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freeUP: Productivity Made Possible

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freeUP

Productivity Made Possible

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Abstract

As education evolves, more and more emphasis is placed upon group projects. With group projects come diversity, more in-depth learning, open-mindedness, and a lot of headaches. What causes these headaches? Scheduling! What if there was an app that you could download to schedule those group meetings for you? Well, there is! freeUP is an application that links to your school's learning platform (for example, Blackboard or Canvas) to make scheduling meetings easy and more productive. freeUP will provide much needed answers to today's top group work problems: scheduling, effective communication, and accountability. This thesis will illustrate research and the findings of a study launched specifically around group work and technology. This research was conducted around group work in general, as well as the value brought by using technology to alleviate the pain points of group work. The purpose of this research is to examine how freeUP can help improve team coordination challenges as well as effective meeting management. These problems, or themes, as well as the functionalities derived from their solutions, will be discussed in detail throughout this thesis.

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Introduction

Edward Teller once said, "the science of today is the technology of tomorrow" ("Technology Quotes", n.d.). Science and technology often go hand in hand, especially regarding education and psychology. Technology can be found everywhere; from cars to classrooms, the use of technology is prevalent. As education changes to include current technologies, the structure and dynamics of the classroom are also changing. Teachers are incorporating group work and group projects as often as they can. While these projects range in depth and topics, at the root of all group work lies a certain framework the team must utilize. They must schedule meetings, decide what to meet about, delegate the work, and create a positive group dynamic that they *want* to be part of. For example, a group project at UNH's Peter T. Paul College of Business and Economics could include financial analysis, developing a new product, or coding and producing an entire e-commerce site. Group projects provide extensive value and have numerous benefits (such as learning to adapt to situations, work with diverse teams, and produce a better end product). However, with these benefits, there are also immense challenges. The number one stressor, according to the survey conducted regarding this thesis, is scheduling (32.52% of students). With the help of technology, and a new app called freeUP, hopefully the stress can be minimized; or eliminated. By eliminating the stress caused by the dynamics of group work, team members can instead channel that energy into the deliverable and project itself to hopefully produce a better outcome.

freeUP, a new scheduling and group management app, will help groups to be more cohesive and to help create a more effective group dynamic. While the use of this technology will not eliminate all human-to-human contact (so that group members can still learn how to

grow as individuals through the trials and tribulations of group projects), it will help make the process easier. Throughout this thesis, the application of field research, analyzing group work and technology, introducing Human-Computer interaction, and drafting both a project charter as well as a marketing plan, will help to justify and introduce freeUP. freeUP will help in creating more effective teams, a better group dynamic, and an enjoyable experience for the mobile user.

The remainder of this thesis is structured as follows. The following section introduces the thesis problem statement (the effects of technology on group work) as well as today's current group work issues. Next, the importance of Human Computer Interaction will be discussed, as well as its impact on facilitating effective group work and in today's technology development. Moving from HCI, this thesis will introduce a new product concept, titled freeUP. Once freeUP has been introduced, there will be discussion around it's marketing overview and the software development approach used. The efficacy of freeUP, or this new technology, is then evaluated through survey and interview findings. This thesis will be used to examine the viability and the impact of such a tool.

Technology & Its Effect on Group Work

Practices & Problems of Effective Teams

Group work is the way of the future. Whether it be a group project in school, playing an educational game as a collaborative group, or working together on a deliverable in the working world, groups have been around for a long time and will continue to rear their head in everyday

life. While mostly everyone groans at the mention of having to work with their peers, the results are in the end, much more comprehensive and diverse. Specific to technology careers, it is often commonplace to find teams made up of either individuals whom can fill many roles (quality assurance, systems analysis, and data engineering for example) or filled with one individual who specializes in one subject area. These diverse groups allow for more effective work processes and a more "well-rounded" final result.

In order to form an effective group, there are many aspects that must fall into place in just the right way. Five main aspects of group coordination have been identified as having the most impact on producing effective groups. These five aspects are, as follows: sharing a common purpose or goal, clearly defining roles, identifying a proper leader, proper and constant communication, and motivating one another while creating a positive and respectful group environment. While a group does not necessarily *need* all five tools to be effective, more often than not a combination of these five characteristics will provide a much better group experience as well as producing a better end product. By eliminating the problems that accompany group projects, it allows the members to do what they do best - work collectively to solve a problem. Collaboration is a positive tool, but it should not be used strictly as the only method of producing deliverables. Instead, it should be used when it will provide benefit and will not take away from the individual's experience.

As stated above, groups are a positive learning and production tool, but they are not without their faults and flaws. Some of the biggest impediments to group success are effective communication, accountability, and proper scheduling. freeUP will effectively propose a

solution to these three issues. However, it is important to outline each issue and the impact it has on the effective collaboration within peer groups.

Starting with effective communication, the importance is clear. A group must all be on the same page and must inform one another of their progress, roadblocks, and plans to move forward. As one could imagine, 5 group members who all have even slightly different ideas of how to proceed can be a recipe for disaster. Two ways to promote proper communication are to have an agenda created and distributed before the meeting, and to distribute meeting minutes as soon as possible. Providing an agenda that details the topics and highlights the key points that must be addressed before the meeting is a great way to start communication. This allows the members to look over the contents of the meeting and allows them to gather their thoughts beforehand. In addition, members can determine if the meeting is needed, if the length of the meeting is adequate, and if they have questions or thoughts beforehand they can inform the group in a more timely manner. In addition, an agenda creates a more productive meeting as it discourages tangents and will allow the group to focus more time and energy on the work or project itself. Distributing meeting minutes allows members to remember what was discussed, which leads to more productivity and increases chances of follow-up actions being completed successfully and in a more timely manner. While it's not enough to just send minutes, they must be composed in a thoughtful and concise manner (Sun, 2007).

The next important roadblock to success is the factor of accountability. Accountability, or being responsible for something, is a struggle that most groups face. Without constant reminder or clear identification, it can be hard for group members to remember what their deliverables are. In addition, it becomes awkward when one member does not produce the work they were

accountable for (even though they may have never even known that they were expected to produce it). Closely linked to communication, it is important for everyone to be on the same page and for the meeting minutes to encompass the list of tasks and the member responsible for completing those tasks. When a group is individually accountable for certain tasks that strongly influence the direction of the deliverable, there is a certain level of respect and trust that must be in place. If a group has poor communication, they often times will not trust their fellow members. This leads to a lower desire or motivation to complete their assigned tasks, which further impedes the progress of the group and can create high tensions between members. To combat this issue, the group should assign specific tasks and deadlines to each member. The way that a task is composed can have a drastic effect on the deliverable. It is important that every member of the group understands the "tasks". To ensure this, they should be written as small, achievable goals that will lead to the success of a larger group goal (Duffy, 2016, p. 117-120). Having a clear plan eliminates stress and allows the focus to be shifted to individual contributions. This allows each member to feel like they are bringing something extra to the table. The main thing to be cognizant of, however, is that *everyone* is on the same page, the tasks are clearly defined, and the responsibility taker has agreed and committed to a certain deadline (Tracy, 2011).

Lastly, and most relevantly to this thesis, is the concept of scheduling. One of the largest headaches related to group collaboration is identifying a time that is convenient and available for all of the members of the group. Scheduling is a huge time-suck and really delays the progress of the group. Directly linked back to communication, this process can be very painstaking. If proper communication is not established, the meeting times could be forgotten, misconstrued, or not

conveyed to all group members. A lack of communication could result in members never showing up to meetings, or even knowing who is in their group. Missing meetings, showing up late, or waiting for late members can put a lot of strain on the members who are always on time and prepared. In addition, improper scheduling can create tension between groups. This impacts the respectful environment and can shatter trust between members. While it is hard to keep consistent meeting times, it can make the process easier and consistency will breed better attendance habits. Scheduling is a complex problem that doesn't have just one solution. There are many different scenarios - busy group members, no meeting location, or not enough/too many meetings. Due to the fact that this is such a delicate process, it can often carry a lot of emotional ties and if one member is always corralling the group, they can build up resentment easily. Another headache associated with scheduling is securing the correct amount of time. If a meeting runs over, the group could get antsy and annoyed that they are "late". On the other hand, if the meeting is too long, the group could feel that they are wasting time that they could be doing other things.

Current Impact of Technology in Group Settings

While there are many hurdles involved with group work, the use of technology can help ease the stress of these roadblocks and make them just the smallest bit easier to overcome. One major venue for technology in easing the group work process is communication. By incorporating an aspect of technology, or a screen, those who fear speaking up in group settings or public settings can be given more of a voice than they would have normally. In addition, this could totally change the outcome of the project or the direction of the group. While technology can aid in allowing every member to have a voice, it can also take away from the progress of the

group by becoming a distraction that members can access from the end of their fingertips. Another way in which technology can help make groups more effective is through allowing virtual collaboration. By allowing members to sit behind a screen or have a way to communicate that isn't face to face, pressures to say the right thing can be reduced. In addition, those who have anxiety about being in a group setting or sharing their ideas might be more encouraged to participate, which helps the overall group dynamic. Technology also allows for a deeper thought process. By using online chats or discussions, members can post ideas in advance and in turn, could produce a more thoughtful deliverable by allowing participants to have more time to think and generate solutions (Marquis, n.d.). Technology also allows for a more inclusive group dynamic. If a member cannot make a meeting, or is out of the country, using a technology like Skype could allow them to participate in the meeting and continue to contribute. This can foster a more welcoming and respectful group dynamic, as members who miss meetings might not feel so left out or feel like they are falling behind. Overall, technology can aide the group in a number of beneficial ways. As time progresses, there will be a continuous demand for an increased integration of technology in day to day collaboration.

Effective Groups, Technology, and freeUP

The influence of technology is important in many ways, but especially in explaining the need and functionality of freeUP. freeUP provides a viable solution to all of the identified management problems. As identified later in the product concept pitch, there will be a multitude of group management attributes, outside of the main scheduling functionality. The first would a task list or deliverables manager. This functionality would directly address the idea of individual and group accountability. Having a place to track this electronically will allow the same access to

all tasks, eliminating the responsibility of one member having to track and remind others. In addition, freeUP will contain a progress bar, which will allow members to keep track of their own accountability as well as motivating them towards a common goal. Having a common goal is a large part of having an effective group, so in this way, freeUP will aid in effective group dynamics. Another aspect of this functionality would be the ability to synthesize meeting minutes based upon the upcoming deliverables. The user would be able to select the tasks that they would like to include in the minutes, and would have a textbox that would allow minutes to be updated in real-time. Once updated, the group would receive a notification and would at that point, be on the same page. While the task list would help improve communication, freeUP will have a "chat" feature that will allow members to talk right in the same application. This functionality would eliminate the need for an external chat application, such as GroupMe. In addition, this would reduce anxiety and stress from having to find the group members, get their numbers, add them on Facebook, etc as well as eliminating the responsibility of one member creating a group. Through the use of freeUP, communication would be easier, and in turn would hopefully lead to more cohesive group dynamics.

Moving into the main purpose of the app, scheduling would be the core objective of freeUP. By eliminating the stressors of having to find common times for group members to meet, members could instead channel that energy into the actual deliverable. Survey participants were asked the following question: "If you had a scheduling tool available to your team, do you think it would help your team better meet deadlines?". Of the 123 respondents, 68.29% of participants said yes and 23.58% said maybe. This clearly outlines the market need for such a product. The ability to pull schedules automatically, instead of having to manually decide a time, will

eliminate stress and will hopefully create a better outcome. This outcome will be achieved by allowing all members to start meeting earlier, and work on their projects throughout the semester, rather than completing them at the last minute. Having meetings set-up from the start will enable the group to spend more time on each segment of the deliverable, and eliminate the stress of cramming to complete the project.

Another important set of functionalities that is related to the scheduling aspect of freeUP are the ability to book a room, to receive confirmations, and reminders. According to the article *Tech Tricks for Planning Meetings, "*...changes in plans or forgetfulness can cause problems--so send out meeting confirmations on the day before the meeting. Each day, check the next day's scheduled meetings, and send out email reminders to all of the participants" (Sparks, 2014). Team members are human and in that sense, are apt to forget things. Being able to automate reminders is a functionality that adds immense value. Having automated reminders would reduce, or eliminate, the stress put on one person to continuously remind the other team members of the meetings. In addition, the reminders will give members time to see if they can still attend the meeting. By providing them with enough notice, members can more effectively communicate and in turn, will help to foster the group dynamic. Also impactful on the group dynamic is the ability to book a room from the same screen as selecting a meeting time. Booking a room immediately ensures that the team will have a place to meet privately, which will further eliminate distractions and allow members to work collaboratively and productively. This also eliminates the stressor of having to scramble last minute to book a room, or having to cancel meetings due to a lack of meeting space.

Overall, technology and group work can work together to allow group meetings to run like a well-oiled machine. Implementing features that will ease the stressors of group work (like communication, accountability, and scheduling features) will allow users to reap immense benefits from freeUP. In addition, freeUP will quite literally, free up the groups time - instead of worrying about the dynamics, they can instead focus on the tasks at hand. Not only will the app make collaborative efforts easier, it will also help to foster a more inclusive and effective group environment.

Human-Computer Interaction

What is Human-Computer Interaction?

Human-Computer Interaction, or HCI as it is more commonly referred, is becoming more and more important in today's computer-driven society. HCI influences everything from user-interfaces, usability studies, and day-to-day applications that are crucial for everyday success. HCI encompasses everything from "software, such as what is displayed on the computer monitor, and hardware, such as the mouse, keyboard and other peripheral devices" ("What is Human-Computer Interaction", n.d.). This distinction is important, as it exemplifies just how comprehensive and important this topic is in today's world. Computer science and cognitive science have remained independent subjects until late; this is where HCI comes to play. Some examples of the marriage (called cognitive engineering) between cognitive psychology and computer science would be artificial intelligence, or "smart" data entry (Carroll, n.d.).

Closely linked to the topic of human-computer interaction is user experience. User experience is often overlooked, but is highly impactful and very influential. To describe User

Experience (or UX), one should think of three characteristics: design, customer need, and emotions. Design is important and includes all aspects, including the overall aesthetic as well as the wireframe design, what content is included, and the way the technology is structured. Customer need is important as well, as that is the main driver behind the product. While it is important to make sure that the basic need is being fulfilled, it is just as important that it is being fulfilled successfully and in a manner that the user enjoys. Lastly, the designer must also think about human emotion. The technology (or really, any product) should be enjoyable, rewarding, and make the consumer happy or feel fulfilled. User experience heavily impacts human-computer interaction in the sense that it basically dictates how the user will interact with the computer or the technology. An inadequate user experience can be detrimental in many ways, such as poor sales, poor reviews, poor publicity, etc. to name a few.

Importance, Application Areas and Goals of HCI

Why do human-computer interaction and user experience matter? Well, despite the fact that it's a field that is growing exponentially, it puts consumers and their satisfaction at the middle of all new technology and software development. Consumer happiness has often been an afterthought of development. This impedes adoption rates and makes it harder for products to flourish. After all, if the consumer does not perceive the new technology as having a high rate of usability, they will not download or purchase the new product. HCI also allows for different calibers of users and the creation of appropriate interfaces for each level. A senior in high-school will have an easier time adopting a complex interface then a senior citizen, for example. So it is crucial that developers take this into account when creating applications, technology, or websites. Where is HCI found? HCI can be found in a multitude of fields and industries. For

example, the practice of HCI can be found in software or products made for hospitals, but also found in educational games or applications or even video games. Overall, HCI is crucial in developing adoptable software and software that people actually *want* to use (Carroll, n.d.).

HCI Principles

Much like any other approach to development, human-computer interaction has specific principles and best practices that should be exercised. While the principles may vary from source to source, or from developer to UX designer, there are three general tiers. These tiers include informative feedback, reducing the working memory load, and to provide alternative interface options for different levels of users (Hearst,1999).

Informative Feedback

The first design principle, informative feedback, is most applicable to systems that must handle an immense amount of information. With any system, it is important to gather feedback to understand what is working and what is not. Above and beyond that, feedback helps to make the software more efficient, more user-friendly, and more enjoyable. This communication is important to gather at every step of the process; during design, implementation, and post-release. However, it is just as important to monitor the feedback. While the issues may be resolved, they might rear their ugly head again. Having the prior feedback will allow for a faster solution and to allow the development team to track the progress and error-cycles of the product. “Feedback should be considered to be a way of simplifying the interaction between the user and the system” (Renaud and Cooper, 2000). In this sense, addressing feedback concerns should further influence the future interactions and behaviors of both new and returning users. Below is the Goals,

Operators, Methods, and Selection model; also known as the GOMS model, taken from (Renaud and Cooper, 2000).

Step	Stages of Human Activity	Conversational Stages
1	Establishing the goal	Establishing the goal
2	Forming the intention	Deciding what to say
3	Specifying the action sequence	Formulating the words in the mind
4	Executing the action	Saying the words
5	Perceiving the system state	Hearing the reply
6	Interpreting the state	Understanding the reply
7	Evaluating the system state	Interpreting what was said

There are many steps in the feedback stage, just as there are many steps in a conversation (which, essentially, is what feedback between a user and computer system is). This model not only represents both ideas, but it does so in a thoughtful manner. While it is important to understand the feedback coming in, it is also important that the feedback is relevant, and measurable. Overall, feedback must be continuous. In addition, it must be evaluated, implemented, and archived (Renaud and Cooper, 2000).

Working Memory Load

The second design principle is to reduce working memory load. Working memory load, or cognitive load, refers to the amount of brain-power that is free to process new information. In regards to HCI, cognitive load can be defined as the following: "the cognitive load imposed by a user interface is the amount of mental resources that is required to operate the system" (Whitenton, 2013). Reducing the working memory load is important because the system should not distract the user. The user's cognitive load should be free to process the *information* that they came to your site, application, or software to find. When a product is poorly designed, the

cognitive load must instead be focused on understanding the interface. Not only is this an undesired effect on the user, but it can also lead to frustration or anger. While there is no way to reduce all extraneous working memory load, the design and usability of the site should strive to make it as minimal as possible. This means making the site easy to navigate, easy to read, etc. so that the user can focus on the meaning and the words on the page, instead of the fonts that they were written in. After all, the best or most natural interface designs are those that seem effortless - like they weren't even designed at all. There are many ways to lessen the "brain power" that users must employ. The most simple of these ways is to make the product visually clean, using different forms of media (pictures and videos) instead of dense paragraphs, smart-data entry, suggested search results, or breadcrumbs. When the minds of the user are free to process the information, and not how to navigate the design, sales and enjoyment are increased exponentially (Whitenton, 2013).

Interface Levels

The last design principle that will be discussed is the idea of incorporating different interface levels. These interface versions are dependent on the skill level or demographics of the user. When considering HCI and usability, there must be tradeoffs between "simplicity versus power" (Hearst,1999). A simple interface will reduce the user's working memory load, but it can also be boring or basic. A powerful interface, on the other hand, is more advanced and can provide more benefit to the direct user. However, this benefit is often shadowed by the learning curve that must be in place to learn how to use the interface. Some categories of users include: novice, intermittent, and advanced. It is important for the product to reach all three categories, but it becomes a slippery slope when trying to design such an interface. If it is too simple, the

advanced user will become bored or annoyed. On the other hand, if it is too complex, the novice user may give up or become very frustrated. It is important for the development team to decide which path they would prefer to go initially, and then either work up to a more advanced or work backwards to a more basic interface. In order to create a design that will satisfy the majority, the team must know both the user who will be engaging with the end-product as well as identifying the tasks that these users will be aiming to accomplish ("HCI Principles", n.d.). By creating "user profiles" or use-cases, the design will be more well-received by each user profile. In addition, offering different interfaces is another solution that will cater to the needs of the product's market.

Overall, HCI is a very important and critical part of development that must be implemented in every aspect of design. These three principles will help to guide the development team to a successful design. No matter how big or small the product is, HCI will aide in increasing use and adoption rates.

General Approaches to HCI

There are many different approaches to implementing HCI in any interface development. Within this section, 4 different approaches will be discussed. These approaches are the anthropomorphic approach, the cognitive approach, the empirical approach, and lastly the predictive modeling approach. While these approaches are all very different, they do not have to be mutually exclusive. In fact, combining approaches can be more beneficial at times than choosing one, ill-fitting approach. When selecting a design approach, it's important to keep three things in mind: the design principles, the general goal of the product, and the end-user.

Anthropomorphic Approach

The first approach is called Anthropomorphic approach. Anthropomorphic can be defined as, “having a human form or human attributes” (“Anthropomorphic”, n.d.). In terms of HCI and usability, this means including a personal touch. For example, when asking Apple’s Siri a question, it can be challenging. When she does not understand the request, she will respond with something like “I’m sorry, but I don’t understand that”. This sort of phrasing mimics how a human would interpret the same situation. By including specific wording, the user might feel more comfortable or more like they are interacting with something in a more human-to-human setting. Within this approach, there are two subcategories, affordances and constraints. Much like human-to-human interaction, there are certain behaviors that are allowed or expected. Affordances are basically the actions that are allowed within certain categories or graphics. For example, when a user scrolls up and down a page, they expect to have to drag the bar on the side or bottom of the screen. The graphic, or the slider bar, is expecting this behavior and will allow it. If the user were to click on the bar, it would not do anything - because it is not expected to allow that specific behavior. In this example, not moving by being clicked on would be an example of a constraint. Another, more common, example would be a grayed-out text box. Affordances and Constraints help to instruct the user and can help to reduce working memory load (“Usability First”, n.d.). Overall, this approach is rather simple to implement and can really change the overall perception of the end-product.

Cognitive Approach

The second approach, or the Cognitive approach, is a bit more involved. The overall goal, however, it really focused on the brainpower of the user. Within this approach, there are three main paths that a developer can take. These paths are metaphoric design, the workload model, and HPI. These methods can be used together or separately.

Metaphoric Design

The first is by using metaphoric design. The best example of this is the idea of using the virtual "trash can" to indicate to a user that they should dispose of unwanted documents in that location; much like they would in their normal day to day behaviors. Using this design approach allows users to learn new interfaces quickly, as they are already familiar with the designs in real life ("Usability First", n.d.). While this is a great approach if the design needs to be learned quickly, if the metaphor is not taken seriously or literally enough, it can create confusion.

Workload Model

The next method would be the attention or workload model. Closely linked to the principle of minimizing working memory load, the whole idea behind this approach is to make things as simple and succinct as possible. The main goal is to keep the user engaged, despite their relatively short attention spans. A huge problem with interfaces is that most users get overwhelmed, or underwhelmed for that matter, and abandon them all together. An example of this in practice today can be found on almost every ecommerce site. When checking out to purchase products, the user must input the important information regarding shipping and payment methods. These forms are often on different pages, or in different layout sections.

Splitting the input areas creates an illusion of less work, which will keep the user engaged longer. If the required input fields were placed together to form one long page, the workload might be perceived as excessive and, at this point, the user might abandon their purchase all together.

Human Information Processing Model

The last approach within the Cognitive design style is the human information processing model, commonly referred to as HIP. The HIP model is rather complex, but focuses on making memorable impressions that the user can easily recall from long-term memory when revising a specific action. This is heavily influenced by the coding of an experience or memory from short-term to long-term memory. The environment and experience (or the usability) can strongly impact how well this memory is transferred. If the action is successfully coded, the user will recall the memory or action more accurately. This is important in design, because it can leave a lasting impression on the user. This impression can make future interactions more successful, as well as creating a more superior brand-image in the user's mind.

Empirical Approach

The empirical approach is based on observations, rather than thoughts or theories. This distinction is crucial, as it provides a whole new perspective. Focusing on usability studies, or really watching users interact with the platform, is an enlightened way to gather information. The researcher can physically see where the pain points are. This is important because some users might not even realize they are having trouble or using the system differently than the

development team intended. There are two levels of the empirical approach; human task performance measures and A/B testing.

Human Task Performance Measures

Human Task Performance Measures are important for a multitude of reasons. As stated above, it is important that the user is using the system as intended; or completing the correct tasks in the intended way. Typically, this happens in a lab setting to determine which layout is more user-friendly. The researcher will define a series of tasks such as: login, find the CEO, etc. and will watch as the user completes these tasks. There are many different variations of these studies. For example, studies can be timed or even recorded. These studies provide valuable results, as they can help the design team fix areas they might not have identified as pain-points through system feedback. There are two ways to measure these studies. The first is an absolute measurement, which would be if the user could (or could not) accomplish the task they were assigned. The other form of measurement is more subjective. This can be setting a time limit for a task, or how many different items they had to click before they achieved the desired outcome ("Usability First", n.d.). The data gathered from task performance studies (or usability studies) is invaluable. It can be used to analyze how well the design and development team has stuck to the guiding principles as well as how effective their chosen design approach was. While this form of empirical approach should not be used alone to judge an interface, it can have a huge impact on the end-product.

A/B Testing

A/B testing can be seen as the second level of the Empirical approach. This form of testing includes tracking the different interactions between two user-friendly interfaces. This can be done in a lab, or post-production. Most A/B testing, however, is done through analytics and without the user knowing that they are participating. The results of this testing can help determine the most effective interface. The effectiveness can be judged on many things including, but not limited to: the click-through rate, the conversion rate, and the bounce-rate. A/B testing allows for the best usability experience for the end-user ("Usability First", n.d.).

Predictive Modeling Approach

The last approach to human-computer interaction development is the predictive modeling approach. This approach is based upon the GOMS model, as mentioned above. The Goals, Operators, Methods and Selection model can help outline the design in an extensive way. This approach is based solely on the user and, as the name states, predicting their behaviors. By using this approach, the development team can design the interface as a holistic process instead of just focusing on end goals or how the user interacts with the interface.

Approach to HCI Used in this Study

In regards to freeUP, it is very important to think about user experience design when creating the prototype. An aspect of software design that is often overlooked or considered last priority is the response time. However, this is where HCI can become very powerful. A study revealed that much like humans and body language, a device or piece of technology should

respond within a few tenths of a second, or the user will become discouraged or frustrated (Kohrs, Angenstein, and Brechmann, 2016).This is crucial when developing the interface, because anger will turn the user off and will provide the app (or software) with a bad reputation before it even launches.

When deciding what approach to use with the creation of freeUP, it is important to identify the end goals and the real benefit that users can derive from the application. While there is a clear market need, it is important that the multitude of desired features don't distract the user from the end goal - a better group experience. The approaches used in the design of freeUP will include a few aspects from all four of the methods described above. From the cognitive approach, the focus will be on both the workload model and the metaphoric model. In regards to the workload model, there has already been research conducted around user's favorite apps. For example, the interview respondents were asked what their favorite app was, and then were asked to explain what features they favored or why they enjoyed the app. For example, one respondent stated that Instagram was their favorite because it was clean, visual, and had minimal reading involved. There is minimal working memory involved in using an app like Instagram, which probably is why it is is popular. Taking inspiration from these answers will help in aiding the UX design of freeUP. To gain empirical data later in the process, the app will utilize human task performance measures to analyze just how effective the interface is. While these are the identified methods that will be utilized in the development of freeUP, they are not set in stone. If the development team feels they will benefit from incorporating aspects of different approaches, they will be free to mix and match as they please.

freeUP Product Concept

Based on the above discussion about group work and intertwining technology, there is a market gap that begs to be filled. That's where freeUP comes in. As education evolves, and as more group projects become part of the daily coursework, it is important to figure out a more efficient system to aide in these projects. Through our survey data, we have identified that 32.52% (40 participants) identified that the most stressful aspect of group projects is scheduling. With this significant amount of students, clearly something needs to done.

freeUP, a homegrown scheduling app, will mitigate these headaches and allow the focus to be shifted back to the diverse learning and the ability to reap the educational and real-world benefits that come with group work. According to Jill Duffy, "Part of being organized is creating habits that help us get the most out of every day. When we rely on habits rather than deliberate actions that require conscious effort, we free up our brains for more important stuff" (Duffy, 2016, p. 117-120). freeUP is an application that links to a higher-education learning platform/course management system (for example, Blackboard, Canvas, Moodle, etc) that would make scheduling meetings easy and effortless. The group leader (either self-identified, or identified by the professor) would add the other group members to a "group" in the freeUP platform. Once the members are added, the app can really begin to work it's magic. freeUP will pull from the learning platform the group member's schedules and automatically analyze them behind the scenes to synthesize and identify 2-3 plausible meeting times that work for all of the group members, without having to speak a word to one another before this step in the process. In addition, there will be a section within the application's user profile that will allow the user to

add in additional scheduling details that might not be located on the learning platform. These details could be items such as: work schedules, sports games and practices, appointments - really any external conflicts that the user knows ahead of time. Once a selection of times has been produced, the app will send these times to all of the users, and allow the group to come to a consensus. After the initial meeting is scheduled, the user has the ability to select the meeting time as re-occurring (with options such as: daily, weekly, bi-weekly, monthly, etc). This functionality would allow the group to take the stress out of scheduling, and will further allow them to better manage their time. As the group schedules meetings, they will also be allowed to book a room (based on the school's ability to permit this). For example, at UNH, the user would have the option of booking a room in Paul College or in Dimond Library.

In addition, the application will send a calendar invite to the users mobile phone (if they so wish) that will allow them to easily add the meeting into their schedule. Along the same lines, freeUP will also have the capability to send SMS texts and push notifications to the group members to remind them of the meeting. These notifications will be sent at a frequency that the group prefers, such as a week before, 2 days before, the day of, a combination of all three, or none at all. These reminders will hold group members more accountable, but it will also allow the group to not put the added stress on the "leader" to remind them of the meeting.

Additional functionality will include group management attributes. The first added functionality will be the ability to create a task list within the application that can be either manually added or imported from the project description or the professor's syllabus. These tasks would be broken down into meeting agendas (that can be viewed by clicking on each meeting date on the calendar) and would be broken down based on the group's specifications. When

surveying 123 students, 19.04% of the participants said they would like to see this functionality included in a scheduling app (such as freeUP). Having a task list that allows users to "claim" tasks increases accountability (and quite frankly, allows you to track deliverables). In addition, there will be a "progress" bar that will show the group how much of the project they have completed, as well as how far they have until the "completion" date. This date would be specified either by the user (manually) or through the imported syllabus. Lastly, freeUP would include a chat feature that would allow the group to communicate within the app, eliminating the need for external ways of communication (group texting, facebook messenger, messaging apps such as Groupme or WhatsApp). This functionality would decrease the friction, noise, and the responsibility of adding another step to group projects and would allow for easier communication flow.

freeUP Project Plan

As with any new technology or software, it is important to outline the project development plan. While freeUP won't have a "project manager", per say, there will be a plan set in place for the development. Please reference Figure D in the Appendix to view the wireframe of the freeUP interface.

Software Development Approach

The software development will be completed using the agile methodology. Agile is a software development approach that works in iterations, so that progress is a cycle instead of a lateral movement. At the end of each iteration (which is typically called a sprint and has a

definitive time period), the team should have produced a “shippable” or functional sub-product of the larger end-product. The benefits of agile are numerous, but the most applicable to the development of freeUP is the ability to continuously test the app as well as being able to “fail fast”. The faster the development team fails, the faster they can combat their failure and turn it around (and hopefully into success). This methodology involves utilizing a “scrum team”. A scrum team is a diverse team in which each member holds a unique role that has been internally chosen (playing heavily on individual and team accountability!). For example, each agile team has a “scrum master”; someone who does the planning and for all intensive purposes, acts as the project manager. However, these roles are cross-functional and flexible, allowing for diverse teams that can adapt quickly to ever-changing requirements and project demands (“The Agile Movement”, 2008).

Agile is the best fit for the development of freeUP because it is a consumer-experience oriented project. This project needs to be continuously and constantly tested, as there are a lot of functionalities that are critical to its success. The timeline for this project is about three months of development time, based on the resources and without drawbacks. Because this is a new project, there won’t be a huge project backlog. Instead, there will be carefully planned tasks. This allows the development team to pull in different aspects, or tasks, when there is bandwidth during the sprint or to plan the sprint accordingly.

Project Scope and Requirements

The scope of the freeUP development process is not easily defined, as there are many different desired functionalities and features. The first and foremost objective is to create a scheduling app that will pull data from the learning platform’s (canvas, blackboard) data schema

or database. This data will then be analyzed and compared to all other group members to find common blocks of "free" or unscheduled time. Also included in the initial development will be the ability to add in additional "busy" blocks manually. The app must be able to cross-reference this data to make sure the common "free" time does not conflict with the additional scheduling conflicts. Also included in the scope of initial development is to allow users to be registered for more than one group (as they more than likely have more than one group project, as stated above, most have 3+ a semester). Next, freeUP must be able to house contact information in a secure manner, with the ability to email and "chat" other members. To do this, the app will pull from each group member's personal user profile, that they must set up at the initial download phase. The app will then display this data and will provide functionality to message members. If linked to canvas, this functionality would piggy-back off of their existing "message" function. Not included in the scope of initial development would be the ability to integrate an external email server, such as outlook or gmail. The most requested feature, a task-list, will require a bit of creative thinking. The end-goal would be to automate the process of pulling tasks from a syllabus or project outline. However, included in the scope of initial development, would be the ability to manually identify tasks and assign them to certain members (or roles). Users would like to self-designate roles once placed in their groups; however, these roles must be able to vary from group to group. In addition, the tasks can become interactive and users can "check off" task boxes once complete. These checkboxes would feed into the real-time progress bar, viewable by all members. There will also be a notes section for users to input important notes and key takeaways. Next, freeUP must include the functionality to book a room directly from the "schedule" screen. This functionality must be basic initially, as each school will have different

"room" options. The scope for the initial development would be to build in functionality for PAUL breakout rooms and the library. Not included in the scope would be the broader functionality to book any room that is "bookable" on campus. freeUP must have the ability to sync with both iOS & Android calendars, so that scheduled meeting times and rooms will be automatically created as a "meeting" or "event" on the user's mobile phone. In addition, there must be SMS integration. This proves to be a bit trickier as the team must find a way to collect all member's phone numbers and carrier data based on the user inputs. This would be used for reminders, which are a critical aspect of freeUP's success. Another important aspect that will be in-scope is the ability to add "friends" on freeUP, keeping the social aspect integrated and engaging. Lastly, freeUP must have the ability to send "push" notifications to users, as a second form of reminders. These reminders must have the ability to be time-controlled and scheduled for certain time blocks (days, weeks, etc). Out of scope of this project would be the ability to customize the reminder text.

The scope will *not* include any additional versions, functionalities, or improvements past the initial development stage. At this time, the scope will be re-visited. The requirements listed above (or the "in-scope" tasks) must be testable, measurable, and clear. Without these three characteristics, the requirements will not lead to a quality end-product.

Use Cases

A large part of end-user acceptance is the ability to continuously test the product. Utilizing the agile methodology will allow the development of freeUP to be comprised of individual functioning bits and pieces to make one cohesive application. However, it is important to test smart, test early, and test often. A huge part of testing will revolve around HCI and

usability testing. This is where "use cases" come into play. These use cases will help guide the interface design as well as gauge the effectiveness of each feature integration (Belhocine, Zenati-Henda, Bellarbi, and Tadjine, 2014). While there are many ways to formulate a use case, below is the general use case that will help to guide the development of freeUP.

> "As a student, I should be able to easily add my group members to a "group" in freeUP so that I can start the scheduling process. After I add these members, I should be able to find meeting times to schedule a meeting. I should be able to book a meeting room, set up reminders, and see the event added to my mobile phone's built-in calendar so that I do not forget about it. I should also be able to add in my work schedule or extra-activities, so that freeUP knows I am busy during select time slots. I should be able to manage the project task list, so that we can stay on top of deliverables. I should also be able to message my group, so that we can communicate easier."

In this use case, each statement's structure provides the requirement, the expected structure, and the argument. The argument, while not always necessary, can make the functionality seem more personable, and in turn, can allow the development team to better understand the need and end-goal. Overall, use cases help to keep the team on track and allow them to better integrate the user's needs and predicted actions to create a more user-friendly interface.

Resources

There are three categories of resources regarding the development of freeUP. These categories include personnel, the technology stack, and financial resources. While there are additional resources that might need to be sought out (support, guidance, or advice) they will not be included in this outline. Starting with personnel, freeUP will need a developer. Overseeing the

project will be both Jordan Collins and Nicole Meyers, as they are the project owners and co-founders. This developer has yet to be sourced, but will work closely with Jordan. Jordan will help to conduct usability testing and research regarding the wireframe. In addition, she will offer her system analysis, quality assurance testing, and limited software development skills. Regarding the tech stack, freeUP will be developed using Intel XDK or Swift, and wireframed through Justinmind. Brackets will be used for writing stand-alone code and CSS. These technologies might change as customer needs change, or additional softwares may be integrated into the process. Lastly, the budget for this development project will be as minimal as possible. If freeUP can be developed in-house, the budget will be $150 or less. If a developer must be hired, then the budget will need to be renegotiated at that time. However, the cap for the budget will be no more than $750. Overall, these resources are being defined at a high-level overview and are subject to change.

freeUP Marketing Overview

Situational Analysis & Current Market State

While there are not applications on the market *exactly* like freeUP, there are a few different categories that freeUP can fall into. These categories are group messaging applications, scheduling applications, and project management applications. Smartphone apps, as an industry, brings in an annual revenue of 12.6 billion dollars with a profit of over 390 million dollars. Within this market, 47% of the apps are games, 32% are social media apps, and the remaining 21% are comprised of the following categories: news apps (9%), entertainment apps (7%) and lastly, other (5%). freeUP would be part of the "other" category (Carter, 2015). There are

millions of apps, but currently there are more than 80,000 educational or related apps in the app store (Nelson, Fien, Doabler, and Clarke, 2016).

Within the "other" category, there are, as stated above, three categories that freeUP overlaps with. The first would be group messaging applications. freeUP's major competition in this space would be GroupMe, Facebook Messenger, and WhatsApp. GroupMe was recently acquired by Skype for over 80 million dollars; proving to be a large competitor for freeUP (Shontell, 2011). In 2016, they had over 100,000,000 downloads and raked in over $330,000 in revenue ("GroupMe", n.d.). Facebook Messenger is also a strong competitor at over 1 billion users, as of July 2016 (Constine, 2016). These two competitors alone make it challenging to enter into the field as strictly a "group messaging" app, so free-up must not position on this feature. In addition, the chat functionality within freeUP must be convenient enough that users do not revert back to these apps. The next category that freeUP is competing directly with is the scheduling apps that currently exist in the market. The two largest competitors in this group are Doodle and When2Meet. While there are many other variations in the current market, these two hold the most market share and the most name-recognition. They are both essentially a polling service that allows users to enter their blocks of free and busy times, and produces the group leader with the availabilities that work for everyone. Lastly, freeUP can be compared to project management apps. There are many out there, but most do not have mobile apps. Instead, software platforms like Asana and Jira are designed for desktops. Overall, while there is much competition in the market, freeUP has a unique positioning in which it could really fill an existing market gap.

Strengths, Weaknesses, Opportunities & Threats Analysis

Strengths

A major strength of freeUP is that there is a strong market need for such a product. In addition, consumers have reacted positively and seem open minded in regards to trying a new software. In addition, consumers are typically willing to try a new free app - they have nothing to lose, in all reality. This makes the distribution and adoption period shorter, which is a strong point for freeUP (and really all mobile applications). In addition, the benefits - increased group productivity and more effective groups - will provide a strong point for freeUP that other products in the market cannot rival.

Weaknesses

While there are many strengths for freeUP and the creation of new mobile apps, there are also a lot of weaknesses within the market. This market is heavily penetrated, which makes it hard to enter for a new product. In addition, there are always new softwares and apps popping up, which makes it hard to gain market share. In addition, freeUP's competitors are large companies that hold a large share of the market as well as brand recognition (ex: Facebook). This will make it hard to compete with, but it is certainly not impossible.

Opportunities

A major opportunity for freeUP is the growing technology dependency. As more and more smartphones penetrate the market, the need for apps will keep growing. The world is becoming a more mobile and tech-dependent society, which creates endless opportunities for any

types of apps to enter the industry. More specifically, education has been a hot-spot of technology integration as of late. Creating an app that can start with college students, and move into different venues, will allow freeUP with the opportunity to create a brand-following more easily and to hopefully open up more doors into the educational market. As identified in the situational analysis, there is no app that does all three things: project management, group chat, and a scheduling app. This is an opportunity because it allows freeUP to offer benefits that consumers in the market have not previously had access too. In addition, it provides for a unique proposition and augmented product concept. The multitude of features that freeUP will provide will attract users in a multitude of ways - either for a certain feature, or because it really is an all in one app.

Threats

While it is an opportunity that the market for smartphone apps is constantly growing, it is also a huge threat. With such high and constant growth, more and more companies will try to enter the market. In addition, apps are being created every day - making the stakes much higher for those who are entering the market. In addition, once an app gets released, it is hard to patent the idea. It is very hard to get a utility or design patent on technology. Because it is a fast moving market, apps can fade out very fast. Technology is constantly suffering from creative destruction, which could render the newest products in the market obsolete in a short amount of time with new and better technological advances. Unless the design of freeUP is revolutionary and functional, it will be hard to hold a large market share for a long period of time.

Market Segmentation & Target Market

As identified in the survey results, 67.48% of the respondents were female with the remainder identifying as males. In addition, most (74.80%) were business students and a majority were seniors (42.28%) or freshman (37.40%). The market segmentation at this state is very high-level, but includes the majority of those who would use the product (college students). As so, the first target market would be college freshman (aged between 17-19 years old). This is the most important segment because they will be more willing to use the software throughout their four years (or more) of college. If freeUP decided to target seniors, they might be less willing to change their behaviors around how they have historically done things. In order to get a complete segmentation of the market, freeUP must survey consumers of all ages and demographics. This would include those in full-time jobs that are heavily focused around group work, as well as high-school students. To conduct the current segmentation of the market, freeUP utilized demographic and behavioral segmentation. The mission statement, or value proposition, for freeup is as follows:

> "For the student who is in their freshman year of college, freeUP is a group management app that will ease the stress of scheduling because it automates the process and takes the social anxiety out of the process."

Pricing & Promotional Strategy

Pricing Structure

Pricing is one of the most crucial points of the marketing strategy, as most consumers can be classified as price sensitive. Of the survey respondents, 97% stated that they would download

a free app, while 45.53% would not pay for a similar app at all. Due to this huge difference in sentiment, freeUP must be free in order to succeed. However, the app must make some sort of money to be worthwhile. This is where the concept of alternative revenue streams comes to play. In order to be profitable, freeUP must run ads within the app. This will provide income to freeUP, but can not take away from the app itself. For a premium version, priced at .99 cents, ads will be removed. All 8 interviewees stated that they would prefer to have ad's on the side of the screen (or if they were non-intrusive; eliminating the market for pop-ups or floating ads) than to pay for an app. So, this revenue structure should not be unattainable and will (hopefully) not deter any potential users. The price per ad will be determined once the official budget has been created. However, the pricing will be determined based on the size of the ad and the length of run-time.

Promotional Strategy

A large part of freeUP's success will be based around promotion. First, freeUP will be promoted locally at UNH. This will be done guerrilla style, by posting flyers, facebook posts, and by going into classrooms to explain the product. In addition, freeUP will have a website that consumers can visit to gain more information as well as to read testimonials and learn about the story behind freeUP. Once an initial user base has been built up, web-based advertisements will be released as well as promotional videos. At this point, it is unclear whether or not freeUP will test the product on a beta group; but this will allow a small group of users to gain insight and spread word-of-mouth publicity about the product. In addition, freeUP will explore the use of brand ambassadors, and promotional sponsorships. These sponsorships would be in targeted

locations; such as the Peter T. Paul College of Business and Economics or any UNH events (like the URC or other group-heavy occasions).

Data Collection

Research Methodology

In order for freeUP to be justified, as well as to further understand the stressors of group work and the interest in technology, external research had to be conducted. To do this, both a web-based qualtrics survey and a series of interviews were administered. Please reference Figures A and B in the Appendix to view both the survey and interview questions. The eight participants for the interview were recruited through word-of-mouth and ran the gamut from all class years (2 participants from each grade) and demographics. No incentive was provided for either the survey or the interviews. To gain participants for the survey recruitment took place via social media, canvas, and word-of-mouth. Initially, 136 people were contacted to complete the survey, and an additional 8 people were contacted to complete the interviews. Of those contacted, the study obtained 123 complete survey responses for a 90% completion rate. As for interview responses, there was a 100% completion rate. All participants had to give consent and were encouraged to opt out if they felt uncomfortable at any time. The research gathered was both quantitative and qualitative. The quantitative data was analyzed using excel and the qualitative data was used to identify concurrent themes throughout the studies (which will be explained in detail a bit later).

Respondent Demographics

The survey consisted of 13 questions. Of the 123 respondents, 67.48% identified as female and the remaining 32.52% identified as male. The majority of the respondents were students in the Peter T. Paul College of Business and Economics (74.80%), followed by 6.5% in CEPS and the remaining participants were members of the other various UNH colleges. A majority of the respondents were seniors (42.28%) with the second most responses coming from freshman (37.40%). This shows that the study was well balanced and that responses were gathered from a diverse set of respondents; those starting college and group work, and those who have experienced it for four years.

Findings

After gathering all of the completed survey and interview responses, the next step was to clean and analyze the data. In order to effectively apply the data and responses, three major themes were identified during the creation of both the interview and survey questions. These The themes (leader roles and group work experience, scheduling, and freeUP) provide a holistic approach to the application development. They were identified by analyzing both the survey data and the interview data to break the questions into commonalities. These commonalities allowed for three distinct areas of responses. In order to identify the required functionality, the experience of participants was important. Their experiences and the roles they assume heavily impact how they feel about both scheduling and the application; therefore making it an important topic to gain insight on. The other two themes are a bit more self-explanatory, as they make up the actual app itself. Please reference Figure C in the Appendix to view the survey results.

Team Roles & Group Work Experience

The first major theme that emerged evolved around the holistic group work experience. This theme was comprised of two major aspects: overall experience, and the individual's perceptions of their team role. Overall, group work is a quite subjective topic that is continuously being discussed. Group work has become an essential part of education as well as more prominent in the work force. Based on a survey conducted for this study, a total of 34.96% respondents participate in an average of 3 group projects a semester, and another 34.15% are involved in 4 (or more) projects in just one semester alone. When analyzing the interview data, the respondents ranged from 4 to 30+ total group projects during their college careers. This large range can be attributed to the fact that the interview included all class years and different demographics. While it is clear that group projects are important and are part of the average student's workload, it is unclear how students view the group work experience. Further analysis of the survey data revealed that 35.69% of respondents somewhat agree and 4.88% strongly agreed that they liked group projects. Together these students represent (40.57%) the positive sentiment around group projects. These respondents feel that group work is beneficial and a good way to learn that is applicable to the "real-world." However, when talking more in-depth with the interview participants, it came to light that the experience is strongly influenced by the group dynamic. For example, one respondent stated the following: "I think they're very beneficial. I assume the leader role. It can be difficult if some are slacking off in the group. But I enjoy working with other people and it's a useful experience. Some are tedious and time consuming for no reason but overall, they're beneficial for the real world. It really depends on the class and the group dynamic." This respondent seemed to capture the sentiment of the whole group; the

overall experience can be broken down into three factors: group dynamic, workload distribution, and importance (or common goal) of the project. If any one of these three factors is negative, the whole outcome of the experience (including the deliverables as well) is impacted in an unpleasant way. On the other hand, however, 21.14% strongly disagreed and 25.20% somewhat disagreed that they liked group projects. This shows that the negative sentiment is the dominant (46.34%) when it comes to group work. One respondent stated "I hate group projects. I always coordinate everything and schedule what we're doing. We would never meet or even have a project if I wasn't there." It is clear that the sentiment on group projects is almost half and half. However, within both groups, members feel strongly about their opinion. The remaining 12.20% were indifferent, and didn't agree or disagree that they liked group projects. These respondents most likely are not heavily involved with the leadership or planning process or are just the "go with the flow" group. While the opinions on group deviate, it is clear that students aren't the most fond of collaborative work.

The next major aspect of this overarching theme was the role that participants take in their group projects or working teams. Most teams have multiple roles that must be filled. For example, there is often a leader, a motivator, someone who is in charge of deadlines, etc. While the roles might differ within each team dynamic, most often there is a clear leader. Their responsibilities often include scheduling, planning, running the meetings, as well as overseeing the progress of the group. When asking survey respondents how often they do the planning in group settings, 34.15% said they they *always* do the planning, 57.72% said that they sometimes facilitate the planning (but other times they sit back depending on the group dynamic), 6.5% always sit back, and only 1.63% of respondents had never planned any group meeting. This data

seemed to align with the interview responses in a congruent manner. One respondent describes this situation perfectly, “I’m the leader but sometimes it varies depending on the other people. In a group with all the same type of people, it’s usually a shared leadership position. I usually contact the other people (text or email), I set up the group chat, I find the meeting times, I contact the people who can’t make the meeting to catch them up, and I usually also try to figure out people’s strengths to give them appropriate roles. I do more work because I work hard and I expect high quality result and I feel like it’s on me if it’s not that high. I make sure we get the A and I don’t rely on others. I put more work in because I want to since I have high expectations for the end result.” The leadership role seemed to be directly linked to the group dynamic. If students felt that no one else would assume the leadership role, or that no one else had, they would assume this position and all of it’s responsibilities. In addition, those who expect a lot out of their group members or are very success and grade-oriented seemed to take control of the group, as they did not feel they could trust the other members to lead in what they deem to be an acceptable manner. Similarly, another respondent provides the same sentiment, “It varies by group. Most of the time, I’m the leader and motivator. But if I don’t get the subject, someone else who knows it better should take the lead.” One of the respondents brings up an interesting situation that affects both the group dynamic, and in turn, the leadership roles. If the students do not feel comfortable with the subject matter, they might be more hesitant to fill this role, even if they have the “soft-skills” (ex: good communication, time-management skills, and detail-oriented) to be successful in the position. The roles that students take are directly linked to the group dynamic, the subject matter, and the expectations of the group.

Scheduling & Planning Behavior

The second, and perhaps most important, theme that was identified was scheduling and planning behavior. Understanding consumer's current behavior will allow for better usability studies and, in turn, a better overall product. It is important to make a product that will compliment current behaviors, instead of asking consumers to unlearn old procedures and learn new habits. First, it is important to identify the overall opinion regarding scheduling. The survey respondents were asked to identify the single most stressful aspect of group projects. The dominant answer (32.52%) was scheduling; followed by delegating the workload (30.08%) and communication (19.51%). However, all three of these factors are interrelated. Poor communication leads to roadblocks with scheduling, which further impedes proper workload delegation. It is a continuously vicious cycle.

While scheduling is the most stressful part of group work, it is essential to complete deliverables. There are many different approaches to scheduling a meeting and the interview respondents seemed to have use them all. A total of five of the eight respondents take the initiative to start a group text-messaging thread or email chain with their group members. Within this chat or email thread, they would share their availability and schedule a meeting after hearing from each member. A small number (one out of eight) of the respondents uses an existing schedule-assistant application called When2Meet, which is discussed in the marketing plan section of this thesis. Lastly, two of the eight interview respondents used facebook messenger and created a chat to further discuss meeting times. While many different methods used are currently being used, it is clear that the driving factor for choice of method is efficiency. However, none of these methods are easy, fast, or stress-free. The goal of freeUP is to eliminate,

or at least significantly reduce, all of the back-and-forth currently involved in scheduling a meeting. Another important aspect of scheduling a meeting is booking or agreeing upon a meeting location. A total of seven of the eight respondents stated that they would book a room after a group consensus on when to meet was reached (on the same day). If they did not reserve a room, members would walk around attempting to find a meeting location. Not only is this frustrating and a risky process, but it is also inefficient. Scrambling last minute to find a room is inconvenient and takes away from time that could have been allocated to the meeting. This process, which could take up to ten or more minutes, could heavily delay or impact the meeting (being unprepared can disrupt the thought process). The other respondent trusts their group members to book a room or would just go to a common location (such as the library) where a room reservation was not needed. Over half of the interview respondents (six out of eight) said that they then wrote down the meeting location and time in a planner (either electronic, using reminders, or with old-fashioned pen and paper).

While the group leader might write down the meeting times, they don't always trust their peers to do the same. After analyzing the data, the current behavior that exists is all over the board. Of the interview respondents, three out of eight stated that they would remind the group, either on the day of or the day before, about the meeting. They communicated these reminders through mostly group text, but email or facebook as well (whichever method was identified in the initial planning stage). One half of the respondents (four out of eight) said that they trusted the group to just remember on their own. However, they also stated that they would text these members if they did not show up to the meeting on time or at all. This course of action wastes the time of the members who arrived on time. In addition, it can create tension and can

negatively impact the team's view of the individual(s). The last participant stated that they do both - they would text the group, but they would also trust them to show up. Overall, leadership roles have a heavy impact on the scheduling and planning of group meetings. In addition, group meetings are more effective when they are scheduled properly and have an appropriate place to meet.

New Product Development (freeUP)

In order for freeUP to be a viable product, initial research had to be conducted. Questions both in the survey and asked directly to the interview respondents provided informative data that will further aid in the creation of this new product. When asked if participants would be willing to try a scheduling app, seven out of eight of the interview respondents responded positively. Comparably, 84.55% of users would download a free scheduling app with an additional 13.01% that would maybe download the app. However, this use rate was heavily influenced by the price of freeUP as well as the accompanying features.

As with most products, price is a heavy purchase influencer. While 97% of surveyed students would download a free scheduling app, only two out of eight of the interview respondents and 10.57% of survey respondents would be willing to pay $0.99 cents. This is a huge difference in market potential. In addition, another three out of eight respondents would only be willing to pay for it if it was "amazing" or if "the whole group was using it". The remaining three out of eight would not pay for it at all (and an additional 45.53% of survey respondents would not pay for freeUP either). The in-between segment, or 39.84% of surveyed students, said that they may or may not pay for the app. It is fair to assume that these consumers

would in fact not pay for freeUP. In order for freeUP to have a successful initial adoption rate, the app *must* be free.

In addition to being free, freeUP must include at least some of the desired functionality. Within the survey, respondents were able to select any and all functionality that they saw as beneficial. Within the interview process, it was a bit more open-ended and respondents were actually asked to describe the features they would like to see, rather than choosing from a list. The most preferred functionality after analyzing the survey results was the ability to have a task list or a to-do list (19.04%). Some of the interview respondents (two out of eight) also suggested this functionality. As explained earlier in this thesis, accountability and even work loads are very influential on group morale. The next most requested was the ability to view the group member's contact info or to have a group chat (16.4% of survey respondents and five out of the eight interview respondents). This functionality would eliminate the need to use an external group messaging platform or to create an SMS text messaging chain. Another aspect of this functionality would be to allow members to email their groups directly from the app (12.75% of survey respondents). At 16.06% of total survey responses and six out of eight of interview requests, the ability to book a room is crucial. While this might prove difficult to implement, the value it brings is tremendous and will heavily influence the adoption rate of freeUP. Students would like to receive automatic reminders (which will be customizable to the group's needs, but defaulted to 1 day before and 1 hour before) regarding their scheduled meetings (15.23% of survey respondents and ½ of interview respondents). Closely related to this feature would be the functionality to include calendar integration (10.26% of survey respondents and four out of eight of interview respondents) as well as the ability to manually input additional scheduling conflicts

(10.26% of survey respondents). The last functionality which was requested in the interview process was the ability to link to a document sharing platform (such as GoogleDocs) and to sync in real-time between a computer and the mobile app (two out of eight of the interview respondents). After analyzing the features and functions holistically, they all come together to form one cohesive and all-inclusive experience that is more than just scheduling, but will be the go-to group or group work hub.

While it is important to understand what the user wants and if there is even a market demand for such an app, it is also important to understand the perceived effect that the overall technology will provide on the group work experience. Of the survey respondents, 55.28% believe that a scheduling app will help them work better collaboratively or as a more cohesive group, and 36.59% believe that an app might help them work better together. Overall, this 91.87% of respondents seem to justify that an app with the abovementioned features, and used properly, would improve their group experience. In regards to the app improving the quality of the deliverables, or producing better results, 44.72% believed that it might help them and 43.90% said it would absolutely help them compete better work. This can be attributed to the fact that they can focus their time and energy on the project or the work, rather than on scheduling, planning, and meeting too late in the game. Of the interview respondents, three out of eight believed that an app like freeUP would really make an overall difference. One respondent felt strongly that it would allow them to focus on the deliverables rather than the group procedures, “It would be better. Scheduling is the hardest part. Its overwhelming...I could spend more time doing the actual work than worrying about scheduling”. However, not everyone agrees with this respondent. Some said that they didn’t think it would make a difference at all (three out of eight),

and others were not sure, but they think it might (two out of eight). While it is hard to forecast the effect of such an app before it has even launched, it is important to gain consumer perspective and to understand the value tied to such an application.

Conclusion

As group work becomes more and more frequent among businesses, classrooms, and peers, both the benefits and problems are becoming more important in day to day life. While the benefits of working as a group are numerous, so are the challenges. freeUP will provide a viable solution to many of today's top group work problems. Through a multitude of research venues, including a specific study launched for this purpose alone, freeUP has been formed to include the most desirable functionalities (such as scheduling, chat features, booking a room, etc). These functionalities will also aid in mitigating some of today's biggest collaboration roadblocks, such as communication and accountability. In addition, freeUP will be developed with a heavy emphasis on user-experience as well as incorporating the different methodologies of human-computer interaction. The next steps for freeUP include development, usability and functionality testing, and launching a beta product. While there are many potential roadblocks to overcome (legality, development, and promotion), there is a strong need for such a product. Having the ability to increase the efficiency as well as the experience of group work would be a phenomenal accomplishment. freeUP will make productivity possible.

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Appendix

Appendix A: Administered Survey Questions

1. What do you think is the single most stressful part about group projects?

    a. Communicating with Members
    b. Scheduling
    c. Delegating the Workload
    d. Meeting Deadlines
    e. Conflict with Group Members
    f. Other (please specify) _____
    g. None of the Above

2. On average how many group projects or labs do you have per semester?
    a. 0
    b. 1
    c. 2
    d. 3
    e. 4+

3. What situation do you best identify with?
    a. I do all the planning for group meetings (ex. finding a room, set up group messages, etc.)
    b. I usually let others take the lead for planning the meetings
    c. I sometimes facilitate the planning of meetings while other times I sit back, depending on my group members
    d. I've never planned a meeting for any group I've been involved with

4. If there was a tool available to help improve the scheduling process, do you believe your team would work more cohesively together?
    a. Yes
    b. Maybe
    c. No
    d. I Don't Know

5. If there was a tool available to help improve the scheduling process, do you believe your team would produce better results? (ex. receive a higher grade)
    a. Yes
    b. Maybe
    c. No
    d. I Don't Know

6. Do you think a scheduling tool would help your team better meet deadlines?
    a. Yes

b. Maybe
c. No
d. I Don't Know

7.Please select any features/functionalities that you would like to see on a Group Meeting Scheduling App:

a. Task List/To-Do List
b. Ability to Book a Room
c. Ability to E-mail Group Members
d. Automatic Reminders
e. iPhone/Android Calendar Integration
f. Places for Additional Time Commitments (Club Spots, Work, etc)
g. Group Contact Information
h. Other _____

8. Would you be willing to pay $.99 for a Group Scheduling app?

a. Yes
b. Maybe
c. No
d. I Don't Know

9. Would you download a free Group Scheduling app?

a. Yes
b. Maybe
c. No
d. I Don't Know

10. Please indicate to the extent that you agree with the following questions:

	Extremely Disagree	Somewhat Disagree	Neither Disagree nor Agree	Somewhat Agree	Extremely Agree
I feel that I do most of the planning in my group projects.	◯	◯	◯	◯	◯
I like group projects.	◯	◯	◯	◯	◯
I feel that group projects are a fair way to be evaluated.	◯	◯	◯	◯	◯

I would download a free app to help me with scheduling.	◯	◯	◯	◯	◯
I would pay for an app to help me with group scheduling.	◯	◯	◯	◯	◯

11. Which group best describes you?
    a. Freshman
    b. Sophomore
    c. Junior
    d. Senior
    e. Graduate Student
    f. Not in School

12. If you attend UNH, which college are you in?
    a. PAUL
    b. COLSA
    c. CEPS
    d. COLA
    e. Carsey School
    f. HHS
    g. Graduate School
    h. Thompson School
    i. Other

13. What is your gender?
    a. Male
    b. Female
    c. Not Listed _____
    d. Prefer Not to Answer

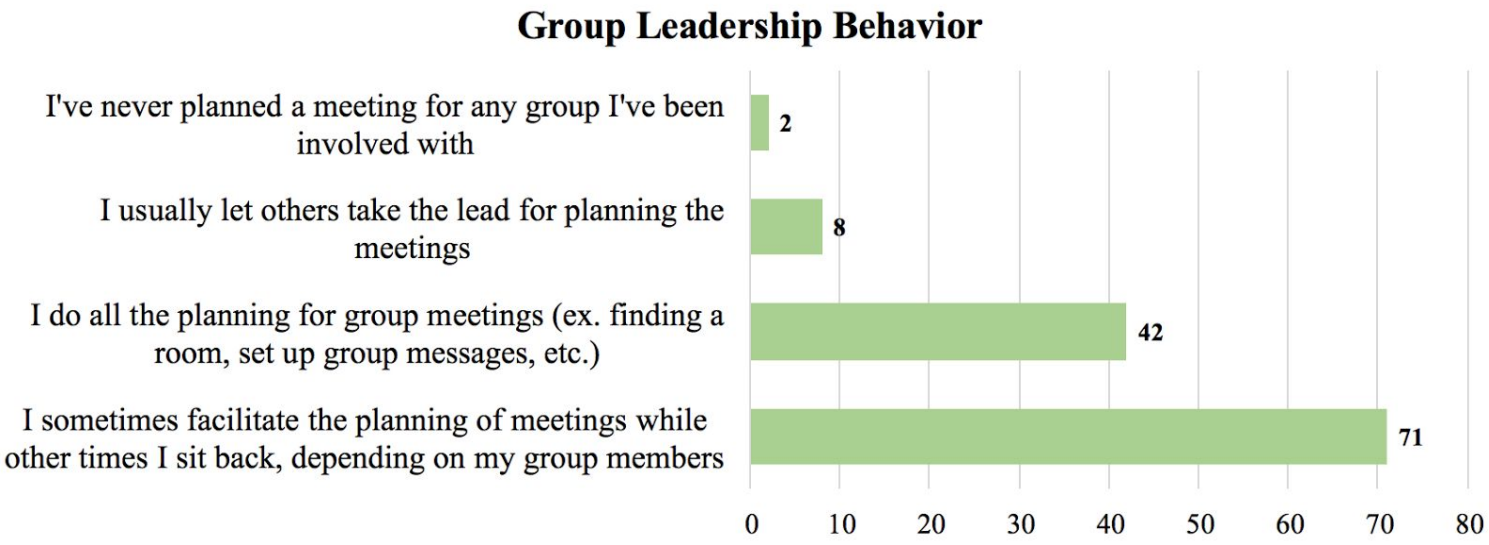
Appendix B: Administered Interview Questions with Additional Follow-Up Questions

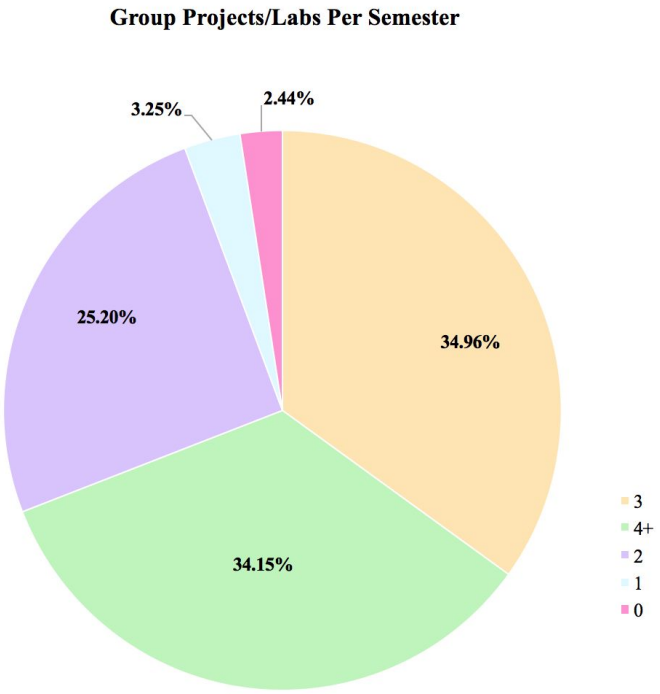
1. How do you feel about group projects?
2. Approximately how many group projects have you been involved with?
3. Describe your usual role in group projects. Does this role vary by group?
    a. Do you feel you are usually leaning on the group or leading the group? How and why?
4. Describe to me how you would go about scheduling a group meeting.
    a. Would you reserve a room?
    b. Would you put this in a planner/calendar?
    c. Would you remind the group the day of the meeting? How?
5. Do you feel that group projects add value to your overall education?
    a. Do you prefer individual or group work?
    b. Do your group grades end up being higher/lower/about the same as your individual work?
6. Describe to me your favorite app.
    a. Why is it your favorite? (features, usability, interface, etc.)
7. Would you use a scheduling app?
    a. Would you pay for an app?
    b. Would you mind advertisements on the side if it were free?
8. What features would you like to see in such an app? (ex: booking a room, group reminders, task list, etc).
9. If you did not have to put effort into scheduling group meetings, do you feel that the outcome of the group project would be better? (higher grade, more effective communication, etc).

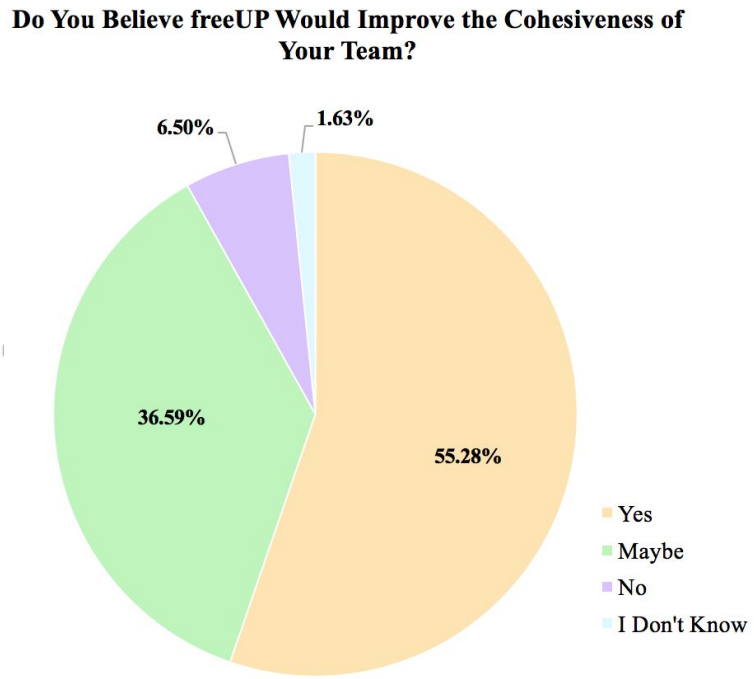
Thank you for your time!

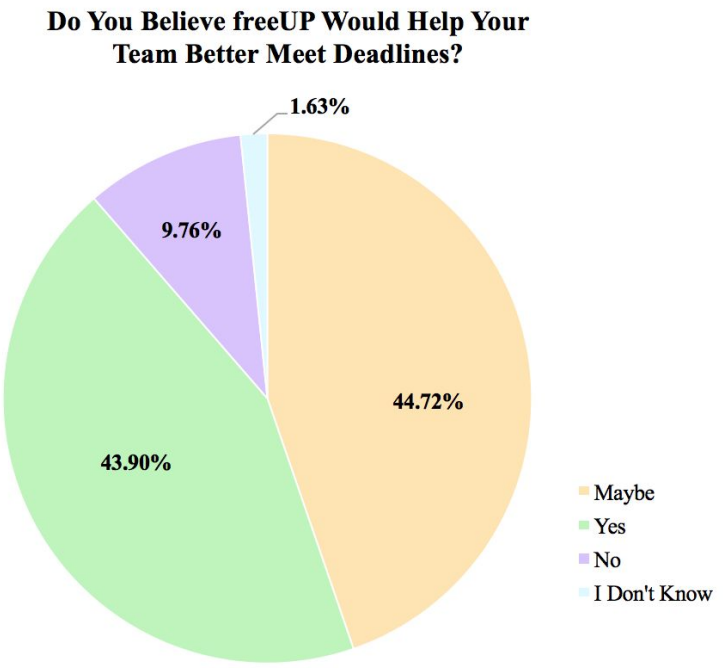
Appendix C: Data Visualization for Survey Results

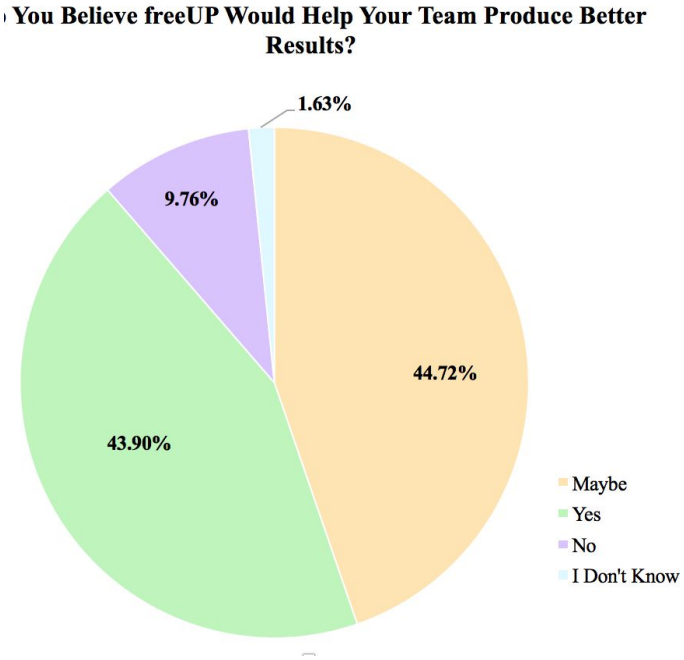
Experience and Contribution to Group Work

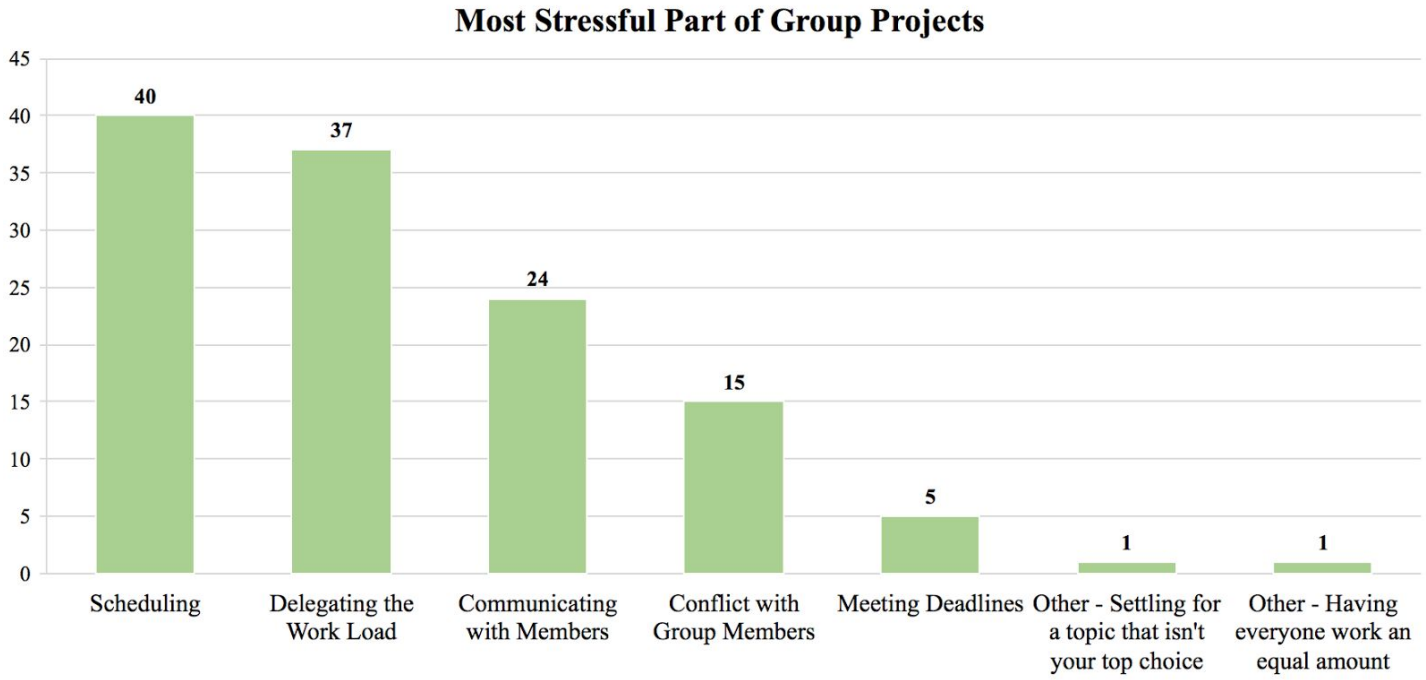




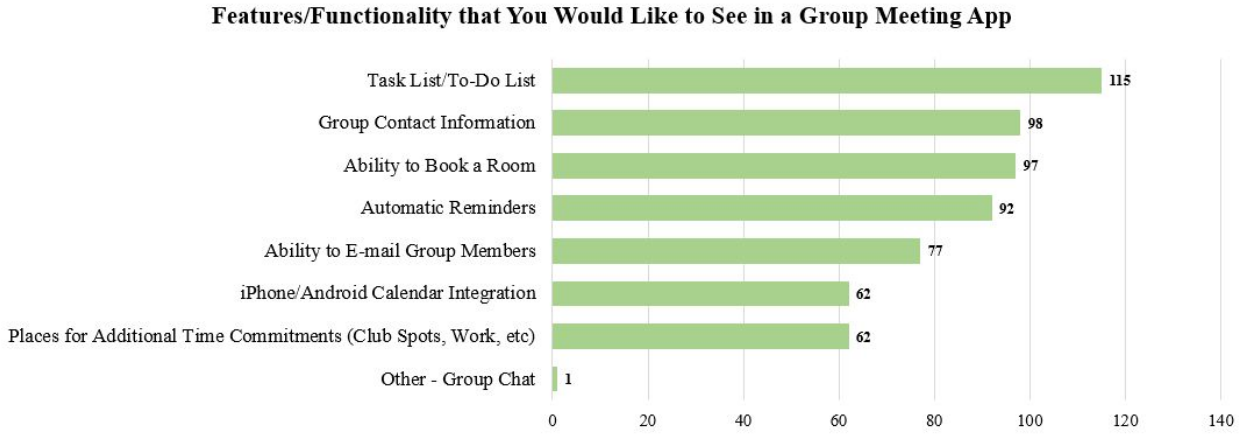


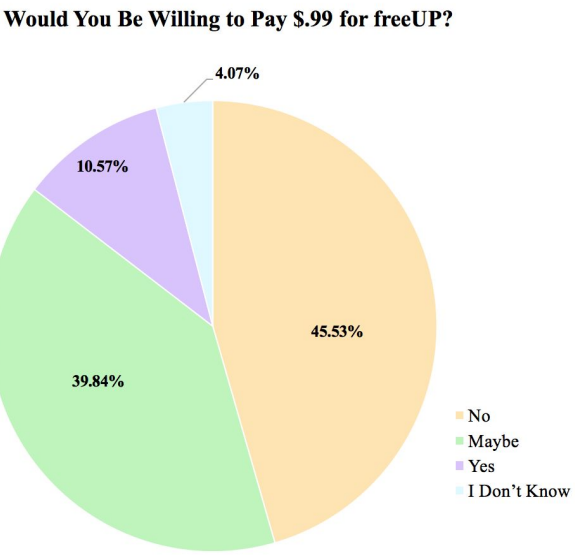

Do You Believe freeUP Would Help Your Team Better Meet Deadlines?
1.63%
9.76%
44.72%
43.90%
Maybe
Yes
No
I Don't Know

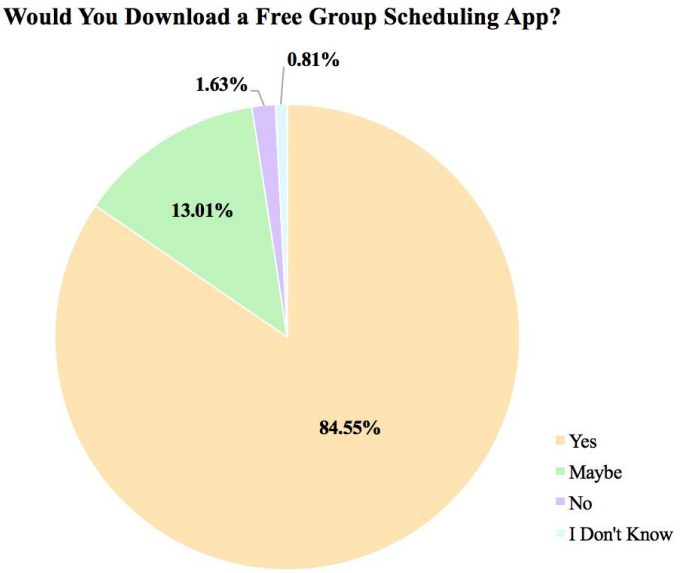

You Believe freeUP Would Help Your Team Produce Better Results?
1.63%
9.76%
44.72%
43.90%
Maybe
Yes
No
I Don't Know

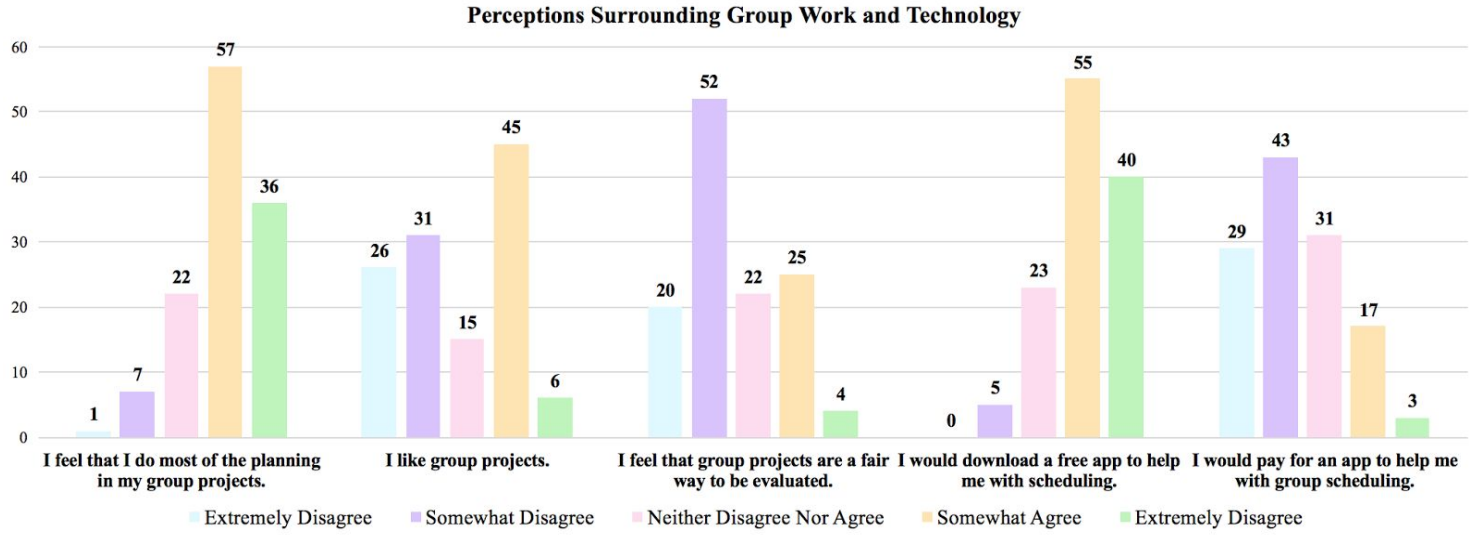

Most Stressful Part of Group Projects
45
40
35
30
25
20
15
10
5
0
40
37
24
15
5
1
1
Scheduling
Delegating the Work Load
Communicating with Members
Conflict with Group Members
Meeting Deadlines
Other - Settling for a topic that isn't your top choice
Other - Having everyone work an equal amount

Mobile Applications Preferences



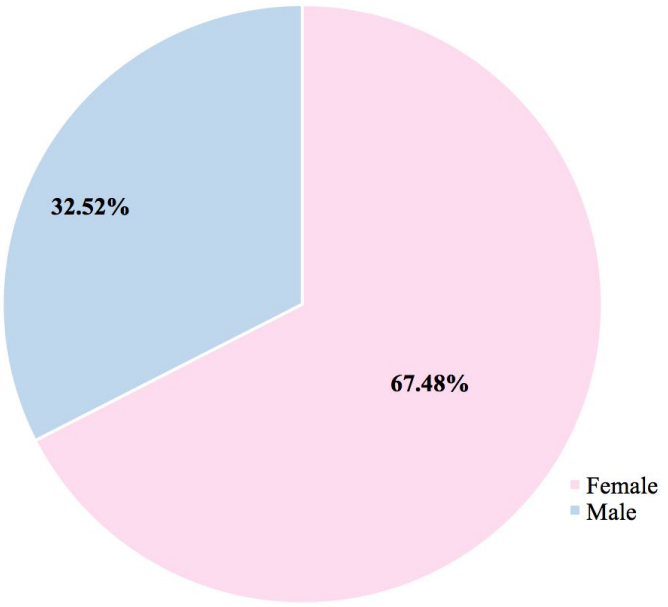




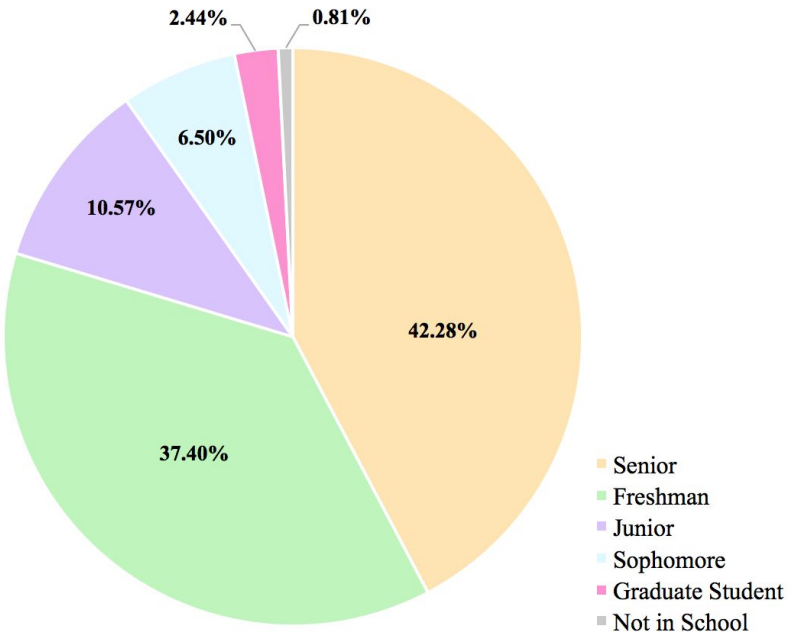


Demographics:

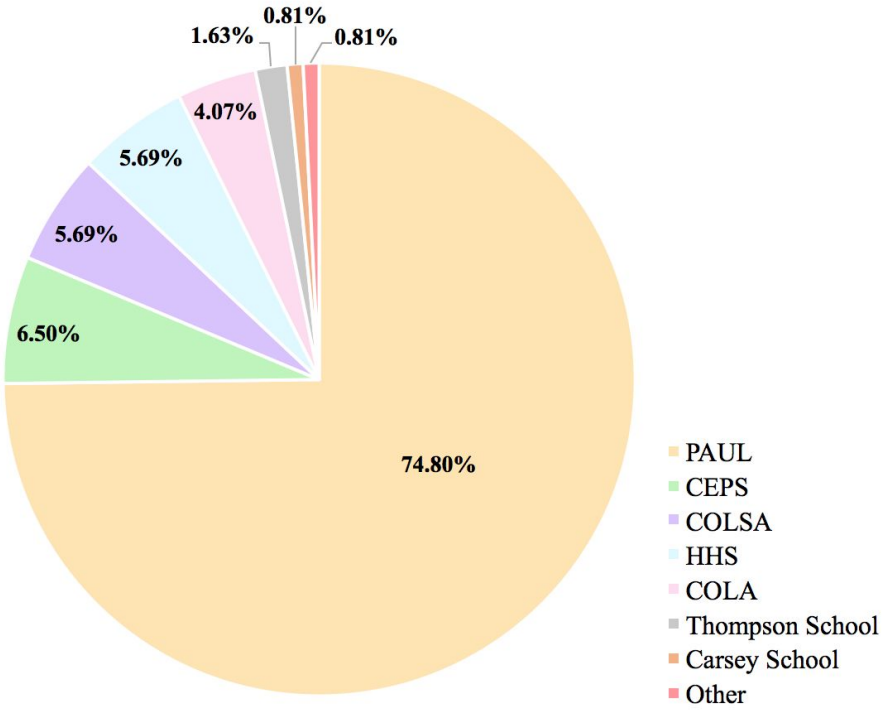
Survey Respondents by Gender



Survey Respondents by Class Standing

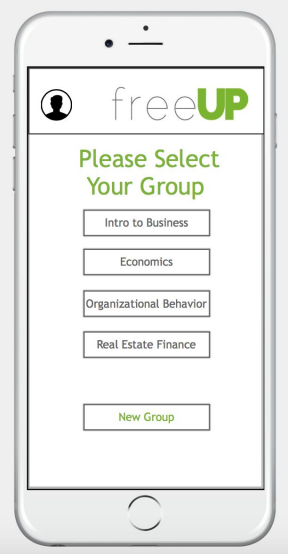


Survey Respondents by UNH College



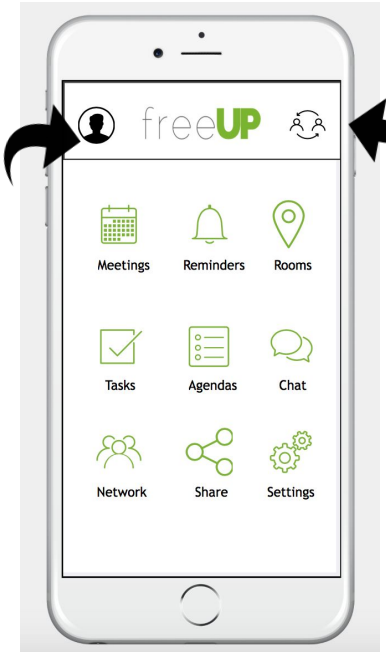
Appendix D: Wireframe for freeUP

This is the first screen a user would see upon downloading freeUP. The sign-on would be SSO based on the school's platform.



After signing in, a user would then select the group they would like to manage. If they need to create a new group, they have the ability to do so here.

This would allow the user to view their profile page.



Users can choose to switch groups easily without having to exit the app.

This is the landing page, where users can choose to use any of the built-in functionality (schedule meetings, review the rooms they have booked, etc).