

LifeMove

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Problem and Solution Overview

With recent advances in fitness-related computing, it is now easier than ever to use technology as a companion to influence our behavior and encourage a healthy lifestyle. Wearable devices like *Fitbit* and *FuelBand* track your exercise behaviors. Smartphone apps like *Moves* utilize onboard GPS to plot your movement. Websites like *EveryMove* and *Fitocracy* log your workouts. *FourSquare*, *Facebook*, and *Yelp* allow you to “check in” at locations to track your contextual movement. A multitude of other programs and apps exist for task tracking—from *Outlook* tasks to *Omnifocus* reminders to OS-supported to-do lists. All of these programs and devices demand some degree of persistent user attention and participation: manually input data, create tasks, indicate task completion, etc. Such persistent user participation is an impediment to true integration with the technology. *LifeMove* is the solution. By combining *Moves*-like consistent GPS data with *FourSquare*-like check-in data, users create goals, and the app tracks them automatically. It is the true fire-and-forget system for location-based goal tracking.

Paper Prototype Description

The *LifeMove* app has four primary components, each accessible from the top-level menu drawer:

- Activities Timeline View
- Goals View
- Notifications View
- Settings View

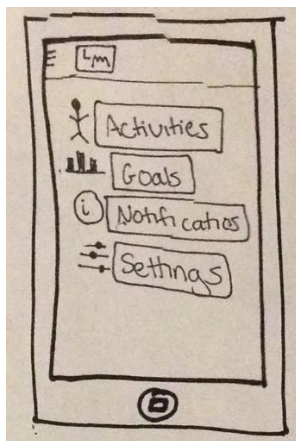


Figure 1: Top-level menu

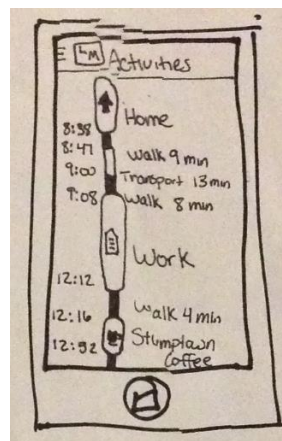


Figure 2: Activities View



Figure 3: Goals View

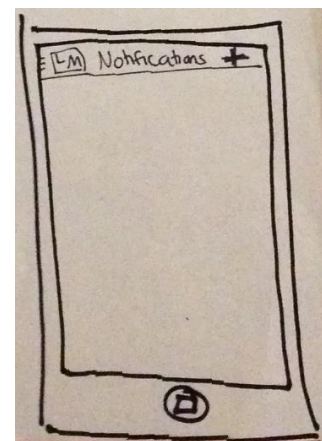


Figure 4: Notifications View

Activities Timeline View

The *Activities Timeline View* is a vertically-scrollable timeline of your activities throughout the day. The items on this timeline show where a user has been, how long they were there, and may also contain additional contextual location details acquired through the *FourSquare* API (e.g. restaurant/business names, etc.). Entries appear in the activities timeline regardless of whether or not they are related to user-defined goals.

Goals View

The *Goals* view lists goals that the user has already created and is the launch pad for either viewing progress towards a particular goal or creating a new goal.

Goal progress is displayed in simple, easy-to-consume formats: Either 1-dimensional bar charts or checklists. When a user is viewing the progress of a specific goal, he or she is also only one click away from being able to modify the goal.

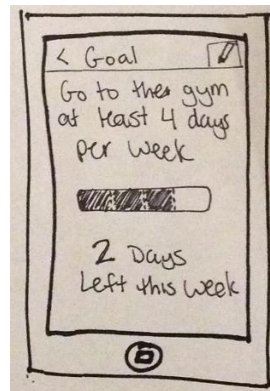


Figure 5: Goal Progress (Bar)



Figure 6: Goal Progress (Checklist)

Creating/Editing a Goal

There are three types of goals, each with different time measurement metrics:

- **Number of Visits** (e.g. "visit the gym X times per hour/day/week/month/year")
- **Amount of Time** (e.g. "visit my elderly grandmother at her home for a total of 20 hours")
- **Timing** (e.g. "Leave work by 5pm on weekdays")

The goal creation screen walks the user through the process step-by-step:

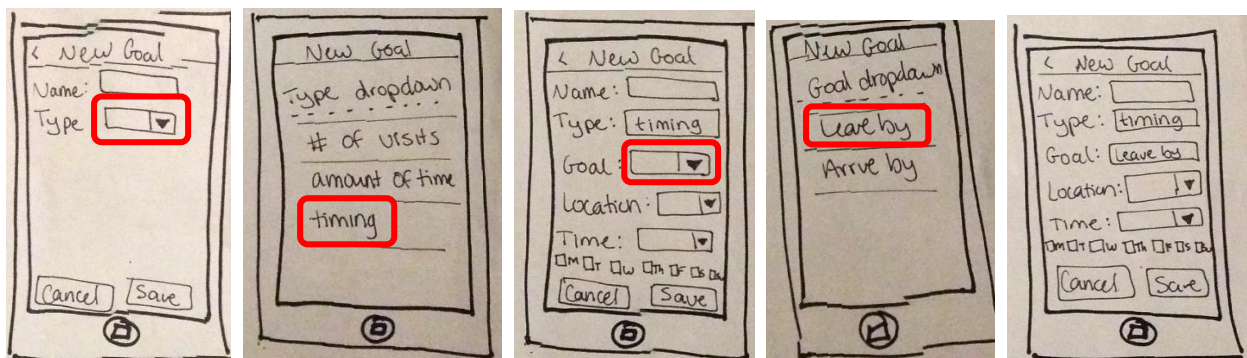


Figure 7: Goal-Creation Process

Notifications View

The *Notifications View* allows a user to set up text/email/phone alerts related to a goal. Users can configure notifications to be sent in a variety of situations:

- When a user has failed to reach the goal.
- When the goal is partially/fully complete.
- A fixed time before the goal is complete (for *Timing* goals—see “Timing” above)

This view is presented as a list of checkboxes with fill-in-the-blank fields.

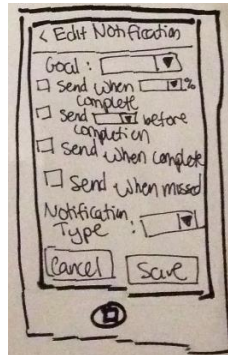


Figure 8: Notification Creation

Settings View

Seeing as how the *Settings View* is used primarily for boring bookkeeping purposes—username, password, user preferences—we did not draw any settings-specific screenshots for this paper prototype.

Prototype Summary

Below is a view of all of the prototype screens.



Figure 9: Entire Prototype

Testing Method

Participants

We chose three participants for our user study based on the following criteria:

- Owns a touch-screen smartphone
- Self-identifies as having a goal-oriented personality

Participant 1

Our first participant, Brad, is an undergraduate student majoring in accounting. He owns the latest iPhone and uses the built-in calendaring and to-do features to manage his schedule, homework due dates, and task list. He is a top student, but between working part-time and studying non-stop, he rarely finds enough time to dedicate to his minor goals: cycling, reading, and... sleeping.

Participant 2

Our second participant, Alysha, is a new real estate agent who owns an older Android phone (HTC Hero). Although she regularly uses her phone for texting, email, and Facebook, she rarely ventures into other built-in features or apps. She actively sets goals/quotas for herself to achieve (e.g. *Show off ___ houses this week; find ___ new clients this month; sell ___ houses this year*).

Participant 3

Our final participant, Eugene, is studying to become a physical therapist while working full-time. English is not his first language. He frequently uses his smartphone to keep in touch with friends, but usually does so in his native language. Although he doesn't usually write down his specific goals, he often sets and keeps general goals for himself: Improve his spoken English through practice, maintain a 3.5 GPA or higher, exercise at least twice a week.

Environment

The testing took place in the quiet lobby of an apartment complex. Although the area experiences occasional foot traffic, those instances are rare and room provided a sufficient degree of privacy. Users sat at a small table while Steph and Karen administered the test. The paper prototype was a stack of notecards, but only a single "active" screen was shown to a participant at any given time.

Tasks

Task 1: Check to see how many hours you've spent at work today

This first task tests a user's ability to use and understand the *Activities Timeline View* outside of the context of any goals. To accomplish this, the user must:

1. Select *Activities* from the top-level menu drawer
2. Scroll through the timeline to view how much time was spent at work

Task 2: Create a goal to leave work by 5pm every day

This task tests a user's ability to set up a simple *Timing* goal. To do this, the user must:

1. Select *Goals* from the top-level menu drawer

2. Click the “+” icon
3. Fill out the *New Goal* dialog
 - a. Choose **Type = Timing**
 - b. Choose **Goal = Leave By**
 - c. Fill in **Location, Time, and Days (M,T,W,Th,F)**
 - d. Click **Save**

Task 3: Create a goal to go to the gym at least 4 times this week

This tests the user’s ability to create a moderately complex *Number of Visits* goal. To accomplish this, the user must:

1. Select *Goals* from the top-level menu drawer
2. Click the “+” icon
3. Fill out the *New Goal* dialog
 - a. Choose **Type = Number of Visits**
 - b. Choose **How Often = Weekly**
 - c. Fill in **# of Visits** and **Location**
 - d. Click **Save**

Task 4: Set up a goal-related notification to remind you to leave work by 5pm

This final tasks tests a user’s ability to set up a notification based on a previously-created goal. This requires the user to:

1. Select *Notifications* from the top-level menu drawer
2. Click the “+” icon
3. Select **Goal = Leave Work By 5pm on Weekdays**
4. Select and check **Send 10 minutes before completion**
5. Choose a **Notification Type**
6. Click **Save**

Procedure

The actual testing was preceded by a short interview with each user to become familiar with their habits in regards to smartphone usage, goal-oriented behavior, and software-assisted task management. Their responses to this interview were later used in the analysis stage in an attempt to gain context into why particular tasks were easy/difficult for each user.

After the initial pre-interview, we introduced *LifeMove*, giving an overview to the problem it is trying to solve (i.e. *LifeMove* aims to use your location data to help you set and keep goals), but deliberately leaving out details about the specifics of *how* it solves that problem in order to avoid influencing their performance on the tasks we would give them.

For each task, we read aloud a script and provided a visible hard copy for reference. The users were asked to voice their thoughts and interact with the paper prototype as they would a real smartphone app while Steph acted as the “computer” and switched/updated screens as necessary.

For the duration of the tasks, Karen acted as an observer took notes based both on the performance of the participants as well as their vocal feedback. Those notes were later used in the analysis stage to identify strong/weak points of the interface design.

After all the tasks were completed by a user, we performed a short exit interview to receive feedback and summarize each user's overall experience. Although the actual experimental feedback was far more valuable than this summary, both forms of feedback were incorporated into the final design.

Test Measures

Throughout the tasks, we looked at two primary metrics:

1. Action accuracy: Did the user perform the correct action to progress throughout each task?
2. Action speed: How long did it take for the user to select any action?

The first metric is the most important. Given the relative simplicity of the *LifeMove* app, there is a very limited number of correct ways to accomplish each step of each task. If a user chooses a correct option, he or she progresses *toward* task completion. Otherwise, he or she progresses *away* from task completion. Our primary goal in our interface design is to make users likely to achieve forward progress toward task completion. To track this, we tallied the frequency of *backwards progress* actions vs. *forwards progress* actions.

The second metric measures how *intuitive* our interface is. We hypothesize that long user delays signify an unnatural interface flow, as a user is required to examine *all* the details of a screen before understanding how to proceed. This was measured by keeping track of the number of any pauses longer than 3 seconds.

Testing Results

Participant 1

The first participant struggled to understand the *Activities View* to accomplish the first task of checking how much time has been spent at work today. He failed to make the connection that the activities listed on the screen represented a timeline of where he had been throughout the day. He also didn't realize that it was scrollable. This confusion meant he was entirely unable to complete the first task.

Goal creation went more smoothly, but the participant once again struggled with the final task of creating a goal-related notification. Of the four notification options—"send when X% complete," "send X minutes before completion," "Send when complete," and "send when missed"—none of them seemed to be the obvious correct choice for creating a reminder to leave work before 5pm.

Although comprehension of the *Activities View* was low, the user could navigate between sections of the app with ease.

Participant 2

Participant 2 struggled with the first task as well, but mostly because she didn't expect the *Activities View* to show a timeline of her locations, so it took a while for her to ever select that view. Once in the *Activities View*, she kept trying to click on the word "Work" as well as its corresponding bubble, hoping to get an

overview of how much time total was spent there. In the case of this user study, the *Activities View* has two disjoint entries for “Work,” and the participant was annoyed that she had to manually add up the times from both entries to get the total amount of time spent at work today.

While creating new goals, this participant was disappointed that the app did not auto-suggest locations based on the name she gave each goal.

Finally, this participant had a lot of difficulty discovering the *Notifications View* and kept attempting to create notifications via the *Goals View*. Since notifications are directly related to specific goals, she was confused that she couldn’t create notifications in the same place as she creates goals.

Participant 3

The final participant is from Russia and had difficulty understanding some of the wording in the app. Specifically, he was confused about the difference between **Timing** and **Amount of Time** when selecting the goal *Type* in the goal creation dialog. Also, for him, it wasn’t clear whether the *Activities* timeline progressed from top to bottom (morning on top; evening on bottom) or vice versa. In addition, once in the *Activities*, *Goals*, or *Notifications* view, he did not understand how to navigate back to the top-level menu drawer, and accidentally closed the app multiple times when trying to navigate throughout the app to accomplish the tasks.

Similar to *Participant 2*, this participant was also annoyed that the app did not auto-suggest locations based on the name of the goal. Likewise, he also wanted notification creation to be closer to goal creation. (He wanted to be able to “just tick something” in the goal creation dialog to set up a notification.)

Results Summary

Based on the experiences of these three participants, there were three main takeaways:

- The *Activities View* needs refining. The fact that it is a scrollable timeline should be more obvious. The flow direction should be clarified (morning is on top; evening is on bottom). The visual elements should be interactive, providing summary details when tapped.
- It should be easier to select a location when creating a goal (e.g. auto-suggested locations)
- Users should be able to create notifications from the goal creation dialog.

Interface Revision Sketches

Based on the results of the tests, we chose to improve three main areas:

1. Tying notification creation in closer to goals.
2. Improving wording in goal creation dialog.
3. Clarifying and extending the abilities of the *Activities View*.

Previous Design

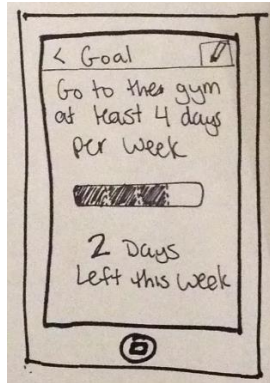


Figure 10: Goal Progress

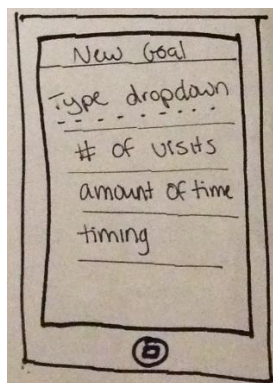


Figure 11: Goal Type Dropdown

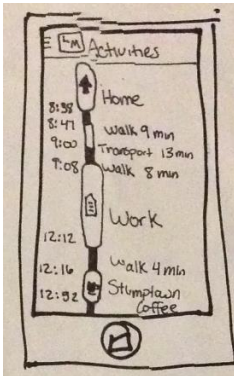


Figure 12: Activities View

New Design

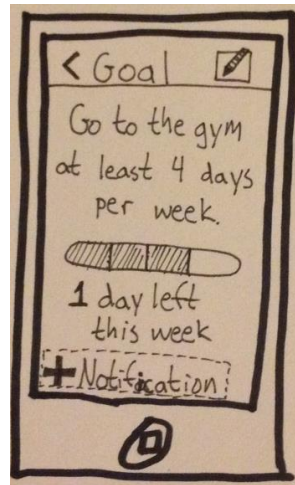


Figure 13: Goal Progress



Figure 14: Goal Type Dropdown

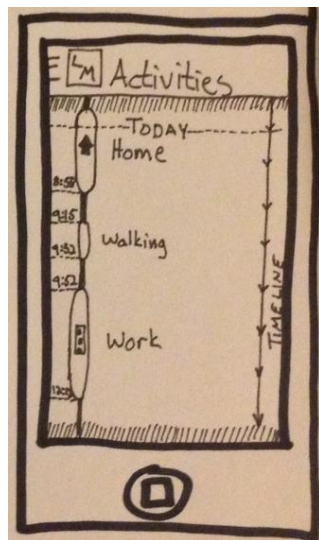


Figure 15: Activities View

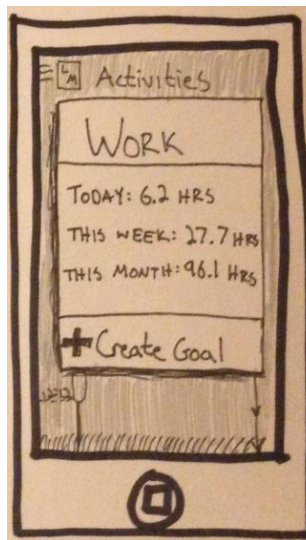


Figure 16: Activities View Details

Rationale

The primary hurdle for users was in creating notifications. The overwhelming feedback was that a user should be able to create a notification when he or she is looking at a goal. (i.e. The preferred workflow is *View Goal* → *Create Related Notification* as opposed to *Create Notification* → *Choose Related Goal*.)

Although we still support creating a notification from scratch, by adding a simple “+ Notification” button to the *Goal* screen, users are now empowered to create goals using a more natural workflow. (Compare Figures 10 and 13.)

Several of the users complained during tasks 2 and 3 that the vocabulary used when selecting the goal type was unclear. Eugene, in particular, was especially troubled by the wording because he is not a native English-speaker. A couple of the types have been renamed: *Amount of Time* → *Total Time*; *Timing* → *Event*. This terminology is arguably more understandable. (Compare Figures 11 and 14.)

The primary change to the UI is regarding the *Activities View*. Users had several complaints:

- It isn't obviously a scrolling surface.
- It isn't obviously a timeline.
- It isn't obvious which direction time flows.
- It doesn't provide any data summaries.
- It isn't integrated into goal-creation.

We addressed these issues as follows (Compare Figures 12, 15, and 16):

- Shading was added to suggest scrollability. In reality, this is primarily a limitation of the low-fidelity paper prototype, but it is still an important issue to call out because there must be some indication in the final product that the surface is scrollable.
- An axis label and directional arrows give strong indications that this is a timeline that flows from top to bottom.
- Tapping on an item or its label shows a summary popup dialog, providing interesting aggregate details about a user's history with that particular item.
- Users can create a goal based on a location through that summary popup dialog. This greatly facilitates that ability to set the location of goal if a user has ever visited that location.

This modification to the *Activities View* not only makes it easier for users to complete the task scenarios, but it also integrates the timeline better with the overall purpose of the app: to create and monitor *goals* based on locations. Before this addition, the *Activities View* was quite unrelated to the rest of the app.

In addition to the above illustrated changes, our new design includes various other minor changes:

- Top-level menu items: Rename *Activities* to *Activities Timeline*
- Notification creation: Only show “Send when...” checkboxes that apply to the chosen goal type

Video Prototype Overview

Our video prototype illustrates a scenario where Steph is suffering the consequences of failing to meet her goal to leave work on time: She has no choice but to sleep at the office because she has missed her last bus. This gives Karen the opportunity to demonstrate to her coworker the new *LifeMove* app which is designed to help us make and keep location-based goals.

Task Scenarios

Seeing an opportunity to educate her coworker about an app that could solve her time-management problems, Karen accomplishes three main tasks while demoing *LifeMove* to Steph.

Task 1: See where you have been today

Karen demonstrates to Steph the *Activities View* which shows where she has been and what she has done today. It is a high-level summary of the day's activities and provides a useful at-a-glance reminder of what she has been up to.



Figure 17: Steph prepares to sleep at work

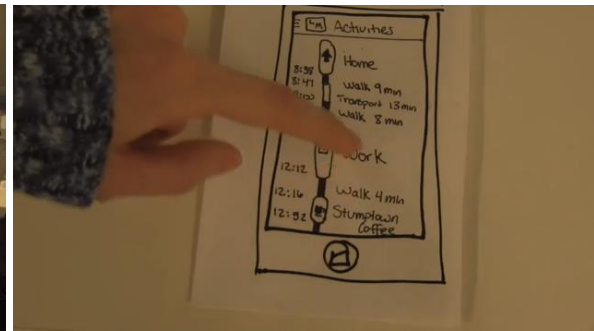


Figure 18: Karen demonstrates *Activities View*

Task 2: Create a goal to leave work on time

LifeMove's primary functionality is the creation and monitoring of location-based goals. Karen shows Steph how easy it is to create a new goal. She opens the *Goals View* from the top-level menu drawer and follows the prompts to create a new goal:

- Name: **Work**
- Type: **Timing**
- Goal: **Leave By**
- Location: **Work**
- Time: **6pm**
- Days: **M, T, W, Th, F**

To complete the goal-creation process, she taps the *Save* button and returns to the top-level menu drawer.

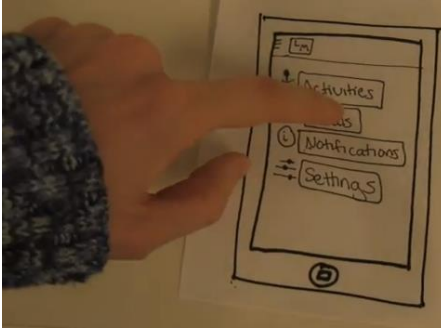
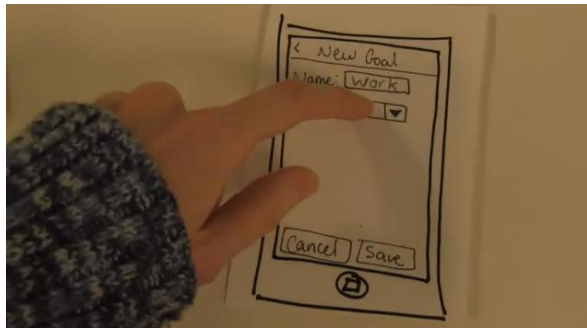
Figure 19: Karen enters *Goals View*

Figure 20: Karen demonstrates creating a new goal

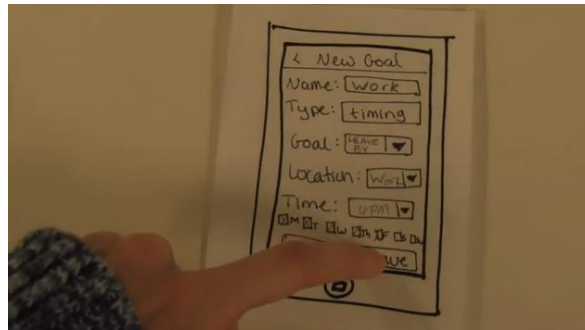


Figure 21: Karen saves her new goal

Task 3: Create a Notification

Finally, Karen demonstrates how easy it is to create a new notification. From the top-level menu drawer, she enters the *Notifications View* and creates a new goal-related notification:

- Goal: **Work**
- Send: **10 minutes before completion**
- Notification Type: **Text**

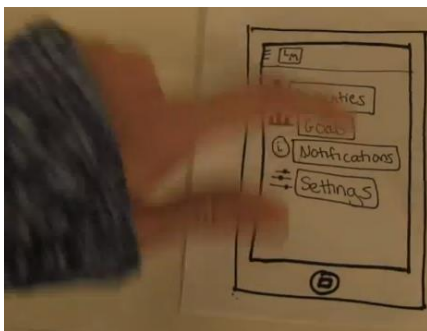
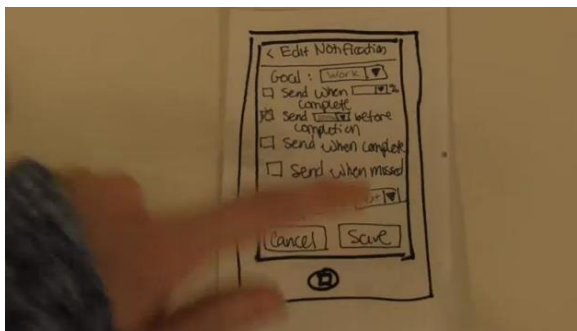
Figure 22: Karen enters *Notifications View*

Figure 23: Karen demonstrates creating a notification

With the new interface revision, there is an additional new notification-creation workflow where a notification may be created from the *Goals* screen. However, to more-fully demonstrate the general navigational model of the app, our video prototype shows only the original, slower workflow.

Scenario Conclusion

After learning about the *LifeMove* app, Steph realizes how useful it could have been to avoid her current predicament. She then settles in for a horrible night of sleep at the office.



Figure 24: Steph sleeps at work

Tools

By borrowing video equipment and software tools at no charge and by starring in the film ourselves, we completed the video prototype far under the original predicted production budget of \$18,500,000. (We had originally cast Nicholas Cage as the sleepy coworker and Mike Tyson as the helpful coworker.) Production required only the following:

- An office space (at Zillow)
- Digital video camera
- Apple iMovie for Mac
- Paper prototype

What Was Left Out and Why

There are multiple *types* of location-based goals, but we chose only to demonstrate an *event/timing* goal.

- **Number of Visits:** (e.g. Go to work at least 5 times per week)
- **Total Time:** (e.g. Work at most 40 hours per week)
- **Event:** (e.g. Leave work by 6pm each day)

The process for creating the different types of events is nearly identical, so demonstrating more than one in the video would have been excessive and unnecessary.

Also, as mentioned earlier, there are multiple pathways/workflows to create goals and notifications. These additional workflows were inspired by feedback we received from participants of the user study. Our video prototype only shows the original workflows because it allowed us to demonstrate more of the navigational model of the app. (The other goal and notification creation workflows can be thought of more as shortcuts.)

Finally, the video prototype does not show the updated *Activities View* summary dialog box because that particular feature was a last-minute addition that didn't exist until after the video had been filmed.

Summary

LifeMove aims to support people in creating and achieving their goals while being as unobtrusive as possible. Where other apps and services require constant fiddling and updating, *LifeMove* automatically tracks goal progress in the background via analysis of GPS and other location data. We designed the UI to be as minimalistic as possible while still allowing for natural workflows.

Our initial contextual analysis informed us as to what kinds of goals users would like to track using a system like *LifeMove*. It also confirmed our hypothesis that a major hurdle in goal-keeping for some people is the need to constantly upload status updates in other traditional goal-keeping systems.

From this contextual analysis, we created a simple paper prototype, as described in this paper. It is purposefully minimalist, allowing users to do only four major things:

- Create/edit goals
- Create goal-related notifications
- View goal progress
- View daily activity summary

Through performing multiple user tests based on the paper prototype, we learned that, despite the relative simplicity of the app functions, several areas were lacking:

- The notification creation workflow was unnatural
- The activities timeline's features and purpose weren't clear
- Some of the wording throughout the app was confusing

That said, most of the users were able to navigate naturally throughout the app, so rather than needing a complete redesign, our prototype only required a few touch-ups to address user feedback. This included updating the notification workflow and redesigning the *Activities View* timeline.

The biggest lesson we learned was understanding the value of user studies. Our original prototype was completely functional and understandable to us, as its designers, but there were a number of small points (mentioned above) that caused users to stumble through the app that were not obvious to us. This is especially true for the notification creation workflow. Through the user study, it was very easy to see where the users *expected* certain functionality to be.

LifeMove has come a long way as its design has been continually influenced by the contextual inquiry, initial design, and user testing. This process has undoubtedly improved the quality of its design and the likelihood of its adoption among users.

Appendix A: User Study Script

Introduction

LifeMove is a smartphone app designed to help users create and keep location-based goals with minimal interaction—a “fire-and-forget” goal-keeping system. It uses the phone’s built-in GPS antennae and connects to the *FourSquare API* to infer your behavior based on your location. It constantly tracks your location and automatically updates progress toward your goals without requiring you to do... anything.

Throughout this study, you will be presented with a paper prototype that represents the app on a smartphone. You may touch and interact with this prototype as you would an actual phone. One of the researchers will act as the “computer” and update or swap out the “screens” as you interact with them.

You will be asked to accomplish four tasks. Please voice your thoughts as you navigate through the app. Although you are free to ask clarification questions throughout the process, we will only respond to “how do I...” questions if you appear to be stuck.

Task 1

It’s 7:00pm and you’re still at work. You have been working a lot recently and feel that your work/life balance has been suffering as a result. You hope to eventually limit the total amount of time you spend each day in the office, but for now, you would just like to quickly check how many hours you have spent working today, excluding your lunch break.

Check to see how many hours you have spent at work today.

Task 2

Wow. Yep. You’ve definitely worked too much today. Since you want to have a healthy work/life balance, you decide that you should try to leave work by 5pm each day, Monday through Friday.

Create a goal to leave work by 5pm each day.

Task 3

Your life-long dream has always been to become a ninja. However, since you are so out of shape, your skills currently only rival those of *Star Wars Kid*. How embarrassing! It’s time to hit the gym!

Create a goal to go to the gym four times each week.

Task 4

You have a tendency to become extremely focused at work and regularly lose track of time. But you really want to achieve your goal of leaving by 5pm each day!

Create a notification to remind you to leave work 10 minutes before your 5pm goal.

Appendix B: User Study Data

Action Accuracy

This data compares the number of forward-progress actions vs. backwards-progress actions. (i.e. “You’re getting warmer” vs. “You’re getting colder.”)

Minimum required action count for each task:

- **Task 1:** 4 actions
- **Task 2:** 10 actions
- **Task 3:** 9 actions
- **Task 4:** 9 actions

	Task 1		Task 2		Task 3		Task 4	
	Forwards	Backwards	Forwards	Backwards	Forwards	Backwards	Forwards	Backwards
Participant 1	6	18	11	1	9	0	12	3
Participant 2	12	8	12	2	9	0	20	11
Participant 3	6	2	14	4	10	1	15	6

Action Speed

This data tallies the number of >3-second delays that each user showed between performing actions. This excludes any delays imposed by the test administrator updating or swapping out screens.

	Task 1	Task 2	Task 3	Task 4
Participant 1	3	2	0	5
Participant 2	4	2	1	4
Participant 3	1	3	1	2

Other Random Feedback

- “It was mostly good. I could navigate it.”
- “The whole ‘percent time’ but then trying to figure out when to leave didn’t make sense so maybe you can change what types of notifications were offered based on which goal was picked.”
- “When I went to make a new notification, there was just this big blank screen and I forgot what I was supposed to be setting up a notification for, so maybe if there was a way to better link the goals and jumping from it to making a notification, that would be good.”
- “Maybe on the blank notification list should instead show a list of the most recent goals. Or maybe after you make the goal, it should offer to set up a notification.”
- “The timeline should have a fisheye view or some sort of roll-up at the end so it’s not strictly linear.”