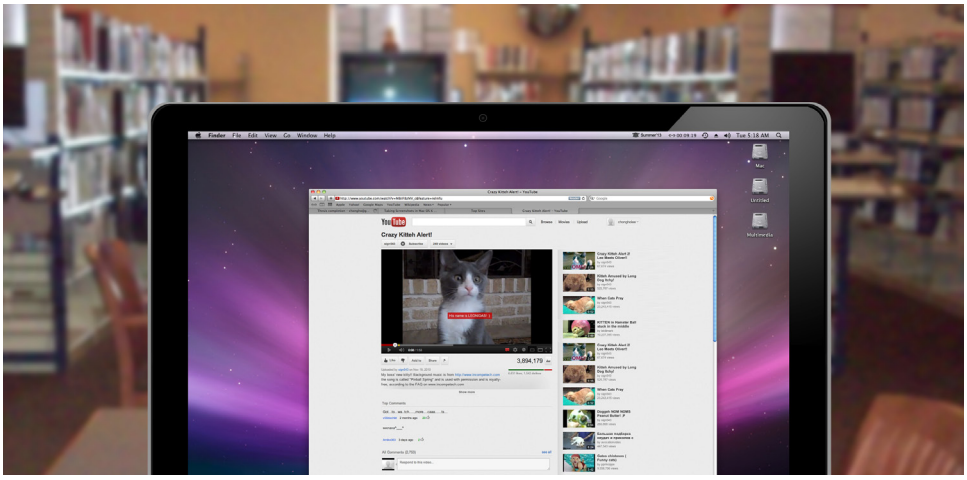
4. Achievement and reward

Anna has completed two sprint sessions a day for five days. After once again achieving her daily goal, a special pop-up appears and telling her that she has won Kairos, the reward for meeting five daily goals in a row. Buttons to post the news to Facebook and Twitter are unlocked. She broadcasts the Kairos achievement to her Facebook page, so friends can see.

6.3.3 *Scenario Implementation*

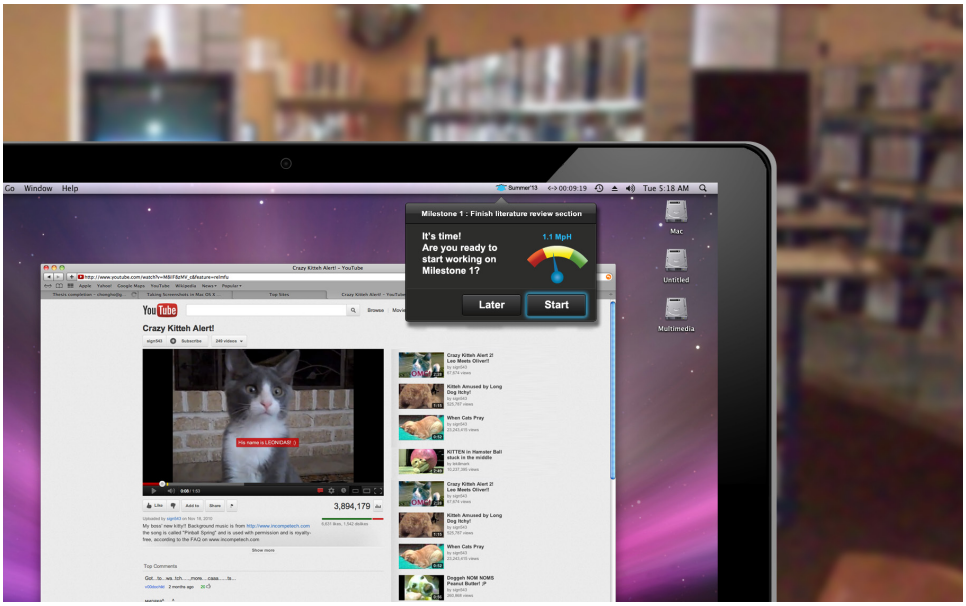
I selected scenario 2 and made visual assets to show the scenario flow.

Figure 23. Kairos scenario implementation (1) (Lee, C. 2012)



Anna is in the library and idles away her time watching online videos.

Figure 24. Kairos scenario implementation (2) (Lee, C. 2012)



Kairos reminds her that it's about time for her to work on the milestone 1. Not feeling like starting her work, she hits Later button.

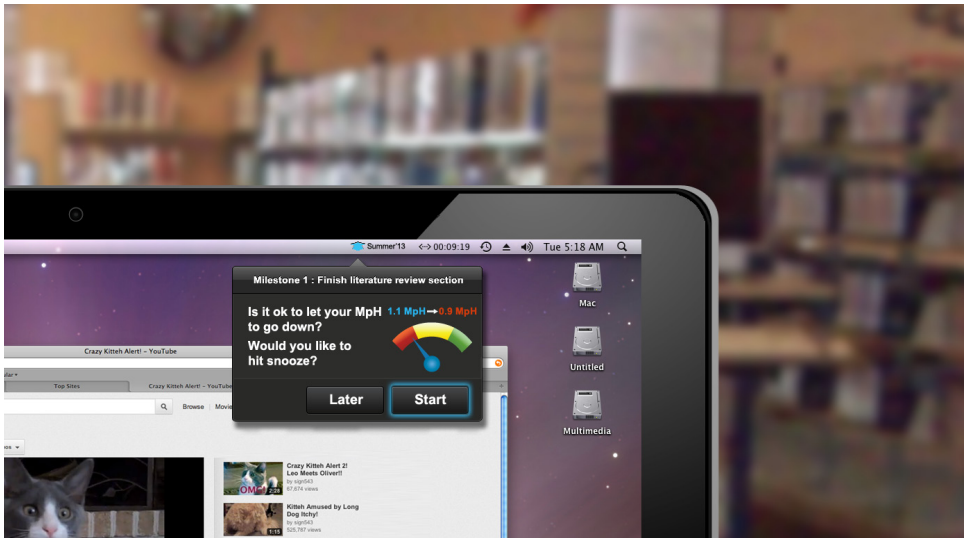


Figure 25. Kairos scenario implementation (3) (Lee, C. 2012)

Because she already snoozed it couple of times, if she puts it off again the MpH will go down. After seeing the possible consequences, she hits Start button.

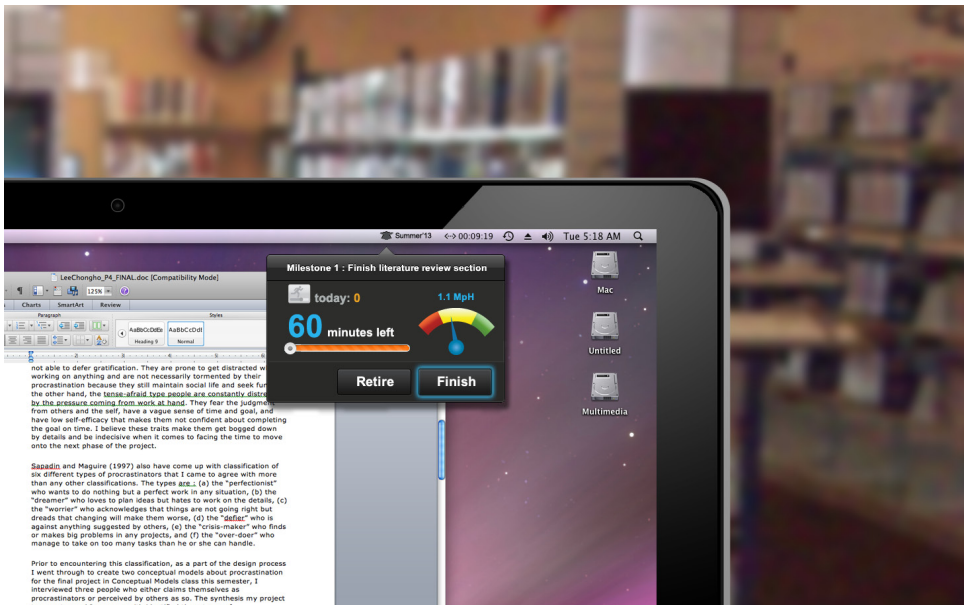
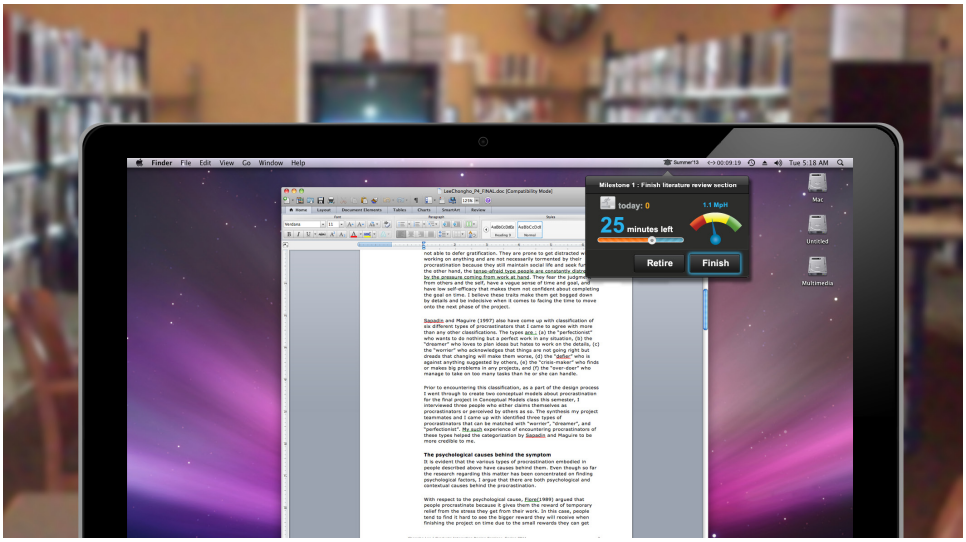


Figure 26. Kairos scenario implementation (4) (Lee, C. 2012)

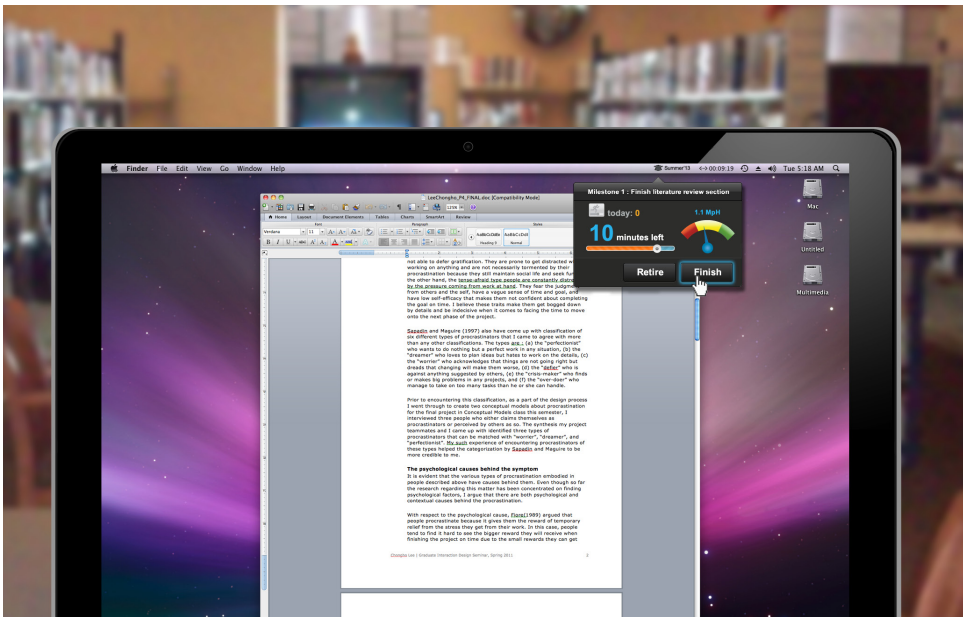
Anna goes into Sprint mode. She focuses on writing her dissertation knowing the clock is ticking and she needs to finish it in about an hour.

Figure 27. Kairos scenario implementation (5) (Lee, C. 2012)



Time passes and Anna keeps herself focused on work and makes a lot of progress.

Figure 28. Kairos scenario implementation (6) (Lee, C. 2012)



When it's about 10 minutes left, Anna finishes writing her literature review section. She hits Finish button.

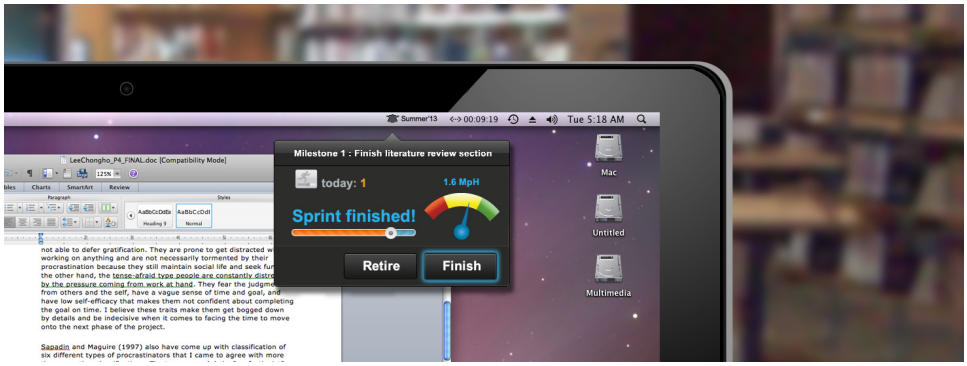


Figure 29. Kairos scenario implementation (7) (Lee, C. 2012)

The sprint she just completed has been counted toward reaching the daily goal. The MpH also increased so she is happy to see the needle moving up.

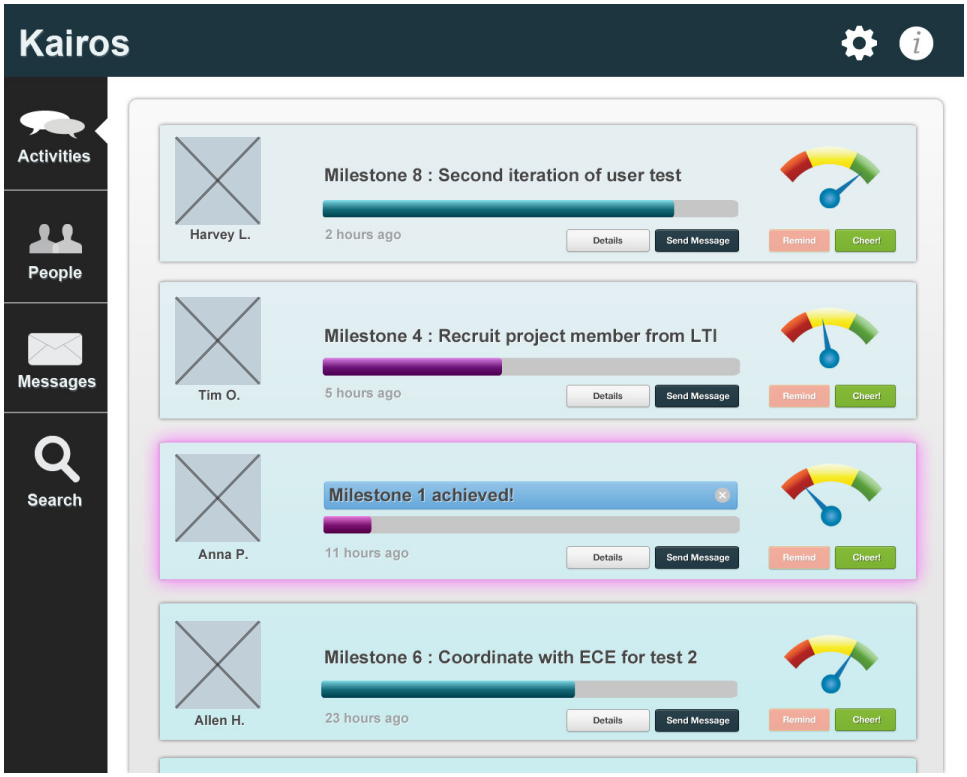
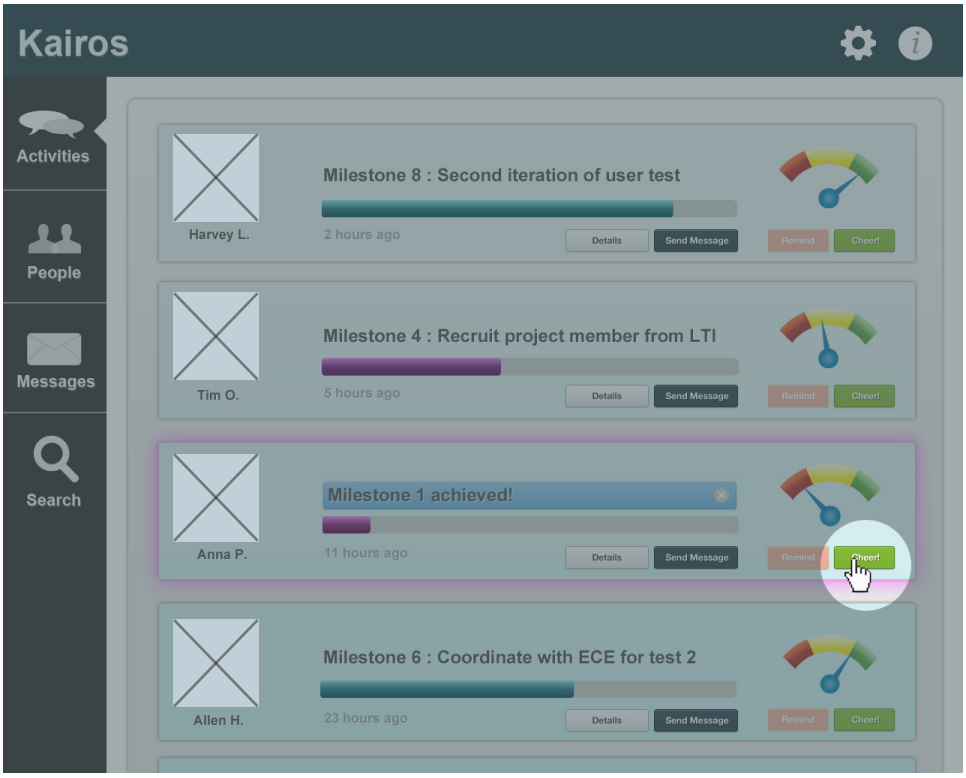


Figure 30. Kairos scenario implementation (7) (Lee, C. 2012)

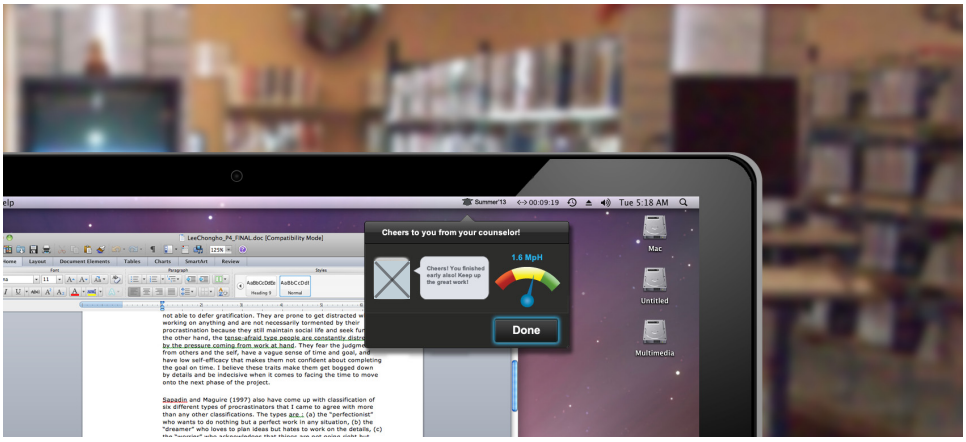
In the meantime, Jim, Anna's counselor gets a notification and sees the Kairos administrator page's activity feed. He notices that Anna has achieved her milestone.

Figure 31. Kairos scenario implementation (8) (Lee, C. 2012)



He clicks Cheer button to congratulate her on the achievement. A message is automatically generated customized for the context and sent to Anna.

Figure 32. Kairos scenario implementation (9) (Lee, C. 2012)



His message makes Anna happy and feel proud.

7. CONCLUSION

This project explored ways to overcome procrastination by empowering procrastinators with a tool to envision the future consequences of actions and to build up confidence by repeated practice and social interaction. Overcoming the desire to remain in the status quo for fear of failure is the key to breaking the habit of procrastination. Designed behavior change has powerful implications for altering a person's quality of life.

Because of design's potential influence, ethical reflection should be part of the design process. If a design has a hidden agenda and declines to ask for the consent from the users, it could be misused. This connects to an interesting finding from this project: if the service I designed was used in a different context — for example, at a sweatshop such as Foxconn, it could be used to exploit workers. Imagine the counselor role replaced by a manager and the procrastinators as workers who need additional oversight. Luckily, in this project, users sign up to be monitored by a counselor because it fits their goal of overcoming procrastination. From this reflection I learned a lot about the importance of context and the consent of users.

However, users should not rely on this service long term. Once they learn to avoid procrastination and build the habit of regular work sessions, they should stop using this service. Like bicycle training wheels, children may feel safe enough to ride with confidence and even try some tricks. This is what behavior design should be like. The user internalizes new behaviors and gradually diminishes the need for the service. However, quite a few commercialized behavior change services don't want users to leave. They create new features to make users more dependent on their service. I look forward to seeing more services put users' well-being before their bottom line. Services should help people develop into goal-oriented active agents able to bring about change in their own lives.

8. REFLECTION

There were two valuable lessons I learned from this year-long design project. The first lesson is that our vulnerability and insecurity are what lead us to procrastinate. As seen in many other behavior change projects, a well-designed solution can guide people away from their bad habits. However, if their behavior change was due to mainly external motivation, they may relapse into old habits, because they are still vulnerable to conflicting external pressures. In order to achieve lasting behavior change, one must feel motivated from within. An autonomous person can work consistently, regardless of external conditions.

The second lesson I learned was the difference design can make in our lives. Design brings order to the chaos of misspent time and effort in achieving our goals. Procrastination means giving up before our efforts can yield results. But willpower glues these meaningless moments into a coherent experience. Designed action repels fear of failure or uncertainty.

I would like to end my writing by arguing that design is humanity's collective effort to overcome procrastination in a broader sense — it pushes past the comfort of the status quo. Empowered by design, we build our own future with intentional effort. Only that effort will turn mechanical and meaningless time — Chronos — into time that creates meaningful existence — Kairos.

9. ACKNOWLEDGEMENTS

I would like to thank Jesus Christ, my parents resting in peace in heaven, my wife who has been giving me endless support, my two sons who have been giving me endless joy and my advisor Jodi Forlizzi who has guided me during this hectic year. My thanks also goes to my classmates Wes, Molly and Clarence who always shared their wisdom with me.

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