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Team Members
Elizabeth Gruenther – Visual Design / Project Manager
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Justin Mandell – Business Analysis
Jim Williams – Content Strategy
Executive Summary

The schedule submission and creation process for part-time employees is plagued with miscommunication, inefficiency and frustration. Our team identified this problem and devised an alternative method for store managers and employees to complete the scheduling process. We surmised that an automated, web-based scheduling system would simplify the tasks involved in schedule submission and creation and alleviate the frustration caused from using an ineffective system. To focus our design and development efforts, we prepared a business case for an online scheduling system that identified potential benefits, costs, risks and returns associated with this endeavor.

In the pre-design phase of this project, we employed a variety of development tools and methods to identify and understand our target user constituents: managers and employees. We identified our users by studying their demographic and environmental make-up, and then determined their primary usage goals and tasks associated with achieving those goals. We wrote detailed scenarios of the current schedule submission and creation system to better understand the specific areas where problems occur. Finally, we prepared a detailed list of assumptions about our users’ goals, habits, tasks and motivations.

Phase two of the project focused on testing and validating our assumptions from phase one. We selected a variety of pre-design user research techniques to test our assumptions. Using a combination of demographic questionnaires, surveys, interviews, contextual inquiry and a logbooking session, we learned about our users, their tasks and their environments. Our research plan involved interacting with representative users and combined ethnographic research techniques with self-reported user data to uncover not only what users report about their activities, but also what their actual activities are.

Analyzing the results of our user research from phase two validated the majority of our assumptions from phase one and enabled us to move to the third and final phase of the project: designing and evaluating the system. Our team used a combination of software development tools to transform our user research into interface elements and included developing user personas, diagramming major system tasks, creating a user character matrix, and drafting a conceptual model. We then set qualitative and quantitative usability goals and identified the functionality list for release one.

These steps enabled us to create lo-fidelity prototypes of our system that we iterated through as a team and then transformed into wireframes for testing with representative users. We conducted formal usability tests with both employees and managers, employing traditional usability testing techniques such as reading directly from a testing script, asking users to follow a think aloud protocol, and presenting users with printed task scenarios. The results of the first round of user testing were extremely encouraging: with only one design iteration, our team created an interface that fulfilled almost 85% of our usability test objectives. From this test, we made changes to the interface based on what we learned from our users and finally developed hi-fidelity prototypes of the new system.
Part I: Identifying and Understanding Our Users
Proposed System Design

Product Name: TimeKeeper
Tagline: We make time so you don’t have to.

Our user-centered design team intends to design a web-based scheduling system for employees at retail stores and restaurants called TimeKeeper. Store managers and employees could access the web scheduling interface from any computer, enabling them to complete and submit schedule requests at home, school – anywhere they have access to the Internet. The TimeKeeper online scheduling system will enable store managers to spend less time compiling and editing weekly schedules and will allow employees more freedom and flexibility to request schedule changes and access weekly scheduling information.

The TimeKeeper system will consist of two separate interfaces, one of which would be designed specifically for employees. Using this interface, an employee could go online to submit his or her weekly schedule preference to the scheduling manager. Employees would be able to specify their minimum and maximum number of work hours per week, the days they are available and unavailable to work, and the times they prefer on those days. The employee could also designate a date range for the current schedule request. Once the employee has completed the schedule request, he/she submits the information online.

The second interface in the TimeKeeper system would exist for the scheduling manager. The manager would be able to view the schedule preferences of all employees, as well as which employees have submitted current schedules. When all employees have submitted schedules, the manager would direct the system to compile all of the employee schedules into one master schedule. The TimeKeeper system would formulate three possible schedules from which the store manager would choose. Managers would have the freedom to make changes or additions to these suggested schedules in order to create the final weekly schedule. After finalizing the schedule, the store manager would direct the system to notify all employees of the weekly schedule via email. Managers would also be able to add additional notes, comments, or special announcements to the emails prior to sending the schedule.

Business Case

Expected benefits:

- Address customer pain points:
  - Employees: Eliminate need to drive to or phone work to obtain weekly schedule. Reduce scheduling conflicts. Increase communication.
  - Managers: Reduce loss of schedule requests. Reduce in-store employee time spent informing off-shift employees of their weekly schedule. Reduce human error in compiling schedules. Reduce time spent to prepare the weekly schedule and time spent revising the schedule.

- Address business needs: Reduce absenteeism due to schedule misunderstandings and mistakes. Reduce time consumed by scheduling process. Increase communication among managers and employees.
**Design development costs and time:**

- 10-week development period for user needs analysis, creation of low fidelity prototypes, user testing and creation of high fidelity prototype(s).
- 5 full-time, dedicated team members *(working 40 hours/week each)*
  - Total time costs over 10 weeks: $40,000 (5 x $20/hr x 40hrs/wk x 10wks)
  - Total equipment costs: $0 *(Development team already owns necessary hardware and software to complete the project.)*
  - Additional Expenses/Misc. costs: $5,000 contingency fund
- To implement the *TimeKeeper* system, we estimate the costs to be $1,000 per year for a store of 60-100 employees. In order to recoup our development costs, we would have to sell the system to at least 45 stores. To make a 25% profit on our initial investment, we would have to sell the product to at least 57 stores.

**Proposed solution features:**

- Long- and short-term schedule requests collated automatically;
- Multiple master schedule options automatically generated;
- Master schedules fully editable once generated;
- Email notification sent to employees when schedule is completed, reducing potential communication breakdowns;
- Notices/announcements delivered along with weekly schedule email as needed;
- Employees submit schedule availability from home or from any Internet location;
- Employees and managers can retrieve schedule from any Internet location;
- Managers can create and notify employees of master schedule from any Internet location;
- Individual user accounts can be accessed and easily updated from any Internet location;
- Specialized GUI Interfaces developed for both manager and employee use;
- Managers will be able to view when each employee receives his or her weekly schedule;
- Web-based application will be affordable for franchises to implement;
- Employees will have access to all other employees’ contact information while conforming to privacy laws and restrictions (facilitating ease of negotiating shift-changes among employees);
- Internet site would link to store scheduling policies increasing awareness of corporate rules;
- Managers will have the ability to edit and update store policies online;
- Managers will have the ability to search for employee availability by day and time. *(If an employee calls in sick this will help the managers find an available replacement more quickly.)*
- Possible add-on features to be developed after initial product release:
  - Settings to specifically customize the system to the business/corporation to allow for the integration of the scheduling system with other store systems. For example, the scheduling system could integrate with an employee time clock or historical sales database to better manage expected business traffic.
  - Additional add-ons could include alerting employees of company scheduling policies when attempting to submit preferred hours that fall outside those policies.
**Project Organization Framework:**

- **Complexity:** This project will focus on a specific niche market, namely large chain retail stores and franchised restaurants. Limiting the system to serve the needs of users in these markets will help focus the design goals and system parameters, therefore allowing for a more comprehensive design process.
- **Duration:** The initial design phase (user/task analysis and prototyping) will take approximately 10 weeks to complete.
- **Project leadership requirements:** The team will require strong leadership to remain focused on the outlined goals. It is imperative that team members not waste time in attempting to develop features and functionality outside the scope of the current project phase.
- **Project team skill requirements:** The demands of this project will require team-members skilled in user needs analysis, interaction design, web site design and development, visual design, and human factors engineering. In addition, all team members will have to stay focused on the goals of the primary user constituents.
- **Roles and responsibilities:** The development team will include a project manager and visual designer, business analyst, content strategist, prototype developer, and information architect.

**Risks:**

- The development team must remain committed to the original project goals while focusing on meeting user needs. If the project expands too far in scope, the size and costs for the development team would also have to increase.
- The development team must avoid creating unneeded/unwanted application features and functions. Focusing on unnecessary functions would decrease the team’s ability to deliver a goal oriented, user-focused application and would also increase the development costs.
- The development team must design a powerful, yet inexpensive and easy to implement system. If the team does not streamline and simplify the scheduling process, companies will not have incentive to purchase the product.
- The development team must strive to test design concepts and prototypes on actual, representative users to ensure that the system meets the needs and goals of intended constituents.

**Return on Investment (ROI):**

- To implement the TimeKeeper system, we estimate the costs to be $1,000 per year for a store of 60-100 employees.
- The largest cost-savings for companies who implement the TimeKeeper system will be in time conservation. Managers and employees who spend less time dealing with scheduling concerns will have more disposable on-the-job time to devote to other important tasks.
  - It is estimated that a manager spends approximately 4 hours a week developing a weekly employment schedule. At this rate, it is estimated that a single store or restaurant will lose approximately $3,000 annually (based on a 40hr workweek at a
salary of approximately 42K/yr). It is our goal to reduce the time spent on employee scheduling by at least half.

- Meeting the schedule reduction goal will save each store approximately $2,200 per year in time lost to scheduling/editing concerns. For a corporate franchise consisting of 20 stores, this cost savings would translate to $44,000 in the course of one year.

- An additional cost-saving measure will stem from a decrease in employee absenteeism due to schedule misunderstandings and/or scheduling conflicts (employees using “false” sick days).

- An intangible benefit of TimeKeeper is that the system will lead to increased communication among employees and managers.

- Another intangible benefit of TimeKeeper is that employees will experience increased job satisfaction because they will be working their preferred hours and they will enjoy more freedom and input over the scheduling process.

**Target Customers:**

- **Retail Store Franchise Corporations:** The long-term cost-savings potential of the TimeKeeper system to decrease time spent scheduling part-time employees and reduce employee absenteeism makes retail stores a prime candidate for synchronized scheduling. Focusing on this market will allow the development team to create a system that specifically caters to the goals of retail chains.

- **Restaurant Franchise Corporations:** Restaurant franchises have scheduling difficulties and goals similar to retail stores. Focusing on these two similar markets will more than double our pool of potential customers while keeping development and customization costs low.

**Critical Success Factors:**

To develop a successful product, the development team must:

- Adhere to the Target Customers’ needs (see above);
- Keep development and final product costs low;
- Find access to users in target markets;
- Research current scheduling systems of target customers;
- Communicate with a representative cross-section of potential users (managers and employees alike).

**Criteria for Measuring Success:**

- 80% decrease in scheduling errors;
- 30% decrease in absenteeism;
- Manager schedule configuration time reduced by 50%.

**Assumption List:**

Our development team assumes the following:

- Not all employees will have access to the Internet; therefore, an alternate schedule submission system (ex. paper availability sheets) will exist to accommodate these individuals. For these individuals, managers will be required to enter the pertinent information into the TimeKeeper system.
• Any company that uses our product will have access to a computer and the Internet in their facilities.
• Current methods of schedule retrieval are unsatisfactory for employees and managers.
• Current scheduling systems contribute to employee absenteeism.
• A web-based scheduling system facilitates communication more effectively than paper-based scheduling systems.
• A majority of employees will be knowledgeable of common web-based systems.
• A majority of employees will have some form of e-mail account.
• Company policies and procedures for scheduling do not preclude the use of our system.
• Three alternate schedule layouts are sufficient for schedule finalization.
• Companies will be willing to change to a new system.
• Companies will be willing to learn a new system.

Intended Constituents and Constituent Demographics

Primary Users
1. Store/Restaurant managers
2. Employees (with Internet access and without Internet access)

Secondary Users
1. Company
2. Customers
3. Technical support & Maintenance staff
4. Trainers
5. Administration

<table>
<thead>
<tr>
<th>Primary User Demographics</th>
<th>Store Managers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsibilities:</td>
<td>Varies</td>
</tr>
<tr>
<td>Age:</td>
<td>16 years old and above</td>
</tr>
<tr>
<td>Physical characteristics:</td>
<td>Varies</td>
</tr>
<tr>
<td>Education:</td>
<td>Minimum high school diploma</td>
</tr>
<tr>
<td>Gender:</td>
<td>Male / Female</td>
</tr>
<tr>
<td>Revenue:</td>
<td>Varies</td>
</tr>
<tr>
<td>Location:</td>
<td>Global</td>
</tr>
<tr>
<td>Skill:</td>
<td>Highly skilled employees</td>
</tr>
<tr>
<td>Computer experience:</td>
<td>Advanced beginner to expert performers</td>
</tr>
<tr>
<td>Nationality:</td>
<td>Global</td>
</tr>
</tbody>
</table>
### Learning Style:
- Conservative to Aggressive

### Attitude:
- Varies

### Cultural:
- Native English and English as a second language

### Power:
- High level of decision-making

<table>
<thead>
<tr>
<th>Learning Style</th>
<th>Conservative to Aggressive</th>
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</thead>
<tbody>
<tr>
<td><strong>Attitude:</strong></td>
<td>Varies</td>
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<tr>
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<td>Native English and English as a second language</td>
</tr>
<tr>
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<table>
<thead>
<tr>
<th><strong>Primary User Demographics</strong></th>
<th><strong>Employees</strong></th>
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<td>Location:</td>
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<tr>
<td>Skill:</td>
<td>General skilled employee</td>
</tr>
<tr>
<td>Computer experience:</td>
<td>Novice users to expert performers</td>
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<tr>
<td>Nationality:</td>
<td>Global</td>
</tr>
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<td>Learning Style:</td>
<td>Varies</td>
</tr>
<tr>
<td>Attitude:</td>
<td>Varies</td>
</tr>
<tr>
<td>Cultural:</td>
<td>Native English and English as a second language</td>
</tr>
<tr>
<td>Power:</td>
<td>Low level of decision-making</td>
</tr>
</tbody>
</table>

### User Goals

**Scheduling Manager Goals – Personal:**
1. Decrease amount of time spent preparing weekly schedule.
2. Decrease amount of time spent notifying employees of weekly schedule.
3. Make entire scheduling process easier.
4. Make entire scheduling process more organized.

**Scheduling Manager Goals – Practical:**
1. Decrease employee absenteeism.
2. Decrease miscommunication regarding employee scheduling.
Employee Goals – Personal:
1. Work desired hours.
2. Eliminate having to call/drive to store to ask when they are scheduled to work.

Employee Goals – Practical:
1. Have access to other employee contact/schedule information in case of need to change shifts.
2. Have more control and input over scheduling process.

User Task List

Employee:
1. Send preferred hours (hours the employee wishes to work) and weekly requests.
2. Send long term schedule requests (i.e. when employee needs time off) and other special requests.
3. Obtain other employee contact information.
4. View the weekly work schedule.
5. View schedule after schedule change/update.
6. View entered employee scheduling preferences.
7. View/change account information (personal contact information and password change).
8. View help documents for how to use the system.
9. View weekly announcements or notices.
10. Print the schedule(s).
11. Find shift replacements.
12. View company scheduling policies.

Scheduling Manager:
1. Send out special notices and/or announcements to employees.
2. View schedule submission lists sent by employees.
3. Edit/update notices and special requests.
4. Compile possible schedules.
5. Edit chosen schedule.
6. Finalize chosen schedule.
7. Print final schedule.
8. Send schedule notification emails.
9. Input employee information/hours.
10. Enter personal information/hours/vacation/time-off.
11. View employee information/availability.
12. View preferred schedule online.
15. Check which employees have viewed/received schedule.
User/Task Matrix

<table>
<thead>
<tr>
<th></th>
<th>Employees</th>
<th>Managers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Send preferred hours (hours the employee wishes to work) and weekly requests</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Send long term schedule requests (i.e. when employee needs time off) and other special requests</td>
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<td>✓</td>
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</tr>
<tr>
<td>View company scheduling policies</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Find shift replacements</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Send out notices, special requests, and announcements</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>View schedule submission lists sent by employees</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Edit/update notices, special requests, and announcements</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Compile possible schedules</td>
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<td>✓</td>
</tr>
<tr>
<td>Send schedule notification emails</td>
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<td>✓</td>
</tr>
<tr>
<td>Input employee information/hours</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Edit chosen schedule</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Finalize chosen schedule</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>View preferred schedule online</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Edit/update company scheduling policies</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Search for employee availability (based on set parameters)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Check which employees have viewed/received schedule</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

Target Users’ Environment

<table>
<thead>
<tr>
<th>Physical</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Managers</td>
<td>Cramped office with limited space</td>
<td></td>
</tr>
<tr>
<td>Employees</td>
<td>Employees have adequate space to submit</td>
<td></td>
</tr>
<tr>
<td>Offices equipped with computers, printers, and access to the Internet. These computers are Windows-based machines.</td>
<td>The majority of employees have access to the Internet.</td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
<td>--------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Managers have offices which can be closed</td>
<td>While there may be possible noise distractions, these have a negligible affect on the schedule completion task</td>
<td></td>
</tr>
<tr>
<td>The offices have adequate light.</td>
<td>Retail stores have adequate light. Restaurants may be dark.</td>
<td></td>
</tr>
<tr>
<td>Managers complete the scheduling process at work in their offices.</td>
<td>Employees currently fill out availability/schedule request forms in the store.</td>
<td></td>
</tr>
</tbody>
</table>

**Social**

<table>
<thead>
<tr>
<th>Managers</th>
<th>Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managers experience indirect pressure to complete the scheduling process by a certain deadline.</td>
<td>Employees experience little pressure to complete schedule requests.</td>
</tr>
<tr>
<td>Managers are expected to complete the task with a low frequency of errors</td>
<td>Scheduling mistakes made by the employee affect the employee negatively.</td>
</tr>
<tr>
<td>Live help and documentation is available to managers by phone and/or email. Some in-store documentation materials (manuals) are available.</td>
<td>The on-site help resource for an employee is the manager and other employees.</td>
</tr>
<tr>
<td>The culture among managers is fairly informal, as is the sharing of information between colleagues.</td>
<td>Information sharing is very informal.</td>
</tr>
<tr>
<td>A definite hierarchy of positions exists in the retail/restaurant environment. Managers, Assistant Managers, Employees</td>
<td>A definite hierarchy of positions exists in the retail/restaurant environment. Managers, Assistant Managers, Employees</td>
</tr>
<tr>
<td>Managers do not frequently interact with system administrators.</td>
<td>Employees have little to no interaction with system administrators.</td>
</tr>
<tr>
<td>Manager/employee interaction is high.</td>
<td>Manager/employee interaction is high.</td>
</tr>
</tbody>
</table>

**Cultural**

<table>
<thead>
<tr>
<th>Managers</th>
<th>Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managers have a working knowledge of English.</td>
<td>A majority of employees will have a working knowledge of English.</td>
</tr>
<tr>
<td>No regional cultural differences will significantly affect a scheduling system.</td>
<td>No regional cultural differences will significantly affect a scheduling system.</td>
</tr>
<tr>
<td>Professional culture is casual; however, managers have more of a stake in their careers and the corporate culture than do employees.</td>
<td>Employees have very little stake in career or corporate culture. Employee turnover is very high.</td>
</tr>
</tbody>
</table>
Many in managerial positions are seeking promotion with the company and view their positions as a long-term career opportunity. Few employees seek promotion within the company and view their positions as a means to an end.

Language differences could affect employee/managerial interpretation of date/time notation. Language differences could affect employee/managerial interpretation of date/time notation.

Environmental Factors Influencing Design

The environmental factors most significantly affecting our design are as follows:

- As varying degrees of education and computer literacy will be involved, the language and icons used in the design must be clear and easy to read/understand.
- Office space is limited. We will cut down on the use of paper.
- To be most effective, the scheduling process must be quick and efficient to complete.
- The system design must prevent date/time misunderstandings.

User Scenarios – Current System

User Constituent: Manager
Task: Create the weekly employee schedule
Sarah, the scheduling manager of a retail store, is preparing to generate the weekly schedule for management and part-time employees. Before she begins, she collects all paper copies of the “Employee Availability” sheets that have been filled out by the employees along with any special requests for time off, vacations, or extended leave. Since many employees fill out their schedule requests at different times, Sarah can spend half of the week tracking down employees whose schedules haven’t been turned in. Once all of the availability sheets have been collected, Sarah manually enters each employee’s new schedule information along with the skill level and job assignment (e.g. cashier), one at a time into the scheduling computer program that has been used by the company for a number of years. Sarah feels frustrated due to the amount of time required to obtain and enter individual schedules for sixty employees every week. She believes that her time would be better spent working on the sales floor assisting employees and customers.

After all of the schedules have been entered, Sarah enters the store hours of operation, sales volume, last year’s sales, total number of hours available per day, and any trend/forecast information into the system. She hopes that this data will help her allocate an appropriate number of employees needed for each day (and times of day) to provide adequate coverage for the expected level of business in the store. She realizes, however, that this information is only a prediction and not an accurate figure for the actual day’s business.

When the scheduling and business information are entered, Sarah then runs the computer program to match employees by availability, skill level, and job with the number of employees needed on a given day. This operation executes successfully but with mixed results, since only
one possible schedule is generated. Each employee’s specifications, such as maximum/minimum hours per week, are considered by the program but can be accidentally overwritten by Sarah during editing.

As expected, the schedule requires a great deal of editing to correct errors made by the system in trying to reconcile the number of employees available with the number of hours needed in addition to employees trained for certain jobs. After compiling the weekly schedule, Sarah prints out the master schedule and begins editing. Sarah knows that every time she prepares the schedule, she will spend one to two hours editing it. Again, she feels pressure to complete the schedule as quickly as possible so that she may attend to other store matters. After Sarah fixes most of the gaps left in the schedule, she then enters the new schedule listings into the program. She realizes that time constraints prevent her from sorting out all scheduling problems in one session. This means that once employees have retrieved the posted schedules, she will have to make adjustments to errors allowed by the system.

Finally, Sarah prints out the master schedule and posts it in the break room. Sarah then prints out each employee’s individual schedule and manually cuts them apart. These schedules are placed in a bin for retrieval by the employees at their convenience. Sarah has now spent at least three hours actually working on the schedule in addition to the many hours taken to prepare for scheduling. This huge time investment is aggravating to Sarah and produces only moderately successful results. Despite all of her preparatory work, she will still be correcting and adjusting the schedule throughout the week.

User Constituent: Manager
Task: Find a replacement for an employee who calls in sick
Robert, a 34 year-old man, has worked at Galaxy restaurant as a store manager for three years. His responsibilities include typical managerial duties, including solving unexpected problems and improving service quality. Among his many duties is scheduling and distributing employee schedules every Monday morning. Every employee must submit his or her scheduling form to Robert by Friday. The scheduling form includes personal information and the employee’s availability for the following week.

On busy Wednesday afternoons, Robert usually works in the front section of his restaurant to take care of the VIP customers. During a conversation with an employee, the hostess calls for him to pick up the phone. Robert finishes his conversation with the server and walks to the cashier counter to pick up the phone. “This is Robert speaking,” he says. “Hi Robert, this is Tom,” answers the person on the other end of the line. Tom, a part-time server, is a responsible employee who works very hard to collect money for his college tuition. “How are you doing?” Robert replies, “You don’t sound well. Is everything OK?” Tom replies, “I’m so sorry Robert. I might not be able to come to work today. I have the flu, and I can barely walk. Can you find someone to cover my shift?” Robert responds, “Sure, don’t worry about it, just get some rest and be sure to see a doctor if you start feeling worse. I will find someone to take your shift tonight.” A relieved Tom replies, “Thanks, Robert. I’m sorry for the inconvenience.”

After hanging up the phone, Robert walks back to his office to check the scheduling forms of each employee to see who is available on Wednesday evening. After 15 minutes of searching,
Robert finds two employees who are available at that time. Robert writes down their telephone numbers and calls Jack first. Unfortunately, Jack has plans to go out of town to visit his family that night and won’t be able to reschedule. Then Robert tries calling Janet. Janet tells him that she was supposed to meet her friend tonight but she thinks she can cancel it. Janet promises to call him back in a few minutes after she has checked in with her friend.

While waiting for Janet, Robert continues looking for the next available person who might be able to replace Tom in case Janet is unavailable. A few minutes later Janet calls back to confirm that she was able to cancel with her friend and that she can cover Tom’s shift. Robert is relieved that he was able to find someone, as Wednesdays are busy evenings at the restaurant. Although he is glad to have found a replacement, Robert is annoyed with the amount of time it took him to ensure that he would have sufficient staff coverage for the evening.

User Constituent: Employee
Task: Submit hours for the week
Beth, a part-time employee at a retail store, is preparing to submit to her manager her availability for the following week. During her lunch break, she retrieves her daily planner, scheduling form, and a pen from her purse, and lays them down on the table next to her roast turkey sandwich. As a full-time graduate student, Beth knows that she is not able to work on Monday and Tuesday evenings because of class. She picks up her pen and immediately crosses out Monday and Tuesday nights on her scheduling form, and while taking a large bite of her sandwich, a dollop of mayonnaise falls on her form. She hurriedly wipes off the mayonnaise with a napkin and worries that her manager will notice the grease stain, concluding that Beth is an irresponsible employee.

Trying to put the mishap behind her, she opens her daily planner and continues to fill out her form. She notices that she is available to work on Wednesday anytime from 9am-9pm, and checks off the hours on her form. She is also able to work on Thursday, but due to a doctor’s appointment at 10am she will not be available to work until noon. As she checks off the available hours on her form, she looks up at a baby crying. Returning her gaze to her form, she realizes that she has accidentally checked off the wrong hours. Because she is using a pen, she attempts to scratch out her mistake, and proceeds to check off the correct hours. Beth knows that she is required to work weekends but does not remember if that means that she is required to work on Friday nights. She does not want to work this Friday night because she is jazzed about having been invited to a hopping party downtown. In the meantime, Beth decides to leave Friday night open and to ask her manager if she is required to work.

Almost done filling out her schedule, Beth looks at her watch and notices that she has to be back at the store in 5 minutes. She quickly checks off the hours she is available to work on Saturday and Sunday and frantically puts her things back into her purse. She wraps up her half-eaten sandwich and stuffs it into her purse to eat during her next break.

Once back at the store, Beth finds her manager in the rear office and asks her if she is required to work on Friday nights. With a surprised look on her face, the manager says, “I thought you knew, all employees are required to work at least part-time on Fridays.” With a sheepish look on her face, Beth reaches into her purse to retrieve her scheduling form to check off hours for
Friday, before giving the form to her manager. Turning even redder with embarrassment, Beth realizes that the scheduling form is not in her purse. She frantically checks her pockets, and realizes that she must have left the form on the table at the restaurant because she was in such a hurry to make it back to work on time. “Oh well,” she sighs to herself, as she picks up a new form and begins to fill out her hours again. “At least my manager won’t see all those scratch marks and the grease stain on the form.”

**User Constituent:** Employee  
**Task:** Shift Switch

Maurice works part-time as a bouncer at the XYZ Bar & Grille. It’s Saturday, and the weekly schedule has just been posted. While Maurice is checking his schedule for the week, he notices that he’s been scheduled to work Wednesday from 6:00 p.m. to close. He quickly realizes that he forgot to request this day off, as it’s his brother’s birthday. He’s unable to work the shift and needs to find a fellow employee to cover for him.

The first thing Maurice does is look over the schedule to see when his fellow bouncers are working. He scans the day he needs off for someone who is not scheduled already and finds two options: Mike and Paul are both off on Wednesday. However, Maurice notices that Mike is working the same days he is while Paul is working Monday, the only day Maurice isn’t scheduled. Maurice makes a mental note in case he needs to offer to trade shifts with Paul.

Now that Maurice knows whom he needs to contact, he needs to find their contact information. He walks out of the break room and looks for the manager on duty. It’s a difficult task, as the restaurant is large and the manager is often quite busy. It’s also difficult because the manager is the only person who has access to the office, which is where the contact information is located.

Once Maurice is able to track down the manager, he writes Mike and Paul’s phone numbers down and proceeds to call them. He calls Mike first because he doesn’t want to pick up another shift this week if he doesn’t have to. Unfortunately, Mike isn’t home, so Maurice leaves him a voice mail. He then calls Paul. When Paul answers, Maurice explains the situation to him. Paul says he would be more than happy to pick up the shift if he were willing to take his Monday shift. Maurice explains the situation about Mike to Paul and tells him he will let him know what is happening after he speaks with Mike. Maurice decides to go home and wait for Mike to call him back.

As of Sunday afternoon, Mike has still not yet called Maurice back. Maurice decides to call him again. When Mike answers, he quickly apologizes and tells him he cannot work the shift for him. Maurice thanks him anyway and then calls Paul to notify him of the situation. Paul answers and they set up the change. With this verbal commitment completed, Maurice now heads to XYZ to write the shift change down on a “shift change sheet” for manager approval. He walks to the train station and after waiting several minutes for the train, boards and arrives at the restaurant. He writes out the shift change request and then searches for the manager. After finding the manager and having him okay the change, he again boards the train for home. With the shift change with Paul okayed, Maurice is now able to attend his brother’s birthday party on Wednesday.
User Scenarios – Future System

User Constituent: Manager
Task: Create weekly employee schedule
Sarah, the scheduling manager for a retail store, is responsible for managing employees during business hours, handling customer needs, and monitoring the sales for the business. Every week, Sarah must generate the weekly schedule based on the electronic availability submissions and requests sent online from management and part-time employees. Prior to schedule generation, employee availability submissions are compiled as they are received to create master schedule options.

Sarah sits down at the desk in her office and brings up the TimeKeeper web site. At the homepage, she logs in to the system and her personal page by entering her name and password. Sarah selects the section of the site dedicated to schedule generation and views which employees have still not submitted their hours for the week. She decides that because only one employee has not turned in his schedule, she will go ahead and generate the master schedule and edit him in later. She briefly switches screens to access the special requests section of the site in which employees list requests for days off and schedule swaps with other employees. On this page, she notices that Dan and Rebecca would both like to have Oct. 26th off. Since the store allows a maximum of three requests off per calendar day, she approves these requests by clicking on a “Yes” reply which notifies the employees by email. Casey has requested a day off on Oct. 31st. However, three other employees have already asked to be off on that day. Sarah types a brief response to explain her decision and clicks the “No” reply.

Back on the main screen, Sarah selects the function to perform a final compilation for last minute submissions. Fortunately, the system knows every employee’s job title (i.e. sales, cashier, and stock) and assigns hours based on employee profiles entered when they are hired. After compiling, she requests the program to display the three schedule options that TimeKeeper has compiled. When she has viewed the rating of the schedules generated, she chooses the first option (best) and begins editing it to optimize the schedule based on this week’s sales/trend information to ensure that the store is properly staffed to handle the expected store volume.

Once she is satisfied with the schedule, Sarah directs the system to notify all employees of the weekly schedule by email. Before sending the notifications, TimeKeeper prompts Sarah to enter any special notes to the employees. She clicks yes to accesses the Store Notes screen and types up a reminder that the Fall Sale begins on the 27th. This information is attached to the individual schedules that are emailed out.

Finally, Sarah prints out the master schedule and posts it in the employee break room. She looks up at the clock and notices that she has only been off of the sales floor for 50 minutes and remarks to herself that the old system would have taken most of her shift to complete.

User Constituent: Manager
Task: Find replacement for employee who calls in sick
Robert is a store manager at Galaxy restaurant. His responsibilities include typical managerial duties, including solving day to day problems and scheduling employee shifts. One busy
Saturday afternoon, Robert receives a phone call from Tom, one of the restaurant’s wait staff. Tom tells Robert that he is ill, and that Robert will have to find another waitperson to cover his shift.

To find a replacement for Tom, Robert goes to his office and logs onto his TimeKeeper personal homepage. The homepage automatically displays the current schedule, and Robert clicks on the cell containing Tom’s shift. When Robert clicks on the cell, it appears larger and includes various action buttons. Robert clicks the “Replace” button.

A list of those employees who are not working but who are available for the shift appears. The first person listed is Jack. Robert phones Jack to see if he is available to work that evening. Unfortunately, Jack is not available because he will be out of town. Robert then phones Janet, the second person listed. Janet is available to work and agrees to take on the extra shift.

Robert double-clicks on Janet’s name, and her name appears next to Tom’s name in the schedule. Tom’s name, however, appears with a strike-through. Robert then enters a note into the cell—“Tom called in sick; Janet covered.” After entering the note, Robert logs off the system and is able to quickly return to the busy restaurant floor.

**User Constituent:** Employee with Computer/Internet Access

**Task:** Submit hours for the week

Beth, a full time student and part-time employee at a retail store is preparing to submit the hours she is available to work for the following week. On Wednesday Morning Beth sits down at her home computer with her daily planner, a bowl of Grape-Nuts, and a mug of coffee. She prepares to login to the TimeKeeper website to submit her hours for the week.

While taking a bite of her cereal, Beth opens Internet Explorer and navigates to the store’s TimeKeeper homepage. Once the page finishes downloading, she enters her login and password in the provided boxes and submits the information to enter her personalized scheduling page. On the screen, she sees an option to enter and submit her weekly work schedule. She clicks on this option, and is taken to the scheduling form.

While waiting for the scheduling form to download, Beth takes a bite of her cereal. Unfortunately, the spoon accidentally misses her mouth and she spills cereal and milk on her blouse. A small drop of milk falls on the desk. Grabbing a paper towel, Beth wipes up the small spill, and dabs at the wet spot on her blouse. She realizes that she will have to change her blouse before she leaves for work.

After cleaning up the mess, Beth returns her attention to her computer monitor, and begins to fill out her weekly scheduling form. She notices that the form is similar to other forms she has filled out online in the past, and is able to use this previous knowledge to help her fill out the form quickly. Beth knows that she cannot work on Monday and Tuesday nights because she has class, and therefore does not check off the boxes next to Monday and Tuesday nights on her scheduling form. She realizes that she does not remember if she is available to work on Wednesday and must consult her daily planner. Beth pulls her daily planner out of her purse, and takes a cautious sip of her still hot coffee. She notices that she is available to work on Wednesday anytime from...
9am-9pm, and checks off the box next to Wednesday. She then proceeds to enter in her available hours for Wednesday by clicking the drop down boxes next to Wednesday and selecting 9am and 9pm respectfully. Consulting her daily planner for Thursday, Beth notices that she is also able to work on Thursday, but due to a doctor’s appointment at 10am she will not be available to work until noon. She checks off the box next to Thursday, and selects 12pm to 11pm.

Beth knows that she is required to work weekends but does not remember if that means that she is required to work on Friday nights. She does not want to work this Friday night because she is jazzed about having been invited to a hopping party downtown. To find out if she has to work Friday nights, Beth realizes that she must access the scheduling guidelines page. She clicks the scheduling guidelines button, and notices that she must work at least part-time on Friday. After reviewing the guidelines, she closes the scheduling guidelines pop-up page, and enters the required hours on her scheduling form.

Finished entering her weekly schedule, Beth presses the “Submit Hours” button, to submit her scheduling form to her manager. After submission, her weekly schedule appears on the screen for review. After reviewing the schedule she entered, Beth notices that she entered the wrong hours for Wednesday, and hits the “Edit” button to correct the problem. While taking her final bite of Grape-Nuts, Beth clicks on the drop-down boxes next to Wednesday, and selects the correct hours she can work. After ensuring the information she entered is correct, she clicks on the “Submit Hours” button, and reviews her final schedule.

Satisfied with her schedule, Beth clicks the “Print Schedule” button to print out a copy of her schedule for her own usage. Then, she clicks the “Finalize Schedule” button to submit her schedule to her manager. Content with her experience, Beth logs off of the website, changes her blouse, puts her dishes in the sink, and leaves the house for work.

**User Constituent:** Employee with Computer/Internet Access  
**Task:** Switch shifts with another employee

Maurice is a doorman at the XYZ Restaurant Bar & Grille. He is responsible for checking the IDs of all customers who come through the bar, as well as for general bar cleanliness.

Every week a new schedule is sent out via email by the restaurant’s scheduling manager. Occasionally Maurice’s schedule changes so he needs to be sure to check each new posting. This week his schedule has changed—for the worse. He forgot to request Wednesday off for his brother’s birthday and now he is scheduled to work. He needs to find someone to cover his shift.

The first thing he does is sit at his computer in his dorm room and “wakes-up” his computer. He then goes to his bookmarks on his web browser and finds the bookmark for TimeKeepers.com, selects it, and then logs in. At his personal homepage, Maurice clicks on the shift changing options link. He types in the date and time he needs off and hits the submit button. The system then provides him with a list of potential employees who are available and who are not scheduled to work the Wednesday shift.
Maurice has a few options. He can contact each person on the list individually, or he can “select all” and send a general note asking if anyone is available to work for him. Maurice decides to send an email to everyone on the list asking if anyone can work for him on the day in question.

An hour later, Maurice checks his email. He received three responses from his co-workers. One from John saying he cannot work, another from Mike saying he can, but he would need to switch shifts on Monday with Maurice, and another from Paul who says he can take the shift.

Maurice sends a reply to Paul thanking him for his help. He tells Paul that he is going to create the shift change request form on TimeKeepers.com to send to the manager as soon as he logs out of his email account. He then sends replies to Mike and John thanking them for their willingness to help, but that Paul is going to take the shift.

With that, Maurice logs back into TimeKeepers.com and clicks on the shift change request link. He then clicks on the “send shift change request” and types in the date/time he is giving to Paul, adds Paul’s name in the space provided for who is taking the shift, and types a note briefly explaining what is happening and then submits the form. An email is then sent to him, Paul and to the managers notifying them all that a request has been submitted for their approval.

The next day Maurice checks his email and finds that his request has been approved by the managers and he is now able to go to his brother’s birthday party on Wednesday.

User Constituent: Employee without Computer/Internet Access
Task: Submit hours for the week
Jill, a part-time employee at a retail store, is preparing to submit to her manager her availability for the following week. Unfortunately, she is unable to use the online TimeKeeper scheduling system because she does not own a computer. She is planning to purchase a computer once she saves enough money, but for now, she submits her schedule using a paper form.

During her lunch break, Jill retrieves her daily planner, scheduling form, and a pen from her purse, and lays them down on the table next to her roast turkey sandwich. As a full-time graduate student, Jill knows that she is not able to work on Monday and Tuesday evenings because of class. She picks up her pen and immediately crosses out Monday and Tuesday nights on her scheduling form, and while taking a large bite of her sandwich, a dollop of mayonnaise falls on her form. She hurriedly wipes off the mayonnaise with a napkin and worries that her manager will notice the grease stain, concluding that Jill is an irresponsible employee. She realizes that once she is able to use the online system she will no longer have to worry about problems such as grease stains.

Trying to put the mishap behind her, she opens her daily planner and continues to fill out her form. She notices that she is available to work on Wednesday anytime from 9am-9pm, and checks off the hours on her form. She is also able to work on Thursday, but due to a doctor’s appointment at 10am she will not be available to work until noon. As she checks off the available hours on her form, she looks up at a baby crying. Returning her gaze to her form, she realizes that she has accidentally checked off the wrong hours. Because she is using a pen, she attempts to scratch out her mistake, and proceeds to check off the correct hours. She looks
forward to the time when she will be able to simply hit the delete key to correct her errors. Jill
knows that she is required to work weekends but does not remember if that means that she is
required to work on Friday nights. She does not want to work this Friday night because she is
jazzed about having been invited to a hopping party downtown. In the meantime, Jill decides to
leave Friday night open and ask her manager if she is required to work.

Almost done filling out her schedule, Jill looks at her watch and notices that she has to be back at
the store in 5 minutes. She quickly checks off the hours she is available to work on Saturday and
Sunday and frantically puts her things back into her purse. She wraps up her half-eaten
sandwich and stuffs it into her purse to eat during her next break.

Back at the store, Jill finds her manager in the rear office and asks her if she is required to work
on Friday nights. With a surprised look on her face, the manager says, “I thought you knew all
employees are required to work at least part-time on Fridays. It is posted under the scheduling
guidelines on the website.” With a sheepish look on her face, Jill reaches into her purse to
retrieve her scheduling form to check off hours for Friday, before giving the form to her
manager. Turning even redder with embarrassment, Jill realizes that the scheduling form is not in
her purse. She frantically checks her pockets, and realizes that she must have left the form on the
table at the restaurant because she was in such a hurry to make it back to work on time. “Oh
well,” she sighs to herself, as she picks up a new form and begins to fill out her hours again. “At
least my manager won’t see all those scratch marks and the grease stain on the form.”

User Constituent: Employee without Computer/Internet Access
Task: Switch shifts with another employee
George works part-time as a bouncer at the XYZ Bar & Grille. It’s Saturday, and the weekly
schedule has just been posted. As George doesn’t have Internet access, he is unable to receive
the schedule online, and must wait until he goes to work, or make a special trip downtown to
view the schedule. While George is checking his schedule for the week, he notices that he’s been
scheduled to work Wednesday from 6:00 p.m. to close. He quickly realizes that he forgot to
request this day off, as it’s his brother’s birthday. He’s unable to work the shift and needs to find
a fellow employee to cover for him.

The first thing George does is look over the schedule posted on the office door to see when his
fellow bouncers are working. He scans the day he needs off for someone who is not already
scheduled and finds two options: Mike and Paul are both off on Wednesday. However, George
notices that Mike is working the same days he is while Paul is working Monday, the only day
George isn’t scheduled. George makes a mental note in case he needs to offer to trade shifts
with Paul.

Now that George knows whom he needs to contact, he needs to find their contact information.
He walks out of the break room and looks for the manager on duty. It’s a difficult task, as the
restaurant is large and the manager is often quite busy. It’s also difficult because the manager is
the only person who has access to the office, which is where the contact information is located.
George realizes that if he had Internet access he would be able to obtain the contact information
online, and not have to continue his “wild goose chase.”
Once George is able to track down the manager, he writes Mike and Paul’s phone numbers down and proceeds to call them. He calls Mike first because he doesn’t want to pick up another shift this week if he doesn’t have to. Unfortunately, Mike isn’t home, so George leaves him a voice mail. He then calls Paul. When Paul answers, George explains the situation to him. Paul says he would be more than happy to pick up the shift if he were willing to take his Monday shift. George explains the situation about Mike to Paul and tells him he will let him know what is happening after he speaks with Mike. George decides to go home and wait for Mike to call him back.

As of Sunday afternoon, Mike has still not yet called George back. George decides to call him again. When Mike answers, he quickly apologizes and tells him he cannot work the shift for him. George thanks him anyway and then calls Paul to notify him of the situation. Paul answers and they set up the change. With this verbal commitment completed, George now heads to XYZ to write the shift change down on a “shift change sheet” for manager approval. While walking to the train station, he ponders the thought of buying a computer. He realizes that if he were able to use the online scheduling system his life would be much easier. After waiting several minutes for the train, he boards and arrives at the restaurant. He writes out the shift change request and then searches for the manager. After finding the manager and having him okay the change, he again boards the train for home. With the shift change with Paul okayed, George is now able to attend his brother’s birthday party on Wednesday.

**User Assumptions**

*(Note: Some assumptions may be listed under more than one category.)*

<table>
<thead>
<tr>
<th>Goals</th>
<th>Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>The current scheduling process is dissatisfactory.</td>
<td>Employees would use an electronic, web-based schedule submission system.</td>
</tr>
<tr>
<td>An electronic scheduling system would work more efficiently than a paper system.</td>
<td>An electronic scheduling system would work more efficiently than a paper system.</td>
</tr>
<tr>
<td>Three schedule possibilities are adequate.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tasks</th>
<th>Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managers create the schedule in isolation in their offices.</td>
<td>Employees don’t like driving or calling in to retrieve their scheduled hours.</td>
</tr>
<tr>
<td>Schedule creation involves researching past sales history.</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Behaviors</th>
<th>Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managers Schedule creation involves researching past sales history.</td>
<td>Employees understand store rules and scheduling practices.</td>
</tr>
</tbody>
</table>

HCI 445 – Analysis and Design for HCI
Schedule creation takes day/time/seasonal concerns into account.

### Stage of Use

<table>
<thead>
<tr>
<th>Managers</th>
<th>Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managers are computer literate—advanced beginner to expert range.</td>
<td>A majority of employees are computer literate—novice to expert range.</td>
</tr>
<tr>
<td>Managers have a solid understanding of store policies/procedures.</td>
<td>Employees understand store rules and scheduling practices.</td>
</tr>
</tbody>
</table>

### Environmental Effects

<table>
<thead>
<tr>
<th>Managers</th>
<th>Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managers create the schedule in isolation in their offices.</td>
<td>The majority of employees have Internet access (either at home, school, friends, etc.).</td>
</tr>
<tr>
<td>Managers have access to computers, printers, and the Internet.</td>
<td>The employees are literate and speak English.</td>
</tr>
<tr>
<td>Schedule creation takes day/time/seasonal concerns into account.</td>
<td></td>
</tr>
</tbody>
</table>

What we need to find out about our users, tasks and environments in order to design a successful system:

### Goals

<table>
<thead>
<tr>
<th>Managers</th>
<th>Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the current scheduling process time efficient for managers?</td>
<td>Do employees dislike the current scheduling process?</td>
</tr>
</tbody>
</table>

### Tasks

<table>
<thead>
<tr>
<th>Managers</th>
<th>Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do managers have to approve employee shift changes?</td>
<td>How do employees currently submit long-term availability?</td>
</tr>
<tr>
<td>How do managers find replacements when an employee calls in sick?</td>
<td>How do employees submit special schedule requests?</td>
</tr>
<tr>
<td>How do managers alert managers to last-minute shift changes?</td>
<td>How do employees find other employees to cover their shifts for them?</td>
</tr>
<tr>
<td>How do employees find other employees to cover their shifts for them?</td>
<td></td>
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### Behaviors

<table>
<thead>
<tr>
<th>Managers</th>
<th>Employees</th>
</tr>
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<tbody>
<tr>
<td>When and how does the manager create the weekly master schedule together?</td>
<td>Is 24 hours adequate time for employees to notify managers of employee-arranged shift changes?</td>
</tr>
<tr>
<td>Do managers have to approve employee shift</td>
<td>Do different staff groups submit schedule</td>
</tr>
<tr>
<td>changes?</td>
<td>requests in different manners?</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>How do managers find replacements when an employee calls in sick?</td>
<td>Do schedule misunderstandings contribute to employee absenteeism?</td>
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</tbody>
</table>

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<td><strong>Managers</strong></td>
<td><strong>Employees</strong></td>
</tr>
<tr>
<td>Do managers have access to computers/the Internet?</td>
<td>Do managers have access to computers/the Internet?</td>
</tr>
<tr>
<td>Are managers computer literate?</td>
<td>Are employees computer literate?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environmental Effects</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Managers</strong></td>
<td><strong>Employees</strong></td>
</tr>
<tr>
<td></td>
<td>Do different staff groups submit schedule requests in different manners?</td>
</tr>
</tbody>
</table>
Part II: Testing and Validating Our Assumptions
Pre-Design User Research Techniques

Research Methods Selected:
To test the validity of our assumptions, our team will employ four different user research techniques: one-on-one interviews, contextual inquiry, logbooking and surveying. The two user groups we will target will be store/restaurant managers and store/restaurant employees. In order to develop an understanding of the goals and pain points of our users, we will use surveys to reach a larger number of managers and employees. For a more in-depth exploration of the issues regarding employee scheduling, we will interview both managers and employees to help clarify issues raised in the surveys.

As surveying and interviewing research techniques focus only on what users report about their actual practices, we will also use a combination of contextual inquiry and logbooking in order to further support the self-reported data. Using these research methods, we will focus on fully understanding the needs and goals of one of our target user groups—managers. First we will perform contextual inquiries and observations with available store managers. Managers who are unable to participate in a contextual inquiry, due to store policy and/or time restrictions, will be asked to keep a logbook as they complete the scheduling process for the week.

All user research participants will also complete a demographic questionnaire whether they participate in surveys, interviews, contextual inquiries, or logbooking. The demographic questionnaire will focus on gathering information about each user’s access to computers, the Internet, and their level of experience using computer systems. Finally, for those individuals who participate in contextual inquiry or logbooking, we will ask that they also sign a consent form allowing us to use their information.

User Research Plan

Questionnaire: Everyone who participates in our user research will complete a demographic questionnaire. (See Appendix E to view the Demographic Questionnaire.)

Surveys: We will survey as many store managers and employees as possible, at a variety of different locations. (See Appendices C and D to view the Manager and Employee Surveys.)

- Our team has identified four target stores where we plan to conduct surveys. They include national retail clothing, electronics and art supply stores. In addition, we have also identified one national chain restaurant. One team member will phone the store or restaurant before we visit to take surveys, and will ask to speak with the store manager. The team member will explain the purpose of the project and ask when the most convenient time to conduct the surveying session would be. Once a time has been arranged, a team member will go to the store or restaurant, distribute the surveys, and wait to collect them once the manager(s) and employee(s) have finished.
Interviews: We plan to interview at least one store manager and one restaurant manager. We plan to interview at least two store employees and two restaurant employees. (See Appendices A and B to view the Manager and Employee Interview Questions.)

- One of our team members has open communication with a national retail clothing store. Another team member has open communication with a large restaurant and bar in the Chicago-land area. Each of these teammates will personally coordinate with the corresponding store manager a time to conduct interviews and a contextual inquiry (or logbooking exercise).

Inquiry: Ideally, we will perform a contextual inquiry with one store manager and one restaurant manager. (See Appendix A to view the Manager Interview Questions that will be adapted during the contextual inquiry session.)

LogBook: If we are unable to complete contextual inquiries with either a store or restaurant manager, we will ask that they complete a logbook during one of their schedule preparation sessions. (See Appendix F to view the Manager Scheduling LogBook.)

Consent Form: All store and restaurant managers who participate in a contextual inquiry or a logbooking exercise will sign a consent form. (See Appendix G to view the Consent Form.)

Research Results and Assumption Validation

Our team was able to complete a wide range of user research. We were able to conduct and collect the following:

- 6 demographic questionnaires from store/restaurant managers
- 14 demographic questionnaires from store/restaurant employees
- 4 manager surveys
- 9 employee surveys
- 2 manager interviews
- 8 employee interviews
- 1 restaurant manager contextual inquiry
- 1 store manager logbook

Interviews and Surveys:

Interviews:
In order to gain insight into our user groups and test our assumptions, we included interviews as part of our research. Our team developed two different interviews based on our user groups: managers and employees. The questions explored users’ goals, tasks, behaviors, environment, and stage of use, and addressed many of the issues raised in our assumption and questions lists. The results of these interviews were further supplemented by the results of similarly phrased
surveys which were also distributed to our constituent users. Responses from our participants indicated an overall displeasure with the current system due to a variety of pain points. Managers’ responses outlined the following problems: schedule development is too time-consuming; the current system is not flexible enough; and inconsistencies exist in the submission of availability and special requests. Employee pain points were shown to involve schedule errors, late schedule postings, inconvenient retrieval options, a poor understanding of scheduling policies and procedures, and a lower comfort level with the scheduling process than that of management. Both user groups indicated a strong preference for an electronic / web-based scheduling system.

Surveys:
We developed the surveys to reach a larger number of employees and managers than are possible via other research methods. We developed two different surveys: one for managers and one for employees. The questions on the surveys covered a number of topics and attempted to mimic the interview questions as closely as possible. For the most part, the data from our surveys confirmed our assumptions about our users. The manager surveys confirmed that the pencil and paper scheduling system currently used by the majority of stores (50%) is inefficient. 100% of managers responding agreed that they would prefer a web-based scheduling system. For employees; 44% responded that the current scheduling method is somewhat to very ineffective; 55% responded that they had missed a shift inadvertently due to scheduling misunderstandings; and 55% also responded that they would prefer a web-based scheduling system over the current one. (For a complete breakdown of the survey and interview data, please see the Compiled Survey Data and Transcribed Interviews sections of this report.)

From these results, our design team has seen a need for a uniform schedule submission process, a reduction in schedule prep-time, more accurate schedules, and consistent postings of the new week’s schedule in our product development.

Demographic Data:
Our team developed demographic questionnaires to distribute to all participants. The purpose of the demographic questionnaires was to uncover information about users and their computer habits, access, and experience. We assumed that the majority of our users would have access to a computer and the Internet both at home and / or on the job. The results of our demographic questionnaire confirmed our assumptions. We collected 20 questionnaires in total: 6 for managers and 14 for employees. A high percentage of both managers and employees have computers at home that are connected to the Internet. A majority of managers and employees access their email accounts more than once a week and a high percentage of users consider themselves to be "very experienced" computer users. These results show high levels of computer familiarity and indicate strong support for a web-based system, such as the one proposed by our design team. (For a complete breakdown of the manager and employee demographic data, please see the Compiled Demographic Data section of this report.)

LogBooking:
To uncover any additional aspects of the scheduling process, we developed a procedure list and asked a store manager to walk through the tasks / steps involved in generating the employee work schedule (a contextual inquiry was not possible due to time constraints). Previous research
had shown that a major pain point for managers in schedule creation was the issue of time. Logbooks are well suited for time-starved participants and seemed appropriate for this project.

The entries provided by the manager outlined the process, problems, and interruptions associated with scheduling under one system currently in use in a retail environment. The entire 20-step process was conducted over four days for a total of 4.5 hours. Throughout this process, over 25 interruptions occurred and ranged from phone calls to employee questions to late submissions of schedules and schedule changes. The participant noted that the biggest setbacks in the process were caused by a major event change for the store and employee schedule changes after the schedule had already been generated. The difficulties that arose in this process indicated opportunities for improvement by our design team. By examining the methods used in the current system, we saw the need to facilitate proper and timely schedule submission by employees and the need to reduce the amount of effort required to regenerate master schedules. (Please see the Transcribed LogBook section of this report for more detail.)

**Contextual Inquiry:**

In order to gain insight into the scheduling manager user group and test our assumptions regarding the manager schedule creation process, we decided to include a contextual inquiry as part of our user research. This process was based on the manager interview but allowed for more accurate responses, as the manager was actually interacting with the system while responding to questions. This method helped to facilitate memory cues and allowed for more accurate and system-specific answers. This process also allowed us to see first-hand the manager’s frustrations while creating the schedule. The interview portion explored the user’s goals, tasks, behaviors, environment, and stage of use, and addressed many of the issues raised in our assumption list.

The consensus from our participant indicated an overall displeasure with the current system. Some problems included the following: schedule development is too time-consuming; the current system is not flexible; and inconsistencies exist in the submission of availability and special requests. At times it is difficult for managers to read employee requests: sometimes the requests are lost, or employee names are illegible or not available, resulting in scheduling errors, late schedule postings, employee absenteeism, and employee dissatisfaction. The participant indicated a strong preference for a speedier and less-complicated solution. He stated that an electronic / web-based scheduling system would be beneficial as long as the learning curve is low. (Please see the Transcribed Contextual Inquiry section of this report for more detail.)

The following tables document each of our original manager and employee assumptions. The tables display whether or not these assumptions were validated by the research. Interesting observations, notes and user comments are also included.

<table>
<thead>
<tr>
<th>Manager Assumptions</th>
<th>Match</th>
<th>Non-Match</th>
<th>Notes/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current scheduling process is dissatisfaction.</td>
<td>✓</td>
<td></td>
<td>All respondents expressed desire for a better scheduling process.</td>
</tr>
</tbody>
</table>

HCI 445 – Analysis and Design for HCI
| An electronic scheduling system would work more efficiently than a paper system. | ✓ | Most respondents believe an electronic system would be more efficient provided that the old system remained as a back up and that the new system had a minimal learning curve. |
| Three schedule possibilities are adequate. | ✓ | All respondents stated that scheduling options must be editable. |

### Tasks

| Managers create the schedule in isolation in their offices. | ✓ | Not all respondents work in isolation or in their office. This indicates the user’s desire for flexibility in the scheduling workspace environment. |
| Schedule creation involves researching past sales history. | ✓ | Sales information was not a critical/necessary component for all respondents. This indicates that the need for such information is company-specific. |
| Managers have to approve employee shift changes. | ✓ | All respondents indicated that manager approval was standard practice in arranging shift changes. |
| Managers must find replacements when an employee calls in sick. | ✓ | Common procedure for respondents entailed checking the schedule and contacting other employees to provide coverage. |

### Behaviors

| Schedule creation involves researching past sales history. | ✓ | Sales information was not a critical/necessary component for all respondents. This indicates that the need for such information is company-specific. |
| Schedule creation takes day/time/seasonal concerns into account. | ✓ | All respondents indicated that special events affect the scheduling process. |

### Stage of Use

| Managers are computer literate—advanced beginner to expert. | ✓ | A majority of managers responded that they use computers daily in their jobs. All managers maintain a frequently accessed email address, and 66% of managers classify themselves as “very experienced” users. |
Managers have a solid understanding of store policies/practices. | ✓ | Due to their job natures, all managers have a solid understanding of store policies and practices.

### Environmental Effects

Managers create the schedule in isolation in their offices. | ✓ | Not all respondents work in isolation or in their office. This indicates the user’s desire for flexibility in the scheduling workspace environment.

Managers have access to computers, printers, and the Internet. | ✓ | All respondents indicated that they used the indicated tools in the scheduling process and that they were available for use.

Schedule creation takes day/time/seasonal concerns into account. | ✓ | All respondents indicated that special events affect the scheduling process.

<table>
<thead>
<tr>
<th><strong>Employee Assumptions</strong></th>
<th><strong>Match</strong></th>
<th><strong>Non-Match</strong></th>
<th><strong>Notes/Comments</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Goals</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employees would use an electronic, web-based schedule submission system.</td>
<td>✓</td>
<td>All respondents agreed an electronic system was an appealing option with many benefits.</td>
<td></td>
</tr>
<tr>
<td>Employees dislike the current scheduling process.</td>
<td>✓</td>
<td>Most respondents felt that the current process contained flaws, caused frustration, and could be improved.</td>
<td></td>
</tr>
<tr>
<td><strong>Tasks</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employees don’t like driving or calling in to get retrieve their scheduled hours.</td>
<td>✓</td>
<td>Most respondents felt inconvenienced by the current methods of schedule retrieval, many citing inconsistent schedule posting times as the primary pain point.</td>
<td></td>
</tr>
<tr>
<td>Employees currently submit long-term availability separate from special requests.</td>
<td>✓</td>
<td>A majority of respondents cited the same process for both long- and short-term schedule submissions. Submission methods varied but all required manager approval and some form of documentation for referencing when the schedule was created.</td>
<td></td>
</tr>
<tr>
<td>Behavior</td>
<td>Checkmark</td>
<td>Details</td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>-----------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Employees currently submit long-term availability separate from special requests.</td>
<td>✓</td>
<td>Submission methods varied but all respondents indicated that manager approval was required.</td>
<td></td>
</tr>
<tr>
<td>Employees must find other employees to cover their shifts for them.</td>
<td>✓</td>
<td>Respondents cited several methods for retrieving employee contact information. All indicated that the process was inefficient and disorganized.</td>
<td></td>
</tr>
<tr>
<td><strong>Behaviors</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employees understand the store’s rules and scheduling practices.</td>
<td>✓</td>
<td>Respondents indicated some knowledge of rules and procedures with varying degrees of correctness. All stated managers as the only readily accessible source of information on the subject.</td>
<td></td>
</tr>
<tr>
<td>24 hours adequate time for employees to notify managers of employee-arranged shift changes.</td>
<td>✓</td>
<td>All respondents indicated (and managers confirmed) that this time frame is acceptable. Earlier notices are preferred, however.</td>
<td></td>
</tr>
<tr>
<td>Different staff groups submit schedule requests in different manners.</td>
<td>✓</td>
<td>Respondents indicated that a majority of employees submit schedule requests using the same methods.</td>
<td></td>
</tr>
<tr>
<td>Schedule misunderstandings contribute to employee absenteeism.</td>
<td>✓</td>
<td>Many respondents revealed that scheduling misunderstanding have contributed to their absenteeism or schedule mistakes.</td>
<td></td>
</tr>
<tr>
<td><strong>Stage of Use</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employees are basic computer users.</td>
<td>✓</td>
<td>A high majority (92%) of employees indicated that they use a computer at home. All respondents rated their level of computer experience at intermediate or above.</td>
<td></td>
</tr>
<tr>
<td>Employees understand the store’s rules and scheduling practices.</td>
<td>✓</td>
<td>Respondents indicated some knowledge of rules and procedures with varying degrees of correctness. All stated managers as the only readily accessible source of information on the subject.</td>
<td></td>
</tr>
</tbody>
</table>
Environmental Effects

| The majority of employees have Internet access (either at home, school, friends, etc.). | ✓ | A high majority (92%) of employees responded that they have access to the Internet at home. |
| The employees are literate and speak English. | ✓ | All respondents indicated that a working knowledge of English was essential and required for employment. |

Implications for the *TimeKeeper* Interface

*Based on the results of our user research, our team has identified the following areas on which to focus when developing the prototype interface:*

- Managers should have easy access to the current schedule at all times. The current schedule should be displayed automatically when managers log in to the system.
- Managers must have great flexibility to edit and re-generate schedules based on updated employee input. The schedule generation function must contain as few clicks as possible, and must be very easy to operate.
- Managers will need flexibility to customize the interface for their particular store/restaurant. They must be able to define scheduling rules and employee classifications easily. Managers will also need a section in which to post relevant store policies regarding the scheduling process.
- The current schedule submission process for employees is short—the majority of employees take less than 15 minutes to complete and hand in their schedule requests. To be effective, the *TimeKeeper* system must allow employees to complete their schedule submissions in as little time as possible.
- One of the greatest benefits to employees in using the *TimeKeeper* system will be in schedule retrieval. E-mail notification of master schedule generation will effectively reduce employee time and energy spent in retrieving their schedules. This functionality must work smoothly in order to maintain employee enthusiasm and enforce loyalty to the new system.
Part III: Designing and Evaluating Our Interface
User Personas

Our research uncovered three broad categories of users: store/restaurant managers, store/restaurant employees with access to computers and the Internet, and store/restaurant employees without access to computers and the Internet. To help envision our users as we create the TimeKeeper user interface, we created three main personas on which to rest our assumptions:

“Somchai”

Name: Somchai
Age: 19
User: Employee with Internet Access

Goals
- To graduate with a degree in Anthropology. He wishes to continue his education and receive a PhD.
- During the summer, Somchai hopes to continue working at Ben Pao. He wants to work more hours and earn more money during the busy summer season.

Motivations
- Somchai works to help supplement his income while in college.
- Somchai likes to wait tables at an upscale restaurant because he can earn more money in less hours than at some other part-time jobs—even those that might be closer to campus.

Frustrations
- Somchai does not have a car. In order to pick up his hours, he must take public transportation. He would prefer an easier way to retrieve his schedule.

Needs
- Somchai is a college student and needs a job with flexible hours that can change from week to week according to his course/homework load.
User Personas Continued

**Fran**

Name: Fran  
Age: 53  
User: Employee w/o Internet Access  

**Goals**
- Fran works to supplement her family’s income.
- Fran wants to continue working at TJ Max for as long as she is able.
- Fran does not want to work full-time and enjoys the flexibility of working at a part-time job.

**Motivations**
- Fran strives to perform well at TJ Max because she does not want to lose her job—she fears that she will not be hired at another place because of her lack of computer expertise.
- Fran and her husband just became new grandparents—Fran is looking forward to buying discounted baby clothes at work.

**Frustrations**
- Fran is afraid of the encroachment of computers in her work life. She is uncomfortable with computers and fears that she will eventually lose her job because of her inability to use them.

**Needs**
- Fran wants to keep working at TJ Max for as long as she can. Her husband is facing a forced early retirement and she will need a way to supplement their income.
## User Personas Continued

<table>
<thead>
<tr>
<th>Name: Claire</th>
<th>Age: 33</th>
<th>User: Manager</th>
</tr>
</thead>
</table>

### “Claire”

<table>
<thead>
<tr>
<th>Age:</th>
<th>33</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal:</td>
<td>Single</td>
</tr>
<tr>
<td>Home:</td>
<td>Savannah, GA</td>
</tr>
<tr>
<td>Degree:</td>
<td>Associate’s Degree</td>
</tr>
<tr>
<td>Career:</td>
<td>Full-time employee at J. Crew</td>
</tr>
<tr>
<td>Position:</td>
<td>Store Manager</td>
</tr>
<tr>
<td>Living:</td>
<td>Lives in an apartment in the city</td>
</tr>
<tr>
<td>Computer:</td>
<td>Has a computer with AOL Dial-Up Advanced Beginner with computers and the Internet in general</td>
</tr>
<tr>
<td>Hobbies:</td>
<td>Movies, volleyball</td>
</tr>
</tbody>
</table>

### Goals
- Claire wants to continue her career with J. Crew and someday advance to Regional Manager.
- Claire wants to learn as much as possible about J. Crew policies and procedures.
- Claire wants to be visible to upper management.

### Motivations
- Claire needs to advance her career at J. Crew because she does not wish to go back to school and earn another degree. She feels that without a Bachelor’s degree, her chances for advancement outside of J. Crew are limited.

### Frustrations
- Claire is frustrated that J. Crew seems to hire talent outside of the company when looking for District or Regional Manager candidates. She feels she is very knowledgeable about day-to-day store operations and is frustrated that she is not taken seriously as a District manager candidate.

### Needs
- Claire needs a way to reduce time spent on store administrative duties so that she can focus on developing her employees, increasing store sales and identifying opportunities to excel as a manager.
Future System – Employee Workflow Diagram

Our team chose to complete a workflow diagram of the most critical tasks our user groups have to complete. For employees, we depicted how a user would log into the TimeKeeper system and submit a schedule request. For managers, we depicted how a user would log into the TimeKeeper system and complete the weekly scheduling process.
Future System – Manager Workflow Diagram

Create Weekly Schedule

Log In

- View / Edit Current Schedule Rules
- View / Edit Employee Information
- View / Edit Personal Information
- View Store Policies

Approve Special Request

Send Approval Result

- Yes
  - Contact Employees (Who haven’t submitted Schedule Request)
  - No

Send Notification

- Yes
  - Send Notification
  - No

Click Generate New Schedule

Select thumbnail (schedule options)

- option 1
  - No
  - Select thumbnail (schedule options) option 2
  - Yes

- option 2
  - No
  - Select thumbnail (schedule options) option 3
  - Yes

Edit Schedule

- Yes
  - Edit / Save Schedule
  - No

Add Special Note / Announcement

- Yes
  - Add note / announcement and Save Schedule
  - No

Accept Schedule

Email New Schedule To all Employees

Print Out Scheduling

Log Off
Character Matrix

Our research helped to validate several of the assumptions we made about our primary user constituents. In reviewing our data, however, we noticed variances in the different user groups. As expected, not all managers and not all employees were alike. In order to understand these differences in the aggregate, our team created a character matrix indicative of the users we encountered. As with the user personas and workflow diagrams, our team used this development tool to solidify our understanding of our users, and to focus on designing a system which would encompass varying levels of motivation and ability among our user constituents.

<table>
<thead>
<tr>
<th>User Characteristics</th>
<th>Manager 1</th>
<th>Manager 2</th>
<th>Employee 1</th>
<th>Employee 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer Usage</td>
<td>Frequent</td>
<td>Frequent</td>
<td>Frequent</td>
<td>Occasional</td>
</tr>
<tr>
<td>Windows Familiarity</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>None</td>
</tr>
<tr>
<td>Stage of Use</td>
<td>Expert</td>
<td>Advanced</td>
<td>Advanced</td>
<td>Novice</td>
</tr>
<tr>
<td>Language</td>
<td>English</td>
<td>English</td>
<td>English</td>
<td>English</td>
</tr>
<tr>
<td>Motivation for learning style</td>
<td>High</td>
<td>Medium</td>
<td>High</td>
<td>Medium</td>
</tr>
<tr>
<td>Primary Computer Use at Home</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Internet Access at Home</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Primary Computer Use at Work</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Internet Access at Work</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Internet Access other than at Work/Home</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Email Usage</td>
<td>Frequent</td>
<td>Frequent</td>
<td>Frequent</td>
<td>Occasional</td>
</tr>
<tr>
<td>Environment Effects</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Learning Style</td>
<td>Aggressive</td>
<td>Self-Guided</td>
<td>Self-Guided</td>
<td>Passive</td>
</tr>
</tbody>
</table>

Conceptual Model

Our conceptual model of the TimeKeeper system is a high level representation of how the ultimate user goal—communication—is transformed and improved with the new interface. Two of the major components of the system are human—managers and employees. The third element, the schedule, is a powerful entity that ultimately ties together the two human elements. When the three elements all work together efficiently, communication is increased.
The conceptual model also represents the interaction between any two players in the system. First, employees use the interface to make schedule requests of their managers. Second, managers use the interface to generate schedule possibilities. And third, the interface notifies employees automatically of their new schedules.

**Functionality List for Release One**

*Functions listed in bold will be built into the lo-fi prototypes and tested during the usability tests.*

**Employees will have the ability to:**

1. Sign in to the *TimeKeeper* website through a main screen by selecting the company they work for and entering their username (email address) and password.
2. Retrieve a lost password or username for site access.
3. Create a personal account profile if a new user of the *TimeKeeper* system.
4. Navigate to important areas of the site to find items quickly and easily.
5. Return to their personalized homepage, log out of the system, and access system help quickly and easily.

6. View their current work schedule and future work schedules.

7. Print personal work schedules from the website.

8. View current store announcements.


11. View current scheduled availability, work preferences and desired total weekly hours.

12. Edit/Update current availability, desired weekly hours and effective-until date.

13. Preview changes made to availability before the changes are submitted.

14. Submit change in availability online.

15. Search for available employees by date and time in order to find shift substitutes.

16. Contact coworker(s) by sending them an email directly through the TimeKeeper system.

17. Edit/Update personal account information (address etc.).

18. Submit a special scheduling request for later review by a manager.

19. Submit a shift change form to a manager for review.

20. Add a personal note explaining the need for a shift change when searching for available coworkers to take over a shift, or when submitting a shift change form to management.

Managers will have the ability to:

1. Sign in to the TimeKeeper website through a main screen by selecting the company they work for and entering their username (email address) and password.

2. Retrieve a lost password or username for site access.

3. Set up accounts for new employees.

4. Navigate to important areas of the site to find items quickly and easily.

5. Return to their personalized homepage, log out of the system, and access system help quickly and easily.

6. View their current work schedule and future work schedules.
7. View/Edit master work schedule.
8. Generate new weekly master schedule(s).
9. Choose from among 3 system (only 2 were provided) generated schedules before deciding on a master schedule for the week.
10. Edit/Update the selected master schedule.
11. Notify employees of their hours for the week via TimeKeeper.
12. View employee availability.
13. View a list of employees with expired availability.
14. Prompt employees with expired availability to submit new information.
15. View/Respond to employee special requests through email using TimeKeeper.
16. Print work schedules from the website.
17. View/Edit current store announcements.
20. View current scheduled availability and desired total weekly hours for all employees.
21. Edit/Update personal current availability, weekly hours and schedule preferences.
22. Contact employees and other coworkers by sending them an email directly through the TimeKeeper System.
23. Manually edit individual employee availability/special requests if necessary.
24. Edit/Update personal account information (address etc.).

Qualitative and Quantitative Usability Goals and Measurable Objectives

<table>
<thead>
<tr>
<th>Employees</th>
<th>Qualitative</th>
<th>Quantitative</th>
</tr>
</thead>
</table>
| Login, view and print current weekly schedule. | - Employees are satisfied with the format of weekly schedule. | - While viewing/printing a schedule, employees will generate less than 2 errors. 
- All employees are able to successfully print out their weekly schedule.
- Employees are able to print out the weekly schedule within 3 mouse clicks from login. |
| Submit availability. | - Employees are satisfied with the process of submitting their availability. | - Employees make no more than 2 errors while submitting their availability. |
availability using the TimeKeeper system.
- The availability form is easy for employees to interpret and understand.
- 80% of employees can successfully submit their availability.
- Employees are able to submit their availability within 5 screens from login.

<table>
<thead>
<tr>
<th>Shift change.</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Employees are satisfied with the convenience of the shift change process.</td>
</tr>
<tr>
<td>• Employees commit 2 or less errors when submitting a shift change.</td>
</tr>
<tr>
<td>• 80% of employees are able to understand the shift change process without explanation prior to using the TimeKeeper system.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Managers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qualitative</td>
</tr>
<tr>
<td>Login, view and print current weekly schedule.</td>
</tr>
<tr>
<td>• Store managers are satisfied with the format and layout of the master schedule.</td>
</tr>
<tr>
<td>• All store managers can view current master schedule without asking for help.</td>
</tr>
<tr>
<td>• Store managers are able to view the current master schedule within 1 clicks of login.</td>
</tr>
<tr>
<td>Generate weekly schedule.</td>
</tr>
<tr>
<td>• Store managers are satisfied that they have access to the information needed to make decisions while generating the weekly schedule.</td>
</tr>
<tr>
<td>• Store managers are able to generate a weekly schedule within 5 clicks of login.</td>
</tr>
<tr>
<td>• All of store managers are able to generate a weekly schedule within 5 minutes of login.</td>
</tr>
<tr>
<td>• All managers understand the process of generating weekly schedule.</td>
</tr>
<tr>
<td>Handle availability notification and special requests.</td>
</tr>
<tr>
<td>• Store managers are satisfied with the special request approval process.</td>
</tr>
<tr>
<td>• All store managers are able to notify employees of expired availability within 2 clicks of login.</td>
</tr>
<tr>
<td>• All store managers can complete the availability notification task without requesting help.</td>
</tr>
<tr>
<td>• Store managers can approve/deny an employee special request within 5 clicks from login.</td>
</tr>
<tr>
<td>• Store managers can complete the special request approval process without help.</td>
</tr>
<tr>
<td>Find replacement.</td>
</tr>
<tr>
<td>• Store managers are satisfied that they have access to the information needed to make a decision regarding finding a replacement.</td>
</tr>
<tr>
<td>• 80% of store managers will be able to find a replacement within 7 minutes of login.</td>
</tr>
<tr>
<td>• Managers commit less than 5 errors when searching for a shift replacements.</td>
</tr>
<tr>
<td>• Store managers ask for help less than 2 times while finding a replacement.</td>
</tr>
</tbody>
</table>
Managers are satisfied with the process and ability to add a personal note.

<table>
<thead>
<tr>
<th><strong>General Objectives</strong></th>
<th><strong>Quantitative</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Qualitative</td>
<td></td>
</tr>
<tr>
<td>• Store managers and employees are satisfied with the ease of use of the <em>TimeKeeper</em> system.</td>
<td>• Store managers and employees will not require a general explanation of system logic before undertaking and completing tasks successfully.</td>
</tr>
<tr>
<td>• Store managers and employees would prefer to use the <em>TimeKeeper</em> system over their current systems.</td>
<td>• Store managers and employees will complete all separate tasks in less than five minutes.</td>
</tr>
<tr>
<td>• Store managers and employees enjoy using the <em>TimeKeeper</em> interface.</td>
<td></td>
</tr>
</tbody>
</table>

**Lo-Fidelity Prototype Creation**

Based on our user research, our team created pencil and paper prototypes of both the manager and employee *TimeKeeper* interfaces. We created the first drafts of the pencil and paper prototypes together as a team. One person drew the interface elements while the other team members made suggestions and referenced the research material. We made heavy use of the future system scenarios and the proposed workflow diagrams as we created the first drafts. *(To view the first drafts of the pencil and paper prototypes, please see Appendices N and O.)*

Once the first paper and pencil drafts were created, our team carefully analyzed each screen and made changes to the information architecture, terminology, and action elements. We iterated through this process several times, further refining our original ideas from the first pencil and paper drafts. When we achieved a set of pencil and paper prototypes we felt were ready to test with users, we transferred the pencil and paper prototypes to Adobe Illustrator. Our team felt that testing users with messy and difficult to read paper prototypes would not be as effective as testing users with clean, standardized wireframes. *(To view the wireframe paper prototypes, please view Appendices P and Q.)*

**Usability Test Plan**

**Test Objectives:**
Our team plans to conduct usability testing on the paper prototypes we created of the *TimeKeeper* system. Our overall goal in conducting the tests is to learn whether or not users can successfully navigate through the system. Specifically, we hope to learn the following:
**Employees:**
1. Will employees be able to interpret the online schedule format without help from the Test Monitor?
2. Will employees understand the difference between submitting their availability and submitting a special request without help from the Test Monitor?
3. Will employees be able to figure out the three-step process for finding a shift replacement and submitting a shift change without help from the Test Monitor?
4. Will employees be satisfied with the *TimeKeeper* system overall?
5. Will employees be satisfied with the format of the weekly schedule?
6. Will employees be satisfied with the process of submitting their availability?
7. Will employees be satisfied with the ease of the shift change process?
8. Will employees be satisfied with the convenience of the shift change process?

**Managers:**
1. Will managers be able to figure out how to edit current schedule information?
2. Will managers be able to successfully generate a master schedule?
3. Will managers understand the difference between long-term availability and special requests?
4. Will managers be satisfied with the format of the master schedule?
5. Will managers be satisfied with their access to employee data when working in *TimeKeeper*?
6. Will managers find shift replacements easy to complete using *TimeKeeper*?
7. Will managers be satisfied with the *TimeKeeper* system overall?
8. Will managers trust the system to provide accurate data and comprehensive schedules?

**Overall Test Design:**
Two store managers and four store employees will be evaluated during this usability test. Each participant will be evaluated individually. In addition to the participant, at least three team members will be present in the testing room and will serve in the following roles:

- Test Monitor
- Computer
- Data Logger/Observer
- Additional Observer(s) as available

During the session, the test participant will perform the following:
- Read and sign the Informed Consent Agreement;
- Complete a series of tasks using the *TimeKeeper* paper prototype;
- Complete a Post-Test Questionnaire as a satisfaction/attitude measure;
- Participate in a team led debriefing session.

**Detailed Test Design:**
Prior to the test, the Test Monitor will greet the participant, introduce the other team member(s) and explain the test proceedings, briefly explaining the purpose and high-level functioning of the proposed software. The Test Monitor will then ask the participant to read and sign an Informed Consent Agreement (*See Appendix G*), ensuring that the participant is fully aware of the potential risks and/or benefits of participating in the test.
Throughout the test, the Test Monitor will read verbatim from a prepared script to guide the participant through the testing process (see Appendices H and I for complete scripts). The Test Monitor will not take physical notes regarding the participant’s progress, but will instead maintain mental notes as to the participant’s actions and reactions. The Test Monitor will be present to answer any questions from the participant, but will not volunteer information unless the participant specifically asks for help. In case of participant questions or if the participant encounters difficulty using the prototype, the Test Monitor will carefully follow the contingency measures outlined in the script.

The individual playing the role of the Computer during the test will manipulate the elements of the lo-fi prototype, providing the action for finger taps and spoken commands from the user. The Computer will not speak during the test, and will not take any written notes. The Computer must also ensure that his or her facial expressions and body language remain neutral during the test, so as not to guide or influence the participant.

During the test, the Data Logger/Observers will note such items as errors of commission, omission, excessive time to complete a task, requests for assistance, points of confusion or hesitation, etc. (See Appendices L and M for Observer Data Log sheets.) The Data Logger/Observers will not speak during the test, and will not aid the participant if he or she encounters difficulties using the paper prototype.

At the completion of the test, the Test Monitor will ask the participant to complete a Post-Test Questionnaire designed to collect subjective information about the user’s performance, the application, and how satisfied they were with the application. (See Appendices J and K to view the Post-Test Questionnaires.) When the participant completes the questionnaire, the Test Monitor will begin the debriefing process. At this time, other team member(s) may join in and ask questions they may have regarding unresolved errors or activities observed during the testing session. During debriefing, team members will also answer any questions the participant may have about the proposed system or the testing process.

**Employee Task List Overview:**
1. Login to the TimeKeeper system.
2. View and print your current schedule.
3. Submit your change of availability to your manager.
4. Search for another employee to take over your shift.
5. Alert your manager of your shift change.

**Manager Task List Overview:**
1. Login to the TimeKeeper system.
2. View and print the current master schedule.
3. Notify employees via email if their availability has expired.
4. Review an employee special schedule request and approve/deny the request.
5. Generate next week’s master schedule.
6. Find a replacement for an employee who calls in sick.
**Test Environment:**
The usability testing for managers will be conducted in an office room of a local restaurant. The test facility will be outfitted with a desk, table and chairs. The Test Monitor and participant will sit side by side at the table. The Data Logger and Observer(s) will be seated at least three feet behind the participant, so as not to disturb or distract the participant during the test. The paper prototypes designed for the manager will be displayed on the table and manipulated as necessary by the Test Monitor.

The usability testing session for employees will be conducted in a similar manner to the manager testing using the same physical set-up. The employee testing session, however, will take place at the Student Center on DePaul University’s Lincoln Park Campus and will make use of the prototypes designed specifically for employees.

**Test Monitor Role:**
If a participant encounters difficulty in completing a task during a test session, or if the user asks the Test Monitor how to complete a task, the Test Monitor will respond with the carefully scripted contingency phrases following each task. If a participant exhausts the available scripted contingency responses, or if a participant asks an unanticipated question, the Test Monitor will use his or her best judgment to respond to the participant.

**Evaluation Measures:**
The data collected in the test will be both quantitative and qualitative in nature. During the test, the Data Logger will record each sequential action the user performs in attempting each task. The Data Logger will also record whether or not the user successfully completed each task, how many errors the participant made in attempting the task, and if the user was able to complete the task without help from the Test Monitor. In addition, the Data Logger will also record how long it takes for the participants to complete each of the tasks. Analysis of the task completion data (whether or not the users were able to complete the tasks) will enable the team to determine how easily the users met the test objectives.

To better measure the users’ attitude toward the product and their satisfaction in using the interface, the Test Monitor will administer a Post-Test Questionnaire after the task completion. Participants will evaluate their experience with specific components of the interface as well as with the application overall.

**Findings from the Usability Tests**

**Summary**
Overall, our design for the TimeKeeper web site tested well with both user groups and revealed strengths that should be included in the final design: general site information architecture, link placement / visibility, and content organization. The simplicity, clarity and completeness of the site allowed users to efficiently complete the majority of tasks. However, opportunities for improvement were found to exist in the naming / wording of links and labels, simplification of schedule entry, and changes / additions to functionality within the employee version of the product. The management portion of the site required clearer wording of explanations and small
changes to layout and responsive feedback. Post-test questionnaires revealed that most users found the site to be easy to use, easy to understand, convenient, effective, and desirable.

**Specific Results from Employee Usability Tests:**

**Task Completion/Performance**

*Task 1: Log-in to the TimeKeeper system.*
All users completed this task with ease in less than 20 seconds.

*Task 2: View and print your current weekly schedule.*
All users complete the task with ease after a few moments to scan the contents of the page for clickable actions.

*Task 3: Submit your change of availability to your manager.*
Most users experienced a significant amount of difficulty with this task and only two users were able to complete it. Many users hesitated, reviewed the available links, and selected incorrect sections on their first attempts. They expressed confusion over link labels they felt were misleading or unclear. Eventually, all users navigated to the correct page but were further confused by the lack of an “unavailable” scheduling option on the interactive submission form. Two users stopped short of completing the task, believing that they were already finished. Only one user quickly and accurately completed the task.

*Task 4: Search for another employee to take over your shift.*
Most users completed the task successfully. Only one user hesitated over the link “Submit Shift Change” and voiced confusion over its purpose versus “Find Shift Change.” Several users stated that prior knowledge gained from the previous task allowed them to choose the correct links.

*Task 5: Alert your manager of your shift change.*
All users successfully completed the task. One user expressed a desire for explicit declaration that the manager would be the recipient of the shift change and found the “Contact Co-workers” tab to be ambiguous.

For the complete Employee usability test results, task time tables and analysis of responses to the post-test questionnaires, please see the Compiled Post-Test Questionnaire Data, Compiled Usability Test Results and Detailed Usability Test Task Completion Times portions of this report.

**Strengths:**

**General Site Information Architecture**
- The site’s information architecture tested very well in the paper prototype stage. Task compartmentalization helped to ensure that users did not become lost in cumbersome site architecture and facilitated task completion. Users were able to complete commonly performed tasks, such as “login” and “alert manager of shift change” in addition to more difficult tasks, such as “search for another employee to take over your shift.” With the exception of one major function (changing availability), users commented that the site was
well organized, consistent, and easy to understand. We recommend implementing this information architecture in the final design.

**Link Placement / Visibility**
- Despite the lack of web-specific functionality and clarifying color cues, users were able to understand the site link structure and most link wording. The placement of links along the left-hand side of the page proved easily identifiable and navigable for the test users and should be sustained in the final design. However, a few instances of poor wording resulted in task-related confusion and are addressed in the recommendations below.

**Content Organization**
- Due in part to the previously established information architecture, the organization of content displayed within each section of the site tested well. The site incorporates linear paths for the completion of each task, and in testing, users found most processes simple to follow and complete once under the correct content area. One user stated that the layout of the content was very acceptable. Post-test responses from users indicated that they found the layout easy to understand.

**Recommendations for Improvement:**
Testing revealed several opportunities for improvement in the final design. Typically, users encountered difficulty interacting with the system due to the names used for site sections and oversights in functionality.

**Link / Label Wording**
- During testing, many users expressed confusion over the wording of a few links and the titles of pages. When given Task #3, three of the users seemed to have trouble deciding between navigation links and focused on keywords for clues. The link “My Availability” was frequently overlooked while links with the words ‘shift,’ or ‘change’ were favored. Based on testing, we decided that the link should be changed to “My Available Hours” due to the fact that users failed to respond to the term ‘availability.’ Similarly, the link “Special Requests” elicited comments from users regarding its purpose or content. We decided to change the link label to “Request Time Off,” a more precise description of the functionality of this area. Page titles were altered to reflect these changes and maintain continuity.
- Two users were uncertain if they had completed Task #3 because of the names used for buttons under the “Change My Availability” section of the site. Initially, we had labeled one button “Preview” to indicate to the user that other steps were required to successfully change one’s available hours. At least one user commented that none of the buttons (“Preview” or “Clear”) seemed to be what they were looking for to continue the process. Consequently, we believe that changing the button label to “Next” would provide a visual cue to the user that they had not yet completed the task.
- Under the “Submit Shift Change” section of the site, we noted that one user misunderstood the purpose of the page and believed that he could select someone to cover the shift for him from the list of employees without prior contact with the co-worker. To help prevent further instances of confusion and shift changes without the consent of co-workers, we decided that the label should be changed from “Employee taking over shift” to read “Who has agreed to take your shift?” Using a complete sentence helps to reduce the ambiguity of the function of
the accompanying drop down menu. To further reduce confusion, we plan to include a disclaimer next to the “Submit Change” button that indicates that the user has formally arranged the schedule change with the co-worker indicated on the page.

Drop-Down Menus
• One user provided insight into usability issues on the login page for the TimeKeeper system. The current site design allows for the selection of the user’s company from a drop-down menu. This user stated that if the system were to be used by a great number of companies, the drop-down menu would become unwieldy to search and increase the occurrence of errors. To rectify this problem, we felt that each company must be given its own URL and that the “Select Company” drop-down menu be eliminated.
• We observed most users struggle through Task #3 due to the profusion of drop-down menus on the “Change My Availability” page. Two users seemed overwhelmed by the number of drop-down controls which increased the amount of time it took them to understand and successfully complete the interactive form. The “Preferences” column proved to be too confusing and many users ignored it. We felt that the information provided by the “Preferences” controls was repetitive and plan to remove it from the page. Additionally, to reduce the number of clicks required to complete the page, the ‘dates effective’ drop-down controls will be substituted for an interactive calendar, similar to those found in Windows applications. The use of a calendar control will also be implemented in the “Find Shift Replacement” and “Submit Shift Change” pages.

Functionality
• The most confusing and challenging obstacle for users in completing Task #3 occurred because of the lack of an “unavailable” checkbox option. Most users noted that there was a checkbox column for “available” and voiced frustration at the missing functionality for specifying unavailability for certain days of the week. Future versions of the site will feature radio button columns for both availability and unavailability.

Specific Results from Manager Usability Tests:

Results:
Task 1: Log-in to the TimeKeeper system.
All users completed the task quickly and easily with no errors.

Task 2: View and print your current master schedule.
All users completed the task quickly and easily with no errors.

Task 3: Notify employees if their availability has expired.
All users completed the task quickly and easily with no errors.

Task 4: Approve/deny an employee special schedule request.
All users completed the task quickly and easily with no errors. One user hesitated and was momentarily confused by the pop-up window.
Task 5: Generate next week’s master schedule.
All users completed the task quickly and easily with no errors.

Task 6: Find a replacement for an employee who calls in sick.
Both users experienced significant difficulty with this task. One user quickly discovered that the cells were clickable, but was confused by the pop-up window and its relevance to the task, requiring some input from the facilitator. A scripted hint was provided for one user after he made several false starts and voiced that he “[didn’t] know what to do.” Once he was told that the cells were editable by clicking, he completed the task successfully.

For the complete Manager usability test results, task time tables and analysis of responses to the post-test questionnaires, please see the Compiled Post-Test Questionnaire Data, Compiled Usability Test Results and Detailed Usability Test Task Completion Times portions of this report.

**Strengths:**

**General Site Information Architecture**
- As mentioned previously, the site’s information architecture tested very well in the paper prototype stage and received positive feedback in the post-test questionnaire. The compartmentalization of tasks and the reduction of on-screen information prevented users from becoming lost or disoriented while completing tasks. All but one task was easily accomplished and users stated that they format was easy to follow and understand. We recommend implementing this information architecture in the final design.

**Link Placement / Visibility**
- Similarly, the placement of links proved optimal for user identification. Despite the lack of web-specific functionality and clarifying color cues, users were able to understand the site link structure and most link wording. The placement of links along the left-hand side of the page proved easily identifiable and navigable for the test users and should be sustained in the final design.

**Content Organization**
- Based on testing observations and post-test questionnaire responses, we believe that the organization of content within the site was successful. Similar to the student version of TimeKeeper, we divided the site content into easily compartmentalized tasks and followed a linear process for the completion of each task. All users found the site easy to use and reported that they would enjoy using it.

**Link Wording**
- We observed little to no confusion among users regarding the choice of words and labels for link and site content. Users were able to identify and select the correct areas of the site using the given nomenclature.
**Recommendations for Improvement:**
Testing revealed very few opportunities for improvement in the final design. Users encountered the most difficulty during Task #6, which involved the wording of directions and the degree of hidden functionality in an interactive scheduling component.

**Wording of Directions**
- We observed users having difficulty with Task #6. Neither user immediately noticed nor understood the meaning of the directions for editing the master schedule. One user required assistance from the test facilitator to discover the clickable nature of the cells within the master schedule for editing. Another user was not sure if the ‘edit shift’ functionality was the correct course of action to take to complete the task. Even when a user found the directions “To edit a shift, click on the cell containing the shift,” we observed that the directions did not accurately clarify the task. Therefore, we decided to add “and/or to find shift replacements” to the descriptive text to clarify any confusion about the range of options available under this functional element.

**Functionality**
- In conjunction with the difficulties mentioned in the previous paragraph, we noted that users required more feedback from the interface to augment their understanding of the page and the functional elements. We felt that it was necessary to add a highlighting property to the cells to indicate that they are clickable. It should be noted that the limitations of a paper prototype reduce the level of interactivity and responsive feedback to users making ‘hidden’ functionality nearly invisible.
- One opportunity for improvement mentioned during testing concerned the ability to view all employee special requests. Therefore, a “View All” link will be placed on the next iteration of the site to allow managers to make informed decisions and prioritize approval of employee requests.
- Both users expressed a desire to see all employees listed on the schedule whether they are scheduled or not to assist them in the decision making process for employee special requests and in editing the master schedule.

Ultimately, the overall success of the design and changes made would require further testing on a functional HTML prototype to fully determine value and clarity to users. We are confident, however, that with the information gathered from the initial testing, along with the changes made to the site, the *TimeKeeper* interface will test well in subsequent rounds of user testing.
Analysis of Usability Test Results and Objectives

Our team is pleased to report that with only one round of testing with paper prototypes, the majority of our usability test goals and objectives were met.

### Qualitative Usability Testing Goals
Findings come from evaluation of the Post-Test Questionnaires.

<table>
<thead>
<tr>
<th>Employees</th>
<th>Achieved</th>
<th>Not Achieved</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employees are satisfied with the format of the weekly schedule.</td>
<td>✓</td>
<td></td>
<td>100% of employees agreed that it was easy to print and view the weekly schedule and 90% of employees agreed that the online schedule format was easy to understand.</td>
</tr>
<tr>
<td>Employees are satisfied with the process of submitting their availability using the TimeKeeper system.</td>
<td></td>
<td>✓</td>
<td>75% of employees agreed that it was easy to submit their long-term availability. However, most participants had difficulty completing this task.</td>
</tr>
<tr>
<td>The availability form is easy for employees to interpret and understand.</td>
<td></td>
<td>✓</td>
<td>75% of employees agreed that it was easy to submit their long-term availability. However, most participants had difficulty completing this task.</td>
</tr>
<tr>
<td>Employees are satisfied with the shift-change process.</td>
<td>✓</td>
<td></td>
<td>95% of employees agreed it was easy to find another employee to cover a shift and 95% of employees agreed it was convenient to search online for an available shift replacement.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Managers</th>
<th>Achieved</th>
<th>Not Achieved</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Store managers are satisfied with the format and layout of the master schedule.</td>
<td>✓</td>
<td></td>
<td>100% of managers agreed that it was easy to print and view the currently weekly master schedule and 80% agreed that the online schedule format was easy to understand.</td>
</tr>
<tr>
<td>Store managers are satisfied that they have access to the information needed to make decisions while generating the weekly schedule.</td>
<td>✓</td>
<td></td>
<td>90% of managers agreed that it is a good idea to separate long-term schedule requests from short-term requests when generating schedules.</td>
</tr>
<tr>
<td>Store managers are satisfied with the special request approval process.</td>
<td>✓</td>
<td>80% of managers agreed that it was easy to approve/deny employee special requests.</td>
<td></td>
</tr>
<tr>
<td>Store managers are satisfied that they have access to the information needed to make a decision regarding finding a replacement.</td>
<td>✓</td>
<td>90% of managers agreed that using an automated scheduling tool would reduce scheduling errors.</td>
<td></td>
</tr>
<tr>
<td>Managers are satisfied with the ability to search for employee availability by date and time.</td>
<td>✓</td>
<td>60% of managers responded that it was easy to find shift replacements using the system.</td>
<td></td>
</tr>
<tr>
<td>Managers are satisfied with the process and ability to add a personal note.</td>
<td>✓</td>
<td>60% of managers responded that it was easy to find shift replacements using the system. (This functionality encompasses the ability to add a personal note.)</td>
<td></td>
</tr>
</tbody>
</table>

### General Goals

<table>
<thead>
<tr>
<th>Achieved</th>
<th>Not Achieved</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Store managers and employees are satisfied with the ease of use of the <em>TimeKeeper</em> system.</td>
<td>✓</td>
<td>90% of managers and 80% of employees agreed that overall, the <em>TimeKeeper</em> system is easy to use.</td>
</tr>
<tr>
<td>Store managers and employees would prefer to use the <em>TimeKeeper</em> system over their current systems.</td>
<td>✓</td>
<td>90% of managers and 90% of employees agreed that the <em>TimeKeeper</em> system would provide a more effective means of schedule management than the current method.</td>
</tr>
<tr>
<td>Store managers and employees enjoy using the <em>TimeKeeper</em> interface.</td>
<td>✓</td>
<td>80% of managers and 80% of employees agreed that if <em>TimeKeeper</em> were implemented in their place of business, they would enjoy using it.</td>
</tr>
</tbody>
</table>

### Quantitative Usability Testing Goals

<table>
<thead>
<tr>
<th>Employees</th>
<th>Achieved</th>
<th>Not Achieved</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>While viewing/printing a schedule, employees will generate less than 2 errors.</td>
<td>✓</td>
<td>Users generated no errors in attempting this task.</td>
<td></td>
</tr>
<tr>
<td>All employees are able to successfully print out their weekly schedule.</td>
<td>✓</td>
<td>Users generated no errors in attempting this task.</td>
<td></td>
</tr>
</tbody>
</table>
Employees are able to print out the weekly schedule within 3 mouse clicks from login. | ✓ | All users tested completed this task in 1 click from login.

Employees make no more than 2 errors while submitting their availability. | ✓ | Half the users tested committed more than three errors when attempting this task.

80% of employees can successfully submit their availability. | ✓ | Only 50% of users were able to successfully submit their availability.

Employees commit 2 or less errors when submitting a shift change. | ✓ | No users committed any errors when attempting this task.

<table>
<thead>
<tr>
<th>Managers</th>
<th>Achieved</th>
<th>Not Achieved</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>All store managers can view current master schedule without asking for help.</td>
<td>✓</td>
<td></td>
<td>No users asked for help to complete this task.</td>
</tr>
<tr>
<td>Store managers are able to view the current master schedule within 1 clicks of login.</td>
<td>✓</td>
<td></td>
<td>All users tested completed this task in 1 click from login.</td>
</tr>
<tr>
<td>Store managers are able to generate a weekly schedule within 5 clicks of login.</td>
<td>✓</td>
<td></td>
<td>Store managers completed this task within 3 clicks.</td>
</tr>
<tr>
<td>All of store managers are able to generate a weekly schedule within 5 minutes of login.</td>
<td>✓</td>
<td></td>
<td>Users completed this task in an average of 1 minute 44 seconds.</td>
</tr>
<tr>
<td>All managers understand the process of generating weekly schedule.</td>
<td>✓</td>
<td></td>
<td>No managers required help or explanation to successfully complete this task.</td>
</tr>
<tr>
<td>All store managers are able to notify employees of expired availability within 2 clicks of login.</td>
<td>✓</td>
<td></td>
<td>All store managers tested accomplished this goal within 2 clicks of login.</td>
</tr>
<tr>
<td>All store managers can complete the availability notification task without requesting help.</td>
<td>✓</td>
<td></td>
<td>No store managers requested help in completing this task.</td>
</tr>
<tr>
<td>Store managers can approve/deny an employee special request within 5 clicks from login.</td>
<td>✓</td>
<td></td>
<td>Store managers completed this task within 3 clicks of login.</td>
</tr>
<tr>
<td>Store managers can complete the special request approval process without help.</td>
<td>✓</td>
<td></td>
<td>No managers requested help to complete this task successfully.</td>
</tr>
</tbody>
</table>
80% of store managers will be able to find a replacement within 7 minutes of login.  

Managers completed this task in an average of 1 minute 29 seconds. However, all participants required help to successfully complete the task.

Managers commit less than 5 errors when searching for shift replacements.  

All managers made errors in attempting this task, but the highest number of errors occurring was 3.

Store managers ask for help less than 2 times while finding a replacement.  

Each store manager required help only one time when finding a shift replacement.

<table>
<thead>
<tr>
<th>General Goals</th>
<th>Achieved</th>
<th>Not Achieved</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Store managers and employees will not require a general explanation of system logic before undertaking and completing tasks successfully.</td>
<td>✔️</td>
<td>✔️</td>
<td>The majority of employees needed assistance with the “Submit Availability” task and all managers required help with the “Find Shift Replacement” task.</td>
</tr>
<tr>
<td>Store managers and employees will complete all separate tasks in less than five minutes.</td>
<td>✔️</td>
<td></td>
<td>The longest single task completion time for any manager or employee was 4 minutes 5 seconds.</td>
</tr>
</tbody>
</table>

**Hi-Fidelity Prototype Creation**

After testing the paper prototypes with managers and employees, our team again iterated through the design process and made changes to the paper prototypes based on what we learned from the usability tests. Once the paper prototypes had been revised and refined, we began creation of the hi-fi prototype. We created our hi-fi prototype website in Macromedia Dreamweaver MX and published the results to a web server. All of the elements that we included in the lo-fi prototype were implemented in the hi-fi prototype. Although the Dreamweaver prototype does not interact with a functional database, all prototyped interactions are simulated and hard-coded into the interface for a seemingly functional website.

In order to provide a more complete vision of our system design, we implemented a color palette in the hi-fi prototype. We developed a muted, neutral color palette of gray, beige and shades of blue. We specifically created the muted color palette so as not to attract attention to the colors in the interface. We eventually intend to offer color palette customization to businesses that purchase TimeKeeper. Each business-specific TimeKeeper interface could employ the branding colors of that particular business. *(For screen shots of the Hi-Fi Prototypes, please view Appendices R and S.)*
Part IV: Conclusions
Next Steps and Recommendations

The pre-design and interface design phases of this project are complete. The next phase of this project would require usability testing on the functional hi-fidelity prototype to evaluate the effectiveness of the design changes from the low-fidelity usability tests. Design iterations on the hi-fi prototype could continue if usability testing objectives were not met with the first round of testing.

Once the results of the user testing with the functional prototype met the set usability goals, production of the actual interface could begin. This would require hiring a team of programmers and web developers to write the code and implement the interface. This same team would also test and debug the interface once the application is written.

At this stage, we recommend launching a three-month pilot test with the actual interface at two store locations. This would enable the implementation team to test the application in an actual user environment. Further refinements to the program’s interface and functionality would be completed at this time.

Upon successful completion of the pilot phase, the full-scale product launch would begin. As outlined in the Business Case, the marketing team would aggressively target national retail and restaurant chains. The second marketing phase would most likely target smaller regional and local chains and would occur after the demonstrated success of the product in the first marketing wave. Depending on the total success of the first release, the TimeKeeper development team plans to offer additional functionality for subsequent product releases. New features could be added for additional releases such as deeper customization and integration with existing store applications.

The Case for TimeKeeper

Picture a manager at a popular retail clothing store, or a manager at a busy franchise restaurant. These individuals must juggle several responsibilities at the same time. Whether it’s making sure the inventory is sufficiently stocked for a busy weekend or ensuring there is an adequate amount of food for the coming lunch rush, they do not have large amounts of disposable time to devote to preparing the weekly schedule.

In our discussions with managers of local retail clothing stores and a local franchise bar and grill, we learned that managers spend an estimated two to four hours creating the employee schedules each week. The schedules are often created over several days, with much of this time wasted in trying to read and accommodate handwritten employee schedule requests. Some of the schedule requests are for one-time special occasions; others include long-term availability information that must be stored for future reference. In a busy store or restaurant, these are often misplaced.

With the demands of their day-to-day operations, it is difficult for managers to find the time to create and refine the schedules. When managers do find the time to create the schedules, they are plagued with constant interruptions. Managers informed us that sometimes they are unable to
complete the schedule in time for posting. This leaves the employees guessing at shifts and leads to lowered employee morale and higher rates of employee absenteeism in addition to frustrated managers.

Employees have informed us that they are dissatisfied with their current method of schedule retrieval. Many must make a special trip to work to view the posted schedule. At times, employees’ special schedule requests are not met. This leaves employees in the situation of either missing other appointments or struggling to find a shift replacement. Employees often have difficulty finding others to cover their shifts, as they do not have convenient methods for determining who is available and qualified to work for them. Also, employees do not have convenient methods to contact other off-shift employees to request a shift change. Given this state of affairs, it is easy to see how these problems can lead to unenthusiastic and unmotivated employees.

Clearly, a better solution is needed. *TimeKeeper* is that solution.

*TimeKeeper* will alleviate the frustration of managers and employees alike. It will enable managers to create weekly schedules quickly and conveniently. It will also enable managers to re-generate weekly schedules in case of unanticipated changes—saving managers the time and hassle of preparing two different schedules for the same week. Employees will no longer have to travel to work to view their schedule; it will be automatically emailed to them when the manager finalizes the schedule online. Long-term employee availability information will be stored from week to week within the system, and special schedule requests will be submitted and processed online. This will eliminate problems associated with paper systems such as illegible and misplaced requests.

Shift changes, shift replacements and basic store notifications will also be handled online, allowing employees the possibility of finding their own shift replacements and freeing the store manager from wasting time in contacting unavailable employees. General store or restaurant policy awareness will also increase, as all store policies will be visible and easily updated online. Finally, the ease and convenience of using an integrated, online web-based scheduling application will achieve the ultimate system goal of increasing communication between managers and employees.

Implementing *TimeKeeper* will:

- Decrease manager time spent preparing and revising weekly schedules;
- Increase employee input over the scheduling process;
- Increase the likelihood of certain employee schedule requests being granted;
- Increase employee morale due to increased control over the scheduling process;
- Reduce schedule misunderstandings;
- Reduce employee absenteeism due to schedule misunderstandings;
- Decrease the occurrence of empty shifts when store managers are unable to find last-minute replacements for employees who call in sick;
- Increase the likelihood of employees searching for and successfully finding shift replacements; and
• Reduce the possibility for human error in preparing the weekly schedule.

Managers and employees have the desire for the program. User research revealed that there is a true need for a more effective way to complete the schedule submission and creation process. User testing proved that the interface we created was easy to use. These facts all lead to the conclusion that *TimeKeeper* is a worthy undertaking with the potential to yield a large return on investment.