IMPROVING GROUP WORK EFFICIENCY

INFO-I 300
Section 29821

Jackson Gillen
Lucas Canelli
JT Cho

Introduction

© Africa Studio / Adobe Stock

Our project aims to explore the ways in which undergrad students ranging from Freshmen to Seniors in a variety of different fields of study utilize technology as an aid in their group work. Given that collaboration is an essential part of anyone's college experience, with group-based projects and assignments a routine occurrence in a semester's coursework, we are particularly interested in maximizing collaborative efficiency and effectiveness for larger-scale class assignments and projects. Students naturally experience a great deal of anxiety and time pressures with course commitments and extracurricular involvements, and we would therefore like to ensure that students are able to approach traditional assignments with the most beneficial uses of digital workspaces, communication tools, and other technologies being employed to manage resources, scheduling, and other nuances of group work.

In this particular stage of the project, we have laid out a framework by narrowing our focus on a particular problem area and an associated target user group. We then began by conducting secondary research to get a more full understanding of the already known assumptions within this subject area. This secondary research helped guide us in our approach to collecting primary research, which involved conducting interviews and observations with students that fit into our target user group. This culminated in our creation of an affinity diagram, which revealed common themes and major takeaways regarding the instinctual approaches to technology uses in group work, the value and functionality of this technology, as well as the various frustrations and challenges that currently exist.

The framework that is laid out in this document will provide a foundation on which we can build from to produce potential design iterations and proposed solutions.

Problem Statement:

In order to improve group work efficiency and organization while making collaboration more accessible, barriers to traditional group entry through electronic mediums must be minimized while maximizing workspace productivity, specifically in college undergrad environments where students lack the resources for full-fledged, professional-grade, and specialized workspace applications.

Optimizing group work efficiency while eliminating existing challenges and frustrations will provide for a more enjoyable college experience where students can maximize their collaborative potential while minimizing needless stress and anxiety.

Target Audience

The target audience we want to reach is students in higher education but we focused our primary and secondary research on developing our technology to tailor to the needs of undergraduate students.

Our goal is for students in colleges and universities across the country to use our technology in order to collaborate in a mobile fashion with their classmates to complete a plethora of different assignments.

© Rawpixel.com / Adobe Stock

Secondary Research

We conducted secondary research to get a better understanding of the natural needs and assumptions underlying traditional group work in college environments, the value behind digital workspaces, as well as some of the technology uses and connection methods that help enable collaboration among users. Our research provided us with a more complete understanding of the current instinctive approaches students use while leveraging technology in their coursework and the reasons behind these uses. We also acquired a better understanding of some of the benefits and drawbacks of existing products. From this research, we were able to better understand gaps in our knowledge that were used to appropriately plan our approach to gathering primary research.

Digital Workspaces Provide the most Value when they Unify Distinct Applications while Supporting Communication and Workflow

The value of workspaces for connecting students in college settings became apparent in our secondary research, specifically in regards to its ability to unify distinct applications while supporting communication and workflow. In his 2021 article, “What Efficiencies Can Tech Consolidation Bring to Higher Ed?”, Tony DiGrazia notes that “the goal is to create a seamless student experience with programs and applications that communicate with each other” (DiGrazia, 2021). Through DiGrazia's writing, it becomes apparent that it is seemingly unnecessary to “reinvent the wheel” in the sense that most college students are already familiar with platforms like Google Workspace due to their prevalent use in K-12 environments. This sort of web-based software approach is ideal since colleges are a “bring your own device” (BYOD) environment. However, “all-in-one” approaches that consolidate technology services into a single platform bring about efficiencies for college students while better encouraging adoption and accessibility. Given the fact that this is lacking in platforms like Google Workspace, this should be an area of focus if we ultimately want to better encourage connectivity and group work efficiency, something that is necessary now more than ever given how DiGrazia notes that online and hybrid learning is here to stay.

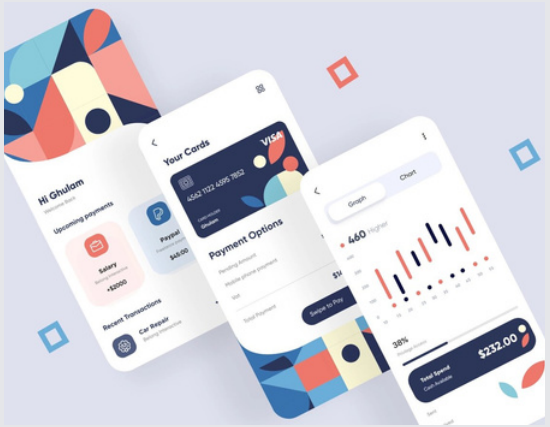
Organization is Essential in Improving the Overall Productivity of a Group

While conducting our secondary research it became increasingly apparent that the organization of a workplace, whether it is digital or in-person, is crucial to the productivity of said workplace. It is important for groups to keep all of their research, ideas, and work organized in a way that is easily rememberable and accessible, as a lack of organization in a group will lead to group members spending excessive time searching for resources and experiencing an "information overload". In their 2018 article, "The Effect of Overflow at Workplace on Employees Productivity and Well Being", authors Krzysztof Nowak, Anna Olga Kuzminska, and Katarzyna Kinga Kowalczyk express that, "experiencing overload can be problematic from an organizational perspective diminishing the accuracy of decision-making, personal well-being, levels of experienced stress, but also decision making, innovation, productivity, and fulfillment of job responsibilities" (Nowak et al. 331). Throughout Nowak and companies writing it is clear that groups work more efficiently and productive while collaborating in an organized environment. Having said that, it is clear how important it is that our technology be well organized and easily navigable in order to maximize group productivity.

© Peampath / Adobe Stock

Design Allows Students to be More Efficient when they Work with Apps

Even though the design of an app or program seems to do little with the efficiency of work process, it actually has a significant effect. This is similar to our previous topic covering organization. People tend to work better on a workspace or platform they are already familiar with. For example, there are students who cannot study in a place where they are not used to, and the same idea applies to apps ("Why Mobile App Design is Critical to Your App’s Success"). Users prefer apps with more familiar and better design, so to develop an app, we should also consider design and familiarity for users. Since our target is college students, we would need to develop potential solutions that are familiar in design for them. For example, we may be best off leveraging the proven benefits of already popular and widely adopted workspace platforms rather than providing a completely new and unfamiliar design that discourages students from trying it out.



Overview & Methodology

We consulted nine primary sources, composed of five one-on-one interviews and four observations. Interview and observation participants were picked to encourage a diverse range of thought and experience given our assumption that certain students approach group work in different fashions based on prior coursework and individual needs. Participants were all undergraduate students at Indiana University who ranged from Freshman to Senior, with a variety of majors including Informatics, Business, Political Science, and Engineering. Our interviews asked participants to speak on prior experiences working in groups for class projects and how technology affected these experiences. From these interviews, we gained insights into specific apps, workspaces, and other websites used, as well as the general value acquired through these services. Follow-up questions were used to elicit more detailed feedback regarding challenges and frustrations with existing technologies. For our observations, we used a variety of different approaches to try and understand common uses of technology in group work, beginning with observing students who were studying at various public spaces, including the IMU and in common rooms at university dorms. We also conducted focus group simulations and follow up questionnaires to observe the instinctual approaches to establishing communication, resource management, scheduling, and other major tasks conducted using technology for newly assigned groups of approximately four students who had never worked together previously. We used the organic and spatio-temproal observation styles to document our observed data during these endeavors and gather plenty of insights into the instinctual approaches to incorporating digital workspaces in group work as well as any associated challenges and frustrations.

INTERVIEWS

Participant 1

College Senior Majoring in Business

In our interview with participant 1 (P1), they spoke on their prior experiences using technology for their few most recent group projects. In doing so, they acknowledged that common approaches to leveraging technology included setting up group chats through apps like GroupMe or the default texting app. They also pointed out how setting up a file space within Google Drive was another early step taken in almost all group projects they were a part of. However, they noted how they've **previously experienced difficulties with connecting with group members when connection methods in certain apps are unfamiliar to them or requires many steps**. They also spoke on when they thought it was most and least appropriate to use technology in groupwork, which often revolved around the time and scale of the assignment.

Participant 2

College Senior Studying Engineering

Participant 2 (P2) talked about the use of applications such as Google Drive and Zoom as a tool for collaboration when doing a school project. While talking, **they highlighted the limitations of apps like Google drive and Zoom when the team is working on physical objects such as machines**. So they said maybe if there is any part of an app that can help students on these physical aspects, it will be helpful. However, they still appreciated the use of those apps as a tool for collaboration since it's location-free.

Participant 3

College Sophomore Studying Business

Participant 3 (P3) noted the use of Google Drive and GroupMe for group work in school. They had a positive perspective towards those apps and said since they're currently a business major, those apps are extremely helpful. To be more specific, Google Drive helped them a lot when they needed to share files and make a team-document that everyone can edit. Lastly, they said since this is also a important factor that other student thinks, **it would be great if there is a better app with all these features**.

Participant 4

College Freshman Majoring in Politics

Participant 4 (P4) expressed that they use other collaborative sites like Google Drive for all of their classes, whether it is for group work or for organizing individual work. They also mentioned that they are in a class GroupMe for all of their classes as well. P4 expressed that **the part they find most stressful about working on a group project with multiple deliverables is the initial process of getting group members contact information**. P4 Stated that there was no easy way to do this and it has to be completed in person by getting the group members numbers or emails. They say that this process is not very efficient and is a step in mobile group collaboration that can be improved on. P4 then went on to say that their preferred method of meeting with group members outside of class is by using Zoom because it is easy to coordinate meetings and to use.

Participant 5

College Junior Majoring in Informatics

Participant 5 (P5) acknowledged three primary uses of technology in group work, including communication, collaborative editing of documents and other resources, and scheduling meetings. They spoke on prior experiences using apps like GroupMe and the default texting app, which tend to be instinctual approaches to using technology in group work, but they noted frustrations with the fact that **the full functionality of workspaces is not always used**. For example, they spoke on their own desire to use features like a collaborative Google Calendar in which group meetings could be integrated and shared with group members, but other students don't often use these sorts of workspace features and instead resort to simply texting one another or setting up a Google Doc.

OBSERVATIONS

Focus Group Simulations

Groups of four college students ranging from Juniors to Seniors were brought together and given a set of tasks that simulated the setting up of technology connections for a newly assigned group for a class project (Observation 1 & 2). The students were told that they had never worked with one another previously and had therefore not already known each other's contact information. The focus group simulated a long-term project that spanned multiple weeks and required out-of-class work with a variety of deliverables (documents, presentations, etc.) all of which were due at intermittent dates. The simulations took approximately 15 minutes and involved establishing communication channels via GroupMe, setting up a resource management workspace via Google Drive, and scheduling due dates, meetings, and other planned arrangements via a collaborative document on Google Drive.

A follow-up interview was conducted with the group of participants to understand the reasons behind their actions. This interview took approximately 10 minutes and revealed many instinctive approaches to group work, including the most common apps and methodologies that are employed for establishing group chats, managing files, and scheduling meetings. The participants were asked to provide more specific reasoning for the actions they took during the simulation and to speak on some of their own frustrations and challenges they've encountered with these traditional approaches. These **frustrations tended to revolve around the lack of an integrated approach for many of the primary functions of technology** outlined above.

Ultimately, the observations we gathered during these simulated experiences brought to light new insights about the basic functions of technology in group work and the intuitive ways that students approach technology as an aid in their work. **While most students have fairly similar processes to implementing technology in their everyday group work that appears to be well-learned, further examination revealed its rather clunky nature full of frustrations and additional steps that appeared to seemingly prevent efficient collaboration**.

Spatio-Temporal Observation - Dorm Lounge

This observation took place the day before a Calculus 1 exam and it was done on three male students who were studying in a dorm lounge (Observation 3). We utilized a spatio-temporal observation and focused on this group of students out of the multiple groups of students in the lounge for a more detailed observation. For the sake of animosity, the participants will be referred to as Student A, Student, B, and Student C. Throughout this observation it came to be apparent that both Student A and Student C looked towards Student B for help with their Calculus studies. Student A asked Student B for help multiple times and Student C asked Student B for help at least once. Through the 10 minute observation, Student B spent more time helping the other students than working on his own computer. There was a point in the observation where Student B had both of the other students' computers in front of him and was helping them at the same time instead of doing his own work.

Some findings that we took away from this observation was that: typically in groups, **one student can be doing a majority of the work**; some students in groups feel comfortable that they can get away with allowing other group members to do the majority of the work; **students that fail to do their share of work lead groups to problems**; more **introverted students struggle to get their ideas and opinions across while working in groups**, and more extroverted group members can tend to carry discussions and ideas in groups.

After conducting this observation, some problems that occur when people work together became obvious. **Our technology needs to cater to these findings and make sure that it keeps group members responsible for the work that they are supposed to complete**. It also is important that our technology **allows all group members, whether introverted or extroverted, to get their opinions and ideas across equally**.

Organic Observation - Indiana Memorial Union (IMU)

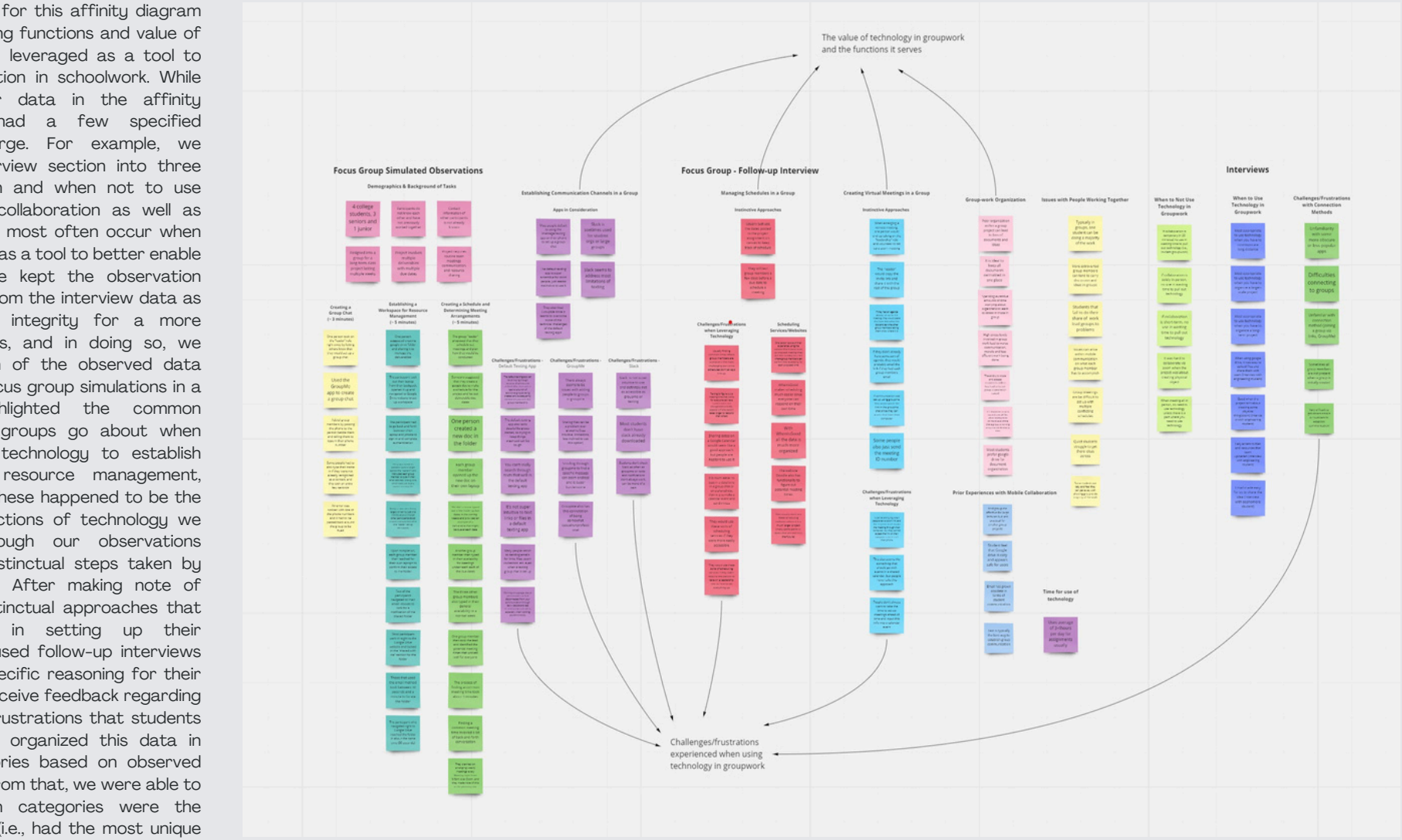
Our observation at the IMU took place on a busy afternoon in a common study space (Observation 4). There were approximately fifteen different students who entered and left our viewpoint during the ten-minute long observation period. Throughout this period, we focused on three students who happened to be closest to our immediate viewpoint. These students were reserved and did not communicate with one another nor did they seem to know one another. They were instead engaging in tasks such as reading a book, typing on a laptop, and taking notes. Other observed technologies in use included an occasional glance at a phone and the wearing of earbuds.

The student who had been using the laptop was interacting with it in a rather passive fashion, occasionally typing but mostly using the mousepad. The student that was taking notes was the most active in their use of technology, which required them to juggle between using a laptop and a tablet. All of these students were rather static in their overall movement and interactions, as all three of them remained seated in their own chairs for the majority of the observation period. The devices that these students interacted with commanded their attention while being interacted with, meaning that the students rarely looked up from their work.

This observation showed us that **students most often utilize these public study spaces to engage in more individualized work, likely due to the more quiet nature of the setting**. This is perhaps why earbuds were a common occurrence. Students in this setting were studying intently and most often focused on their immediate technology or books. **Interaction with these technologies was often passive in nature and did not require large gestures or any audible commands that would seem out of the ordinary for this setting**. This observation reinforced many of our assumptions about the uses of technologies in public spaces and the tasks that they help aid in, such as note-taking.

Affinity Diagram

Our main theme for this affinity diagram was the underlying functions and value of technology being leveraged as a tool to enable collaboration in schoolwork. While aggregating our data in the affinity diagram, we had a few specified categories emerge. For example, we divided the interview section into three parts with when and when not to use technology for collaboration as well as frustrations that most often occur when using technology as a tool to better enable collaboration. We kept the observation data separate from the interview data as to maintain its integrity for a more effective analysis, and in doing so, we structured much of the observed data regarding the focus group simulations in a way that highlighted the common processes that groups go about when first leveraging technology to establish communication, resource management, and scheduling. These happened to be the three major functions of technology we determined through our observations based on the instinctual steps taken by the participants. After making note of some of the instinctual approaches that students used in setting up their technology, we used follow-up interviews to elicit more specific reasoning for their actions and to receive feedback regarding challenges and frustrations that students experienced. We organized this data in separate categories based on observed similarities, and from that, we were able to determine which categories were the most prominent (i.e., had the most unique frustrations).



Link: https://miro.com/app/board/uXjVOHPoyql=/

We found this approach effective in aggregating and analyzing our data since it drew our attention to specific areas where improvement is necessary. From our secondary research, we made the assumption that it would be ineffective to "reinvent the wheel" in the sense that most students already have a well-learned and instinctive process for leveraging technology in their group work. Our primary research observations only reinforced this assumption. Therefore, we focused on collecting data that would help us determine how to improve certain features of these popular workspaces. While creating our affinity diagram, we already began discussing ideas about how potential solutions could address some of these identified frustrations. Furthermore, another aspect of our primary research that stood out to us was the fact that while most of the necessary functionality that students desire is already implemented in these workspaces, they fail to present a well-implemented and unified all-in-one solution. For example, not all students make use of the calendar functionality that is built into many workspaces while other groups choose to use disconnected group chats in external apps. With this being said, we are looking forward to exploring potential solutions that address these feature limitations while providing a better all-in-one workspace that addresses the major frustrations that we've already identified.

Works Consulted

Secondary Research Sources:

DiGrazia, T. (2021, November 8). What efficiencies can tech consolidation bring to Higher Ed? EdTech. Retrieved March 1, 2022, from https://edtechmagazine.com/higher/article/2021/11/what-efficiencies-can-tech-consolidation-bring-higher-ed

Maiorca, D. (2021, September 13). Google Workspace vs. Microsoft 365: Which is better for productivity? Make Use Of. Retrieved March 2, 2022, from https://www.makeuseof.com/google-workspace-vs-microsoft-365/

Nowak, Krzysztof, Anna Olga Kuzminska, and Katarzyna Kinga Kowalczyk. (2018)"The effect of overflow at workplace on employees productivity and well being." Retrieved March 2, 2022, from https://www.researchgate.net/profile/Maciej-Urbaniak/publication/329170720_THE_ROLE_OF_PROCESS_IMPROVEMENTS_TOOLS_IN_BUILDING_RELATIONSHIP_BETWEEN_SUPPLIERS_END_INDUSTRIAL_CLIENTS/links/5bf9b085458515a69e39c362/THE-ROLE-OF-PROCESS-IMPROVEMENTS-TOOLS-IN-BUILDING-RELATIONSHIP-BETWEEN-SUPPLIERS-END-INDUSTRIAL-CLIENTS.pdf#page=331

Why mobile app design is critical to your app's success. Il Blog sul Mobile, Cloud e IoT. (n.d.). Retrieved March 13, 2022, from https://blog.duckma.com/en/mobile-app-design-critical/

Primary Research Sources:

Participant 1. Personal Interview. 22 February 2022

Participant 2. Personal Interview. 4 March 2022

Participant 3. Personal Interview. 5 March 2022

Participant 4. Personal Interview. 25 February 2022

Participant 5. Personal Interview. 6 March 2022

Observation 1. Personal Observation. 6 March 2022

Observation 2. Personal Observation. 6 March 2022

Observation 3. Personal Observation. 4 March 2022

Observation 4. Personal Observation. 24 February 2022

IMPROVING GROUP WORK EFFICIENCY

INFO-I 300
Section 29821

Jackson Gillen
Lucas Canelli
JT Cho

Introduction

Our project aims to explore the ways in which undergrad students ranging from Freshmen to Seniors in a variety of different fields of study utilize technology as an aid in their group work. Given that collaboration is an essential part of anyone's college experience, with group-based projects and assignments a routine occurrence in a semester's coursework, we are particularly interested in maximizing collaborative efficiency and effectiveness for larger-scale class assignments and projects. Students naturally experience a great deal of anxiety and time pressures with course commitments and extracurricular involvements, and we would therefore like to ensure that students are able to approach traditional assignments with the most beneficial uses of digital workspaces, communication tools, and other technologies being employed to manage resources, scheduling, and other nuances of group work.

In this particular stage of the project, we began by reflecting on our research to determine the major underlying themes that must be addressed in our potential solutions. Based on our categorizing and aggregating of data within our affinity diagram following the collection of secondary and primary research during the first stage of this project, we made note of major takeaways in the data regarding the various ways that groups go about leveraging technology in well-learned and instinctual ways as well as the impacts of these instinctual approaches in terms of the many frustrations and challenges that result. Particularly, we were interested in how these existing digital workspaces tend to do more harm to the efficiency of group work due to their many feature limitations and overall disconnected nature.

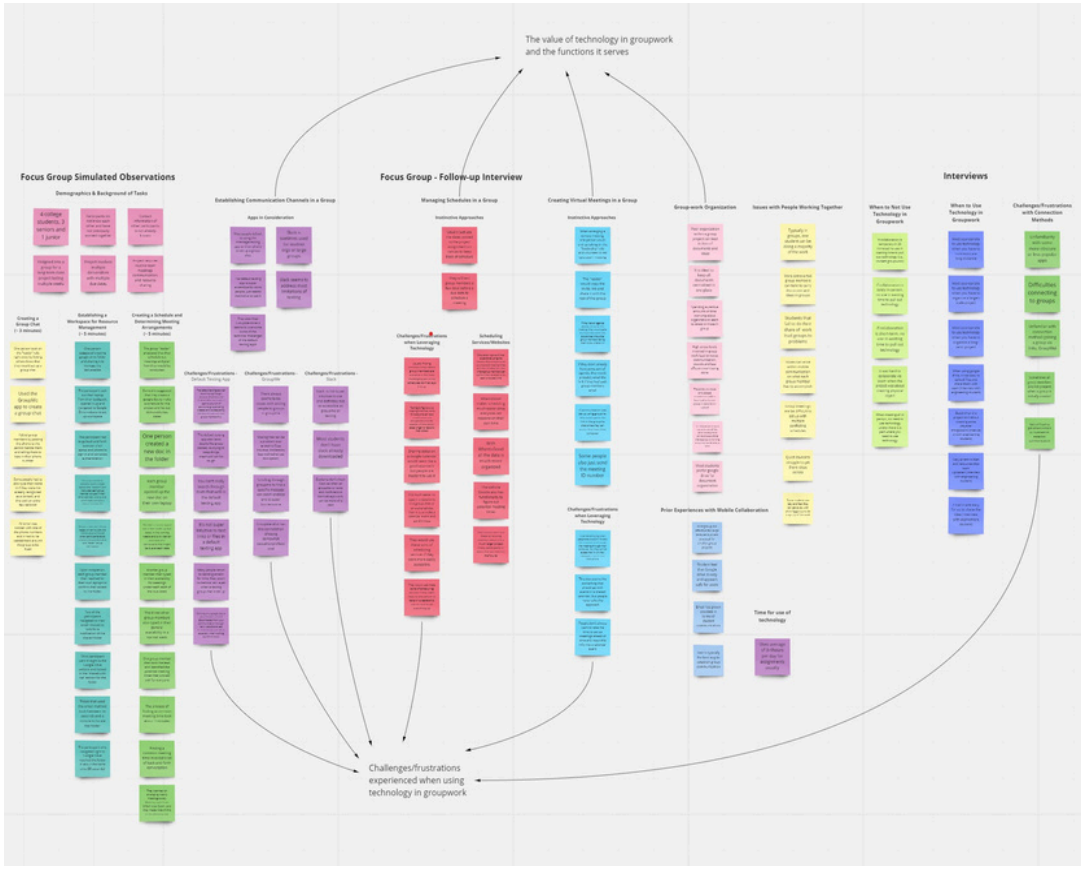
Using these themes, we created two distinct personas that embody the values of our product's intended users. Our interviews and observations provided us with a glimpse into the natural tendencies of group work and the various roles that are embodied by participants, including those who naturally take on a more extroverted "leader" role versus those who tend to be more introverted and would rather be told what to do via a process of delegation. Defining these two distinct personas was important to us because we needed to be able to propose solutions that cater to a diverse range of users, each of whom views technology as either useful or frustrating in unique ways.

Following these steps, we then set out on proposing various ideas through a process of prototype sketching. Each of these sketches aimed to address a unique frustration identified within our affinity diagram research while also catering to the needs of our two personas. We eventually proposed three ideas which each incorporated a prototype detailing the context of the use-case as well as another prototype that visualized the human interaction via the various interface screens that users would need to interact with.

Finally, we concluded the concept stage of the project by presenting our prototypes and eliciting the feedback of three individuals. We summarized the feedback and settled on one particular prototype to iterate on. This culminated in the creation of one final low fidelity prototype of our system that succinctly outlined how a user would interact with it to complete some of the most fundamental tasks involved in the early stages of group work.

Affinity Diagram:

Analysis of Themes



Link: https://miro.com/app/board/uXjVOHPoyqI=/

Theme 1 - Well-Learned Processes:

Our primary research provided us with evidence that students have a well-learned and often instinctual process when deciding to leverage technology in school work, and this process is often similar for the vast majority of students. This coincides with our secondary research findings that students choose to utilize collaborative platforms like Google Workspace simply because of their prevalence in K-12 environments. Students are already familiar with these online platforms and generally go about a consistent process when setting up new group chats, getting members connected, sharing and editing resources, and scheduling meetings.

With this being said, not only do group members gravitate towards using a consistent set of platforms and services, but they also commonly feature a distinct set of roles, with the most important being the natural "leader". Our observations and interviews revealed that one person in each group who tends to be more extroverted or motivated will volunteer to set up digital workspaces and enable technology connections. For example, they will be the one to create and add members to a group chat or gather members' email addresses to share a collaborative folder. Conversely, other group members tend to take on more of a supporting role - some tend to act as organizers while others simply like to be told what to do in a delegating fashion.

Ultimately, our solutions must address a key set of functions that embody the fundamental values of leveraging technology in group work. For example, digital workspaces are used because they enable communication and resource management while facilitating scheduling, meetings, and delegation of responsibilities. These platforms keep group members accountable and informed while keeping resources organized and accessible. Our solutions must not only keep these use cases in mind, but they must also acknowledge the varying degrees of interactions based on whether a group member is functioning in more of a leader role or a supporting role.

Theme 2 - Disconnected Inefficiencies:

Our second major theme that emerged from our research revolved around the many frustrations and challenges that had a direct relationship with inefficiencies caused by the disconnected nature of the technologies being used in groupwork. Our observations and interviews revealed how a multitude of different approaches were being used for distinct yet similar needs within the group, such as text communication compared to video calling. Whereas a group may instinctively turn to their default texting app to establish a group conversation, when it came time to conduct video calls, a platform like Zoom would almost always be used. Despite the fact that students had a well-learned process for using these platforms, they nonetheless caused inefficiencies because they required additional setup external to the existing group chat as well as the rather clunky communication of links, meeting IDs, and other event invitations. Research participants noted that this is an area where they would have preferred a more streamlined process that didn't leave such a disconnect between the existing group chat communication and the video calling communication/chat functionality.

Furthermore, when simply trying to schedule a meeting or manage other group scheduling arrangements, this too involved a rather clunky process that was built upon a large degree of back-and-forth texting. This was because student's did not instinctively leverage digital collaborative calendar's and felt as though scheduling helpers like the WhenIsGood website were simply too disconnected from their existing group chats. Participant's also noted that they would use these sorts of services if they didn't require so many involved steps that hinged upon the actions of one group "leader". One other insight from our research was the fact that student's don't always want to take the time to set up meetings ahead of time and input lots of information into a calendar event.

Ultimately, our solutions must address the existing disconnected nature of these sorts of workspaces by reducing the necessary steps to conduct simple functions, like scheduling a meeting and initiating a video call. Our solutions must also better integrate and unify functionalities like communication with file editing and resource management. Lastly, some degree of automation must be considered as to better encourage the use of collaborative calendars. Students value organization, but if too many burdensome steps are involved, the costs will simply outweigh the benefits. Therefore, we must consider solutions that incorporate a vast range of features and use cases without requiring users to leave our platform.

Persona One
The Extroverted Leader

Before brainstorming and sketching potential ideas, we reflected on our research and the types of participants we interacted with to define who exactly would be interacting with our product. Our interviews and observations revealed how there are two distinct types of teammates who often emerge during group work in educational contexts. These include the often more extroverted and motivated leader who instinctively sets things up and delegates roles as well as the comparatively more introverted group members who function in supportive roles who would rather be told what to do.

Beginning with the extroverted leader, this usually tends to be just one group member who instinctively volunteers to set up group chats, establish and share a digital workspace for resource sharing, and arrange/schedule team meetings. The leader's more extroverted nature tends to allow them to take more initiative while also carrying discussions and driving new ideas in the group's work. They also often instruct others on what to do via a process of delegation while keeping team members accountable. Therefore, they are an active and responsive communicator and they are quite familiar and competent with the instinctive processes necessary to leverage technology in group work.

Our research highlighted how organization was the primary value derived from technology uses in group work, as students often get stressed when files are not accessible or backed up. Furthermore, students need to be able to both work simultaneously as well as on their own time while editing shared documents, spreadsheets, reports, or other large and complex group deliverables. Student often uses collaborative websites and workspaces to enable this functionality, and the leader is the one who takes the initiative to get this arranged.

When it comes to meetings and scheduling in the group, the leader is often the one who solicits the other group members' availability and plans meetings. Given how this can often be a cumbersome and clunky process, especially as more group members are involved and as schedules get busier, they desire a more streamlined and potentially automated process that provides more assistance. They would also like for a way to better integrate communication features like video calling with other resource editing and scheduling features.

Lastly, given the fact that the leader is often delegating roles and responsibilities, they would also like for a way to better keep group members accountable as to alleviate stress.

MATT

Age 18 - 22 | Full-time undergrad student

- Competent with basic technology uses
- He takes his education seriously and aims for efficiency with his schoolwork
- He likes to leverage technology to stay organized
- He is an active and responsive communicator in his many groups
- He naturally takes on the "leader" role in group work and often instructs others on what to do
- He takes initiative and his extroverted nature allows him to carry discussions and drive new ideas in his group work

REASONS HE WOULD CONSIDER USING TECHNOLOGY IN GROUPWORK

- He gets stressed when documents and ideas are disorganized and fears that they will get lost if they are not maintained in a centrally located, well-organized workspace
- His extroverted nature and natural initiative gives him the drive to often initiate group-wide actions that help maintain communication over long-distance for large-scale projects that are lengthy in duration, spanning multiple days, weeks, or months
- He often creates new files or needs to share existing notes, documents, presentations, or other files with his teammates
- He needs to collaborate with other group members to simultaneously work together on deliverables, both synchronously and asynchronously, through a variety of devices

TYPES OF TECHNOLOGY USES IN GROUPWORK

- He instinctually uses his phone to establish group chats with teammates and is almost always the one who creates the group chat
- He texts other students most frequently, but is not opposed to making a quick phone call with another individual or using his phone to video chat with a group of other individuals
- He often uses collaborative websites to work with classmates, which invovles sharing documents, presentations, images, links, and other files with teammates and interacts with these directly from his phone

FRUSTRATIONS WITH TECHNOLOGY APPLICATIONS

- He desires a more universal approach to communication & resource management rather than having to juggle a variety of different apps that seemingly aren't integrated with one another
- He would like a quicker way to set up and add members to a workspace that allows members to text, video call, edit and share documents, and manage scheduling all in the same place
- He wishes there was a better way to keep people accountable for the work they do during a group project

MIRO BOARD

https://miro.com/app/board/uXjVOHPoyqI=/?invite_link_id=23394032209

IMAGE SOURCE

© Drobot Dean / Adobe Stock

MARY

Age 18 - 22 | Full-time undergrad student

- Competent with basic technology uses
- She takes her education seriously
- Organization is important to her
- She naturally takes on supporting roles in group work and is usually told what to do
- She is quieter and reserved and her introverted nature often makes it difficult for her to get ideas across
- She is oftentimes perceived as "lazier" compared to natural leaders in groups who tend to take more initiative

REASONS SHE WOULD CONSIDER USING TECHNOLOGY IN GROUPWORK

- She wants to stay in contact with her teammates and have access to the group's resources when it comes time for her to pitch-in and do her work, even if this occurs in the project's later stages when it is nearing the due date and the group members are no longer collocated
- She needs a way to check her availability for group meetings and let her teammates know of this information even if her schedule tends to be unaligned with that of her teammates
- She needs a way to access and edit the group's files on her own time while also posing questions to the group, seeking feedback, and receiving the support of her more extroverted teammates

TYPES OF TECHNOLOGY USES IN GROUPWORK

- She often has to use collaborative websites to work with classmates but also to keep track of her own work while keeping uploaded files organized
- She likes to easily get added to digital group chats and workspaces rather than creating them herself
- She likes that she can easily access files and resources that her teammates have uploaded and she creates new files in workspaces like Google Drive and shares them with the team
- She likes to use a digital calendar to keep her busy schedule organized and often refers to this when her teams are deciding on times to meet

FRUSTRATIONS WITH TECHNOLOGY APPLICATIONS

- She would like an easier and quicker way to join digital workspaces set up by her group members, and she would the workspace to better distinguish her responsibilities from those of others
- She would like an easier way to manage group scheduling arrangements in a way that doesn't require so many back and forth messages and continually checking her personal digital calendar that is disconnected from the group calendar
- She wishes there was a way to keep her group's work organized in one place so that it is easier to retrieve

MIRO BOARD

https://miro.com/app/board/uXjVOHPoyqI=/?invite_link_id=23394032209

IMAGE SOURCE

© Antonioguillem / Adobe Stock

Persona Two

The Introverted Supporter

The second type of group member that emerged from our interviews and observations was the often more introverted teammate who chooses to take on more of a supportive role, preferring to be told what to do rather than taking the initiative to delegate responsibilities. Although these individuals may be comparatively perceived as lazier than the leader, they are no less important to the group's success and they equally value organization, especially through the leveraging of technology in their work. These individuals tend to be told what to do and naturally take on more of a quieter and reserved role, meaning that it can sometimes be difficult for them to get their ideas across during group discussions.

While these types of individuals don't necessarily take the same initiative to set up digital workspaces or group chats, they nonetheless are quick and eager to get added to the groupwide communication, as they feel a need to stay in touch with their teammates and be up-to-date with the happenings of the group. They also utilize technology as a way to seek support from their group members when necessary while also staying informed.

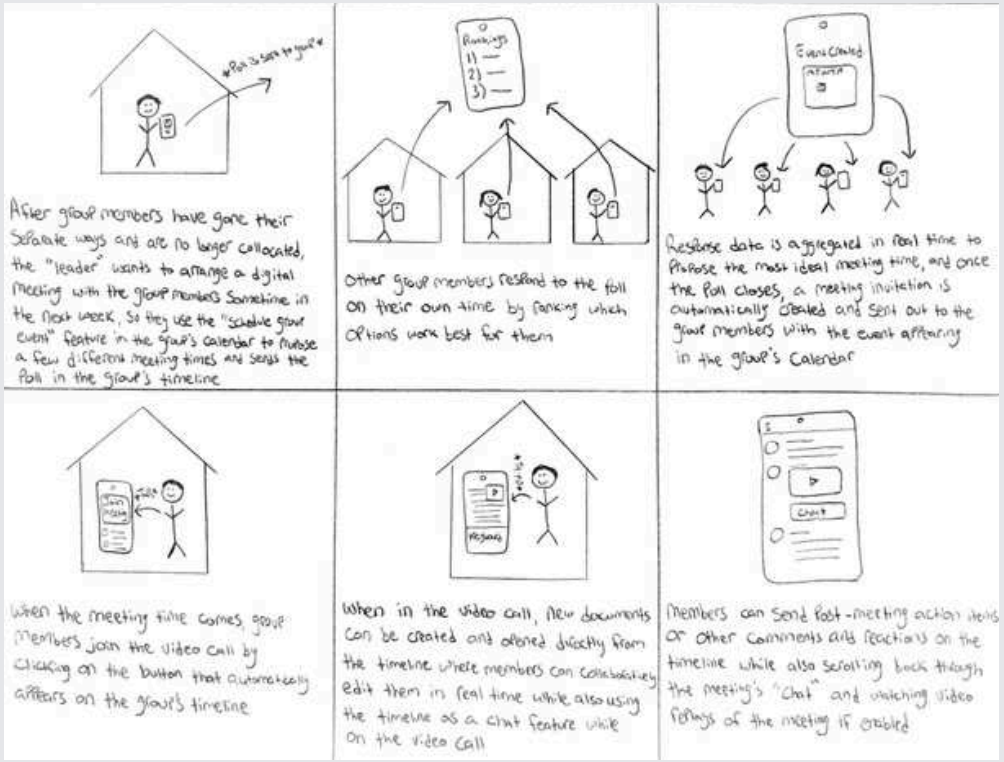
These students may choose to not take on a leadership role in the group because they have an already busy schedule with many other commitments. Therefore, they feel a need to manage their schedule using digital calendars and are competent and proficient with their use. However, they get easily frustrated when their group members choose not to use collaborative calendars because it makes things disorganized while requiring more of their valuable time for constant interaction and responses.

Even though these individuals are not necessarily involved in the establishing of digital workspaces and the creation of virtual meetings, their participation in the process is still an essential step, and if our product does not integrate this participation in an efficient manner, then they will experience frustration to a similar extent as the group's leader. Therefore, it is important for us to consider both of these types of group members and propose potential solutions that cater equally to their distinct habits and needs. While the vast majority of college undergrad students are competent and familiar with technology, having a well-learned process already employed in their routine coursework, workspaces can burden all users with their feature limitations, the multitude of steps that are necessary to complete simple tasks, and the disconnected nature that results from the use of multiple different products and services. It is essential for us to keep these themes and personas in mind when developing and iterating on our proposed concepts.

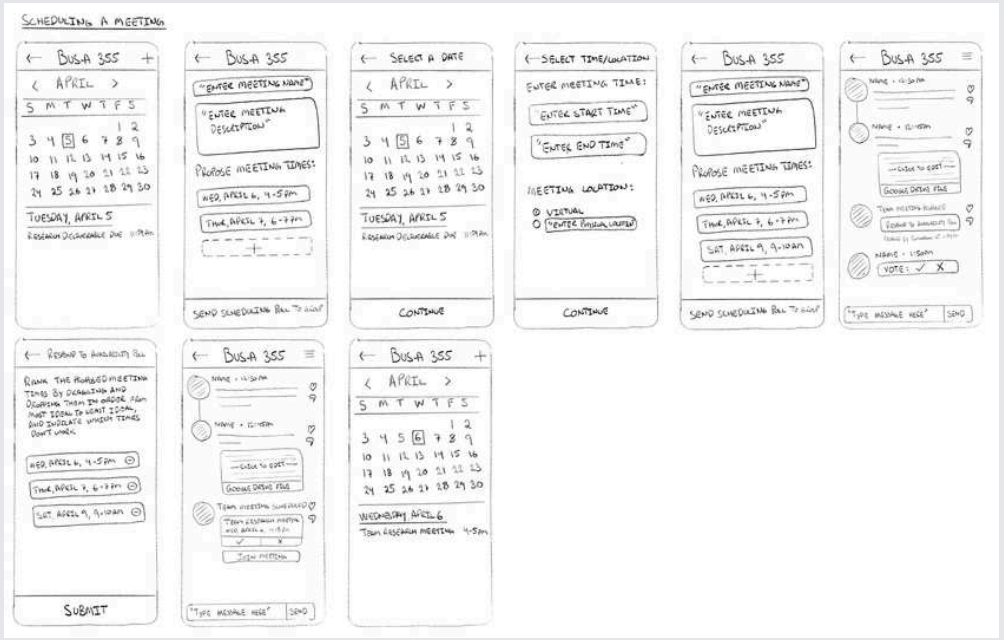
Concepts & Brainstorm Sketches:

Idea One - Scheduling Assistant & Automated Meeting Creation

Our first idea is for a scheduling assistant and collaborative calendar functionality that is more fully integrated within a unified digital workspace mobile app. Our research identified how students often use a rather clunky setup of multiple disconnected apps and workspaces in their routine group work to enable communication, resource sharing/editing, as well as scheduling and video calling. This inefficient approach is necessary because of feature limitations that currently exist with many commonly used workspaces. For example, students do not intuitively leverage the benefits of shared digital calendars and instead use a rather burdensome and labor-intensive process of scheduling and setting up meetings. Students also desire to use scheduling assistants like WhenIsGood to arrange meetings, but its disconnected nature with existing group chats often acts as a barrier to its use. Therefore, this idea would save students time by integrating a poll-like feature to collect available meeting times. The system would aggregate the data in real-time to find the most ideal meeting time and it would automate the process of creating a meeting invitation and sending out links to join the video call. The meeting would also appear on the group's shared calendar. This would bring efficiency to a vital part of group work by eliminating the need for cumbersome back-and-forth texting that is often necessary to find common meeting times, and it would also streamline the process for creating and joining groups, saving students valuable time.



Storyboard of Use Case Prototype

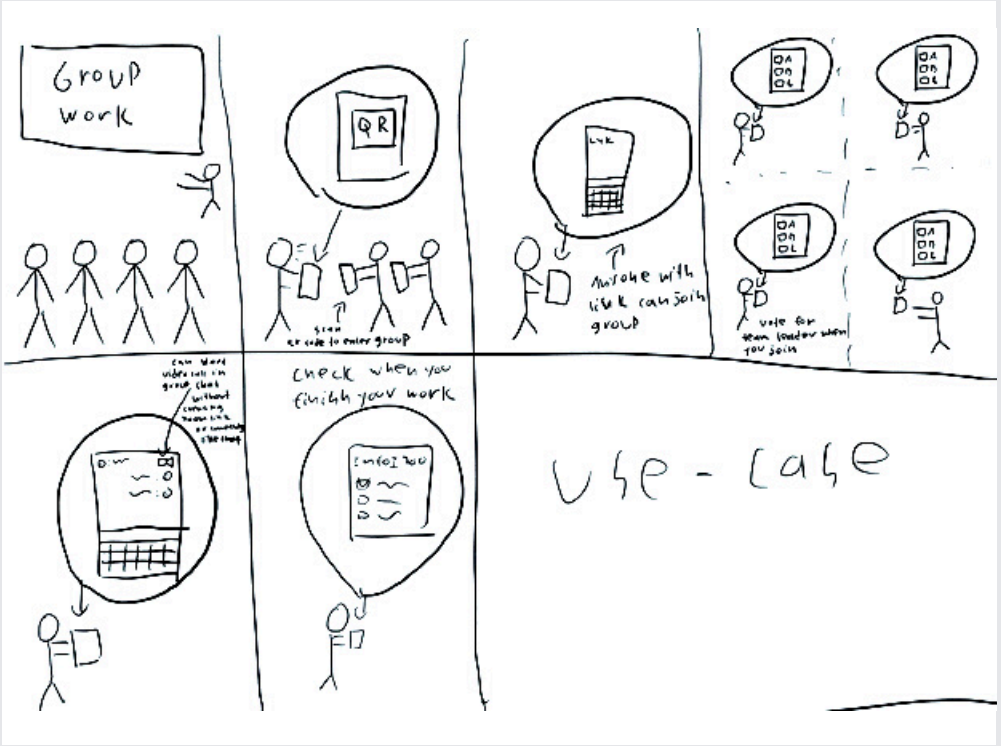


Human Interaction Prototype

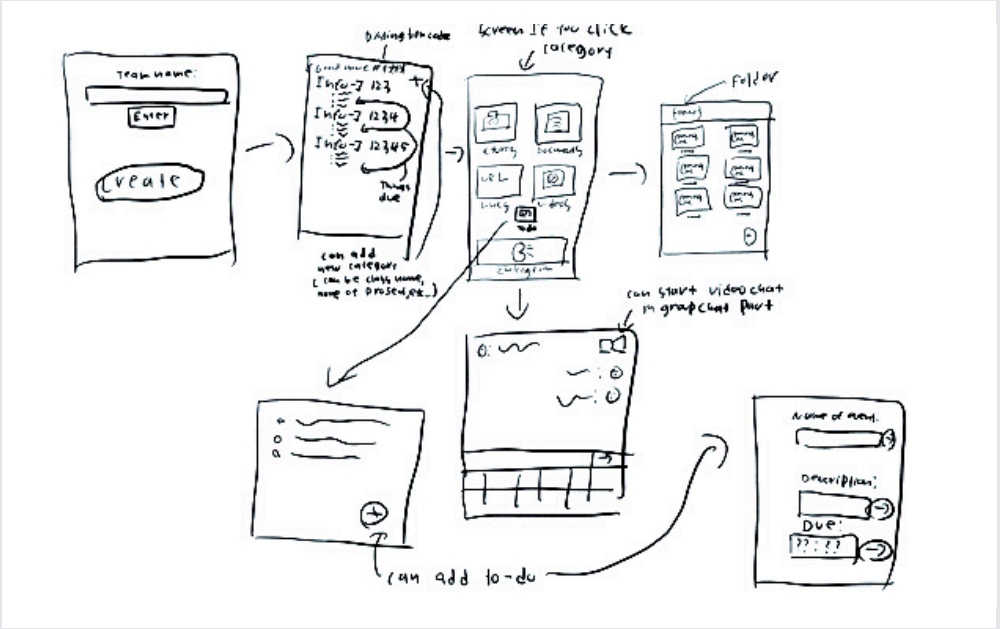
Concepts & Brainstorm Sketches:

Idea Two - Quicker Connection Methods via QR Codes

Our second idea focused on the fundamental aspects of establishing connections with other group members during the group's creation process in a digital workspace app. For our use case prototype, we focused on the QR code as a mechanism to quickly join new groups by simply scanning sharable codes with group members rather than having to use a more laborious process of sharing phone numbers or email addresses. By doing this, we made it more accessible for people to join the group's room. This idea further incorporated other features designed at improving the overall value and functionality of the workspace, including voting systems and file organization. For the human interaction part, we focused on designing interfaces that demonstrated the group creation process as well as the organization-focused features accessible once a group has been established. Whenever the member of a group go into the group's room, they will see things laid out in a more organized fashion. For example, they can see the due dates for the group's assignments so that they can keep track of and finish their work more efficiently. Lastly, when they have done their part of the work, they can check the boxes so that they can see who is actually fulfilling their responsibilities.



Storyboard of Use Case Prototype

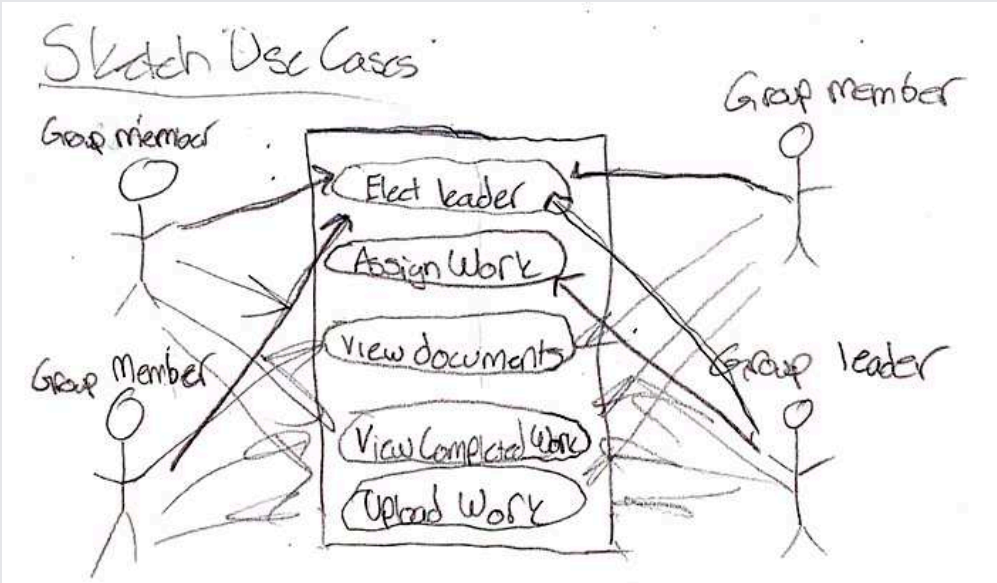


Human Interaction Prototype

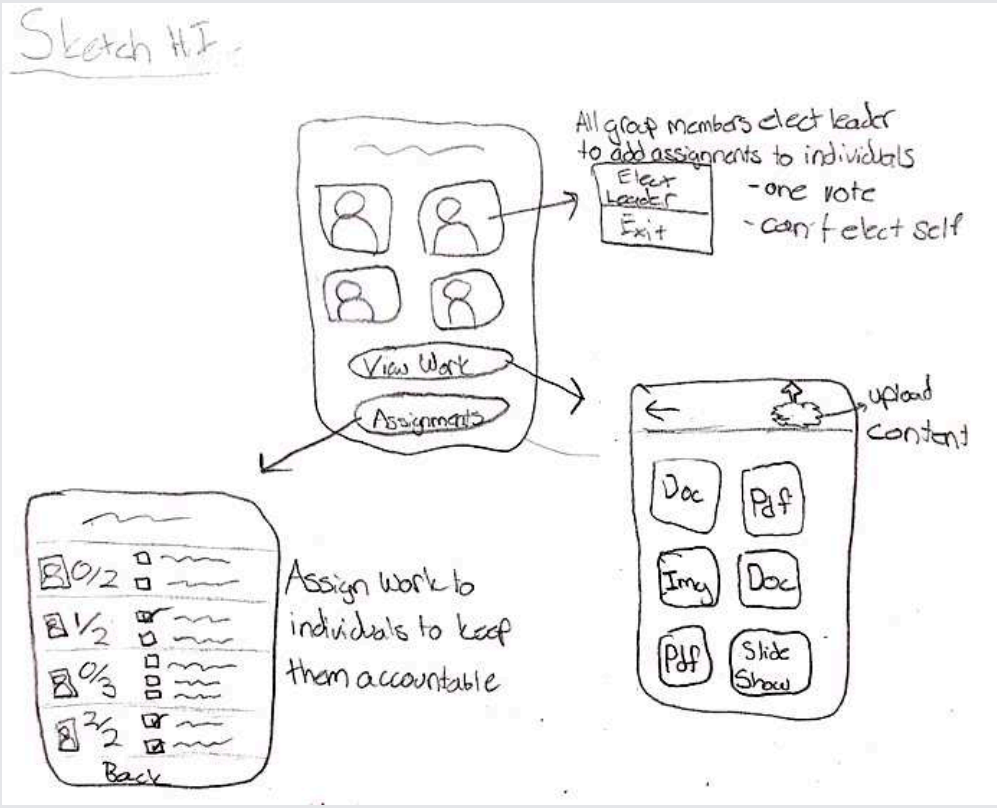
Concepts & Brainstorm Sketches:

Idea Three - Organization/ Accountability Features

Our third idea focused on both an organizational feature and a page that will allow group members to track the tasks that they are supposed to complete to keep all group members accountable for their work. Our research showed that It is important for groups to keep all of their research, ideas, and work organized in a way that is easily rememberable and accessible, as a lack of organization in a group will lead to group members spending excessive time searching for resources and experiencing an "information overload". To ensure that a groups work is well organized we incorporated a Google Drive like organization page into our app design. The page will be similar to Google Drive because it is unnecessary to “reinvent the wheel” because most college students are already familiar with platforms like Google Drive due to their prevalent use in schooling environments. This sketch also includes a feature that will show the tasks that individual group members have been given to complete by the group. As group members complete the activity they can check off a box to show it is complete. Throughout our observations, it became obvious that some students in groups feel comfortable that they can get away with allowing other group members to do the majority of the work. This feature will solve this issue by giving group members the ability to look back at the page to see who in the group did not complete their part. This will also create a sense of accountability that will pressure lazier students into completing work that they otherwise might allow other members to do for them.



Storyboard of Use Case Prototype

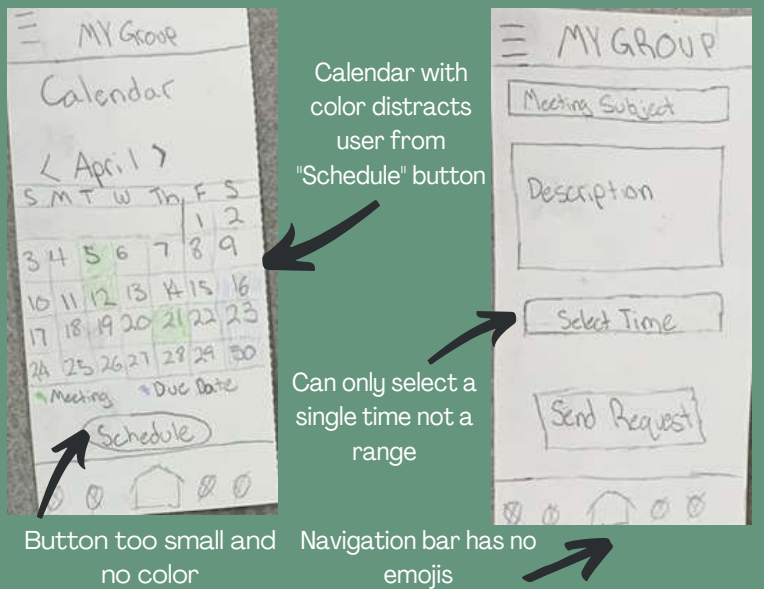


Human Interaction Prototype

Iteration

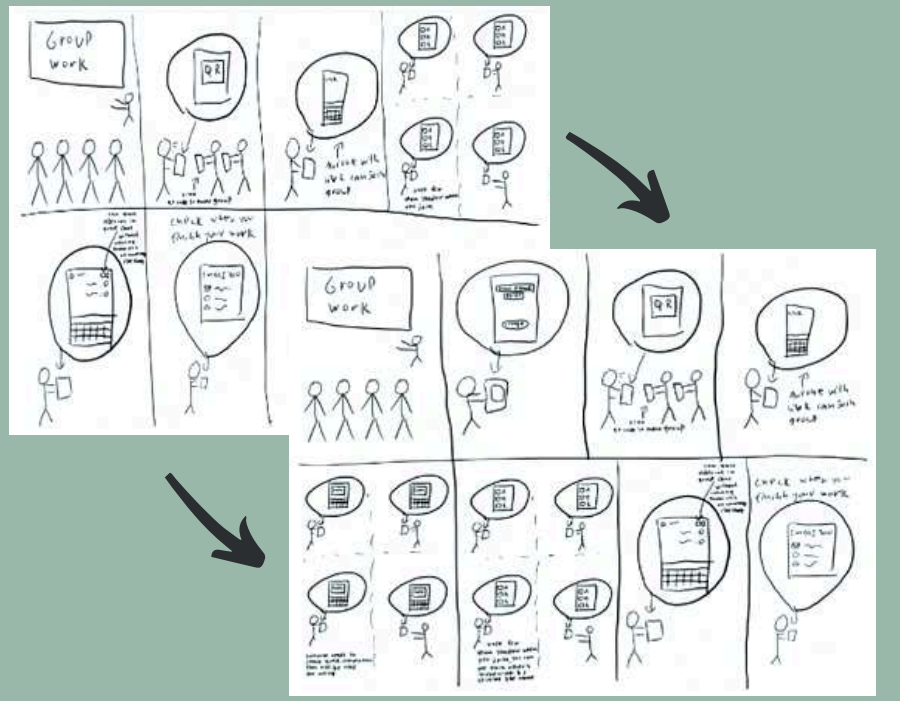
Human Interaction Prototype

After showing our human iteration prototype sketches to multiple people, we received a few critiques that will improve our app. We learned that it was difficult/confusing to navigate to our Schedule a Meeting page due to the "Schedule" button not being prevalent on the bottom of the calendar page and because our navigation bar on the bottom of all pages did not have pictures drawn for each page yet. It was also clear that our process of scheduling a meeting needed to be improved on in order to allow group members to suggest a range of availability instead of just a specific time. In order to improve our design, we decided to focus on making it easier to navigate our app and improve how the meeting scheduling function works. To improve navigation we plan to add small emojis to our navigation bar on the bottom to make it more obvious where each bottom navigates. We also plan to make the "Schedule" button on the calendar page larger and added color to it to make it stand out more. Finally, we plan on improving the functionality of our scheduling a meeting process by allowing users to input a range of times that they are available as opposed to a single time so that the suggested meeting times can be more appropriate for all group members' schedules.



Use Case Prototype

When we finished our use case prototype, we showed it to three different people to garner feedback. Prior to receiving the feedback, our main goal of the prototype was to focus on the QR code system, as well as the assigning of roles on a newly-formed team and the delegation of tasks. Our storyboard incorporated visuals that provided context as to where students would utilize the QR code system as well as what steps are necessary to set up and join a group. We further demonstrated the scenarios in which students could vote on roles within the team, delegate tasks, and utilize the collaborative calendar functionality. Upon presenting our prototype to our peers, we received feedback that suggested we incorporate a system that can better allow group members to get to know one another prior to having to vote on a team leader and other roles. Furthermore, another piece of feedback we received suggested that we link other apps such as Canvas or Zoom to our app, as it could allow for better efficiency since these other apps are still often essentially used by college students. One last suggestion we received was to visualize the process regarding how group members would create a group meeting, as it would help to understand the overall process better. With this in mind, we added a scene that demonstrates how one person would go about creating a group meeting. We also created a scene that visualizes how students could write a brief biographical description about themselves so that other group members could know more about one another when voting for a leader.



Low-Fidelity Human Interaction Prototype

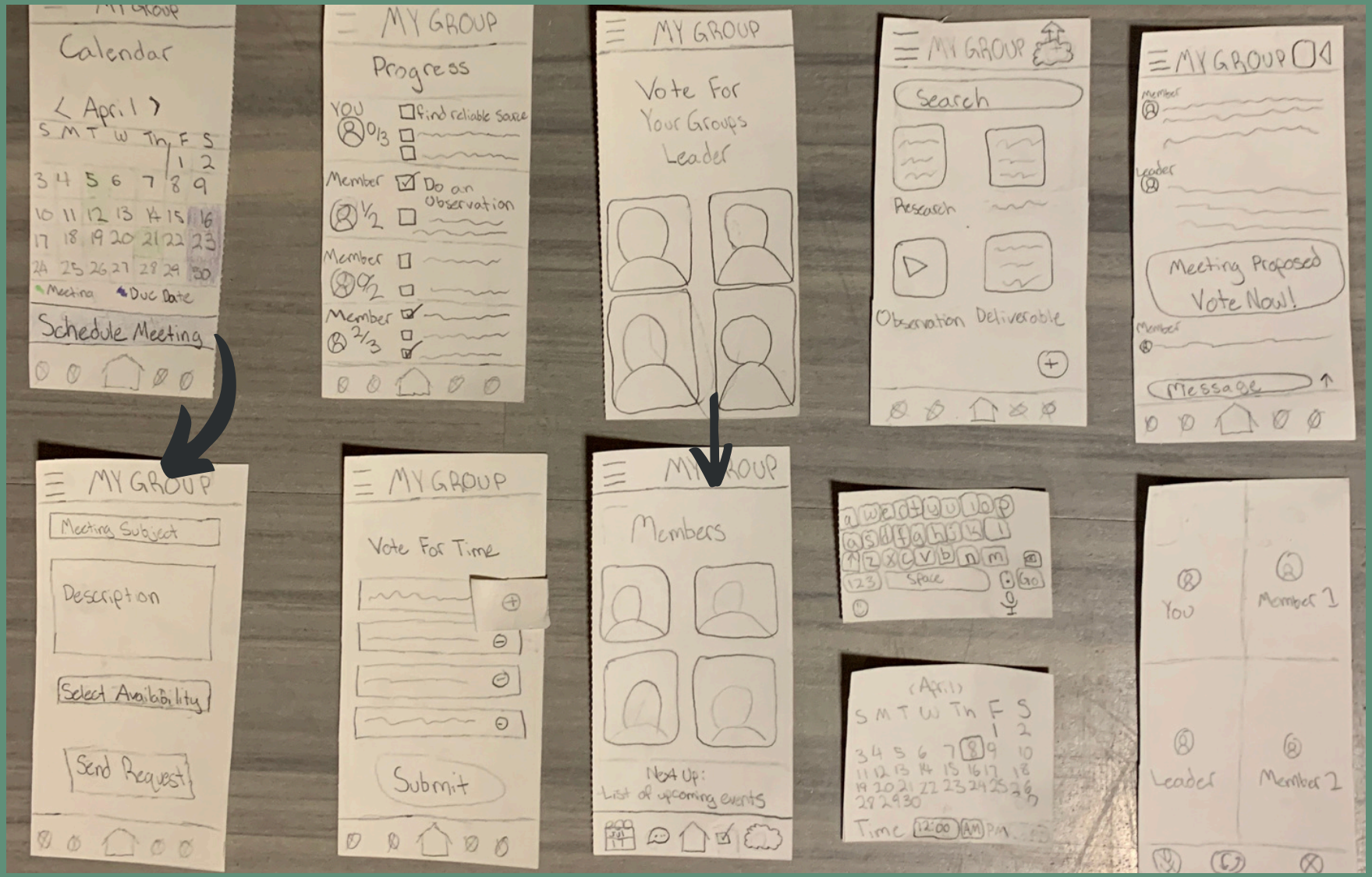
View scheduled meetings and due dates and start the schedule a meeting process

Page to show what work individual members are supposed to complete. Members check off boxes as tasks are completed

Start by voting for a group leader. Group leader can assign work to other group members

Google Drive like organizational feature

Messaging feature; tap on icon in top right to start a group call



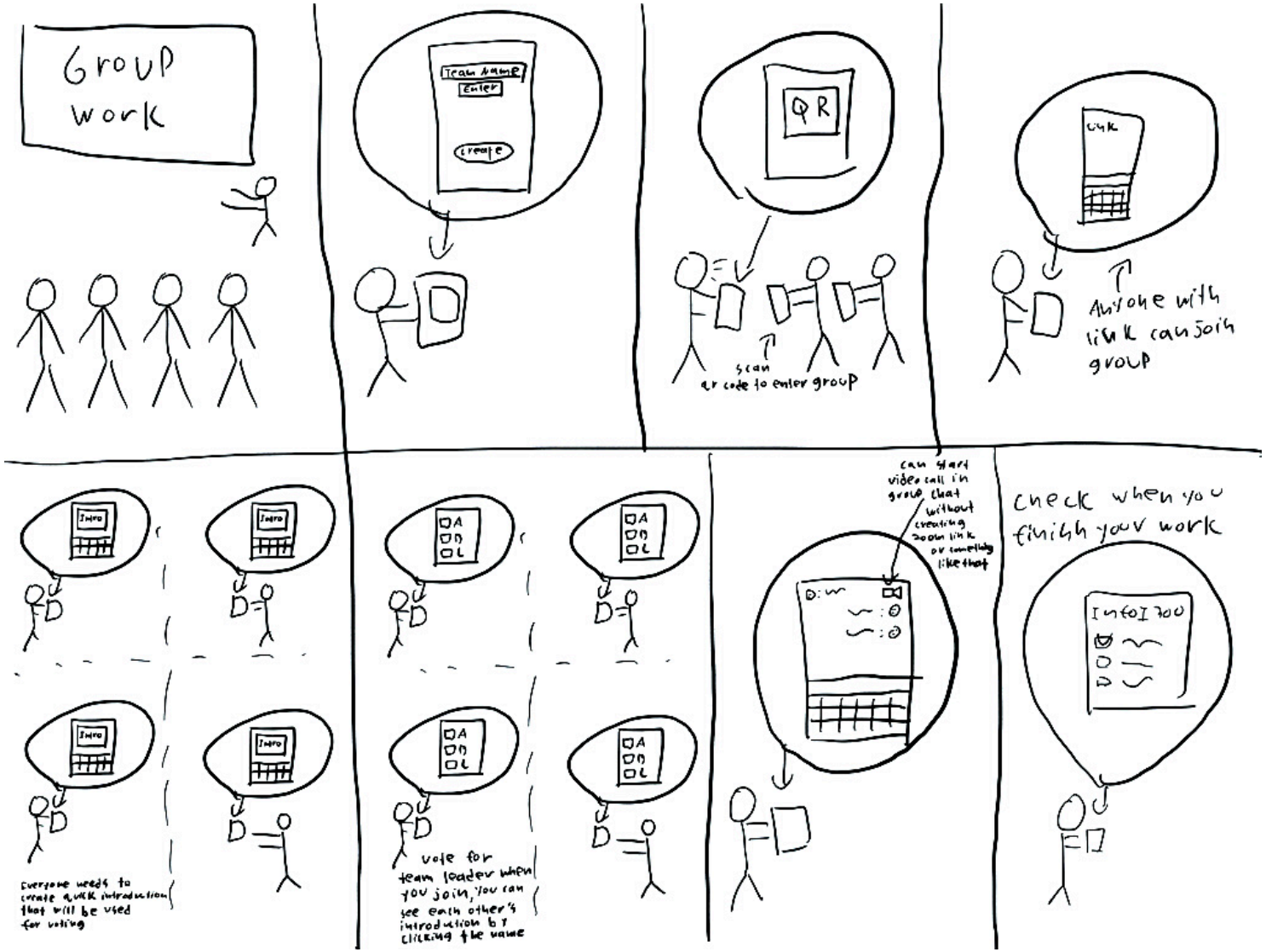
Input meeting details and select your availability; the app will only propose meetings within everyone's availability

Vote on proposed meeting times to schedule a meeting that works for everyone

Home page, with functioning navigation bar with emojis

Group call feature

Low-Fidelity Use Case Prototype



Whenever someone initially creates the group meeting, other group members can scan the unique QR code or join with a traditional link

With embedded task delegation, due dates, and other scheduling features, it is easy to track work that has been completed and what still must be done; keeps group members accountable

Group members will vote for a group leader and other pre-defined roles, and users will include short biographical info about themselves to tell others who they are

Group members can start a group video or voice call via the group chat; there is no need to use other apps like Zoom

Works Consulted

Secondary Research Sources:

DiGrazia, T. (2021, November 8). What efficiencies can tech consolidation bring to Higher Ed? EdTech. Retrieved March 1, 2022, from https://edtechmagazine.com/higher/article/2021/11/what-efficiencies-can-tech-consolidation-bring-higher-ed

Maiorca, D. (2021, September 13). Google Workspace vs. Microsoft 365: Which is better for productivity? Make Use Of. Retrieved March 2, 2022, from https://www.makeuseof.com/google-workspace-vs-microsoft-365/

Nowak, Krzysztof, Anna Olga Kuzminska, and Katarzyna Kinga Kowalczyk. (2018)"The effect of overflow at workplace on employees productivity and well being." Retrieved March 2, 2022, from https://www.researchgate.net/profile/Maciej-Urbaniak/publication/329170720_THE_ROLE_OF_PROCESS_IMPROVEMENTS_TOOLS_IN_BUILDING_RELATIONSHIP_BETWEEN_SUPPLIERS_END_INDUSTRIAL_CLIENTS/links/5bf9b085458515a69e39c362/THE-ROLE-OF-PROCESS-IMPROVEMENTS-TOOLS-IN-BUILDING-RELATIONSHIP-BETWEEN-SUPPLIERS-END-INDUSTRIAL-CLIENTS.pdf#page=331

Why mobile app design is critical to your app's success. Il Blog sul Mobile, Cloud e IoT. (n.d.). Retrieved March 13, 2022, from https://blog.duckma.com/en/mobile-app-design-critical/

Primary Research Sources:

Participant 1. Personal Interview. 22 February 2022

Participant 2. Personal Interview. 4 March 2022

Participant 3. Personal Interview. 5 March 2022

Participant 4. Personal Interview. 25 February 2022

Participant 5. Personal Interview. 6 March 2022

Observation 1. Personal Observation. 6 March 2022

Observation 2. Personal Observation. 6 March 2022

Observation 3. Personal Observation. 4 March 2022

Observation 4. Personal Observation. 24 February 2022

IMPROVING GROUP WORK EFFICIENCY

INFO-I 300
Section 29821

Jackson Gillen
Ryan Williams
Lucas Canelli
JT Cho

Introduction

Our project aims to explore the ways in which undergrad students ranging from Freshmen to Seniors in a variety of different fields of study utilize technology as an aid in their group work. Given that collaboration is an essential part of anyone's college experience, with group-based projects and assignments a routine occurrence in a semester's coursework, we are particularly interested in maximizing collaborative efficiency and effectiveness for larger-scale class assignments and projects. Students naturally experience a great deal of anxiety and time pressures with course commitments and extracurricular involvements, and we would therefore like to ensure that students are able to approach traditional assignments with the most beneficial uses of digital workspaces, communication tools, and other technologies being employed to manage resources, scheduling, and other nuances of group work.

In this particular stage of the project, we moved beyond the concept phase to produce both medium and high-fidelity prototypes of our workspace mobile application based on the insights we gained throughout the sketching process. We began by producing a wireframe mockup in Figma that provided a conceptualization of what each of the major interfaces would look like in terms of the layout of content.

After settling on the interface layout and making some adjustments in response to feedback we received from our peers, we translated our medium-fidelity wireframes to high-fidelity, fully-interactive prototypes within the Figma software. We again made slight revisions based on necessary adjustments that would help with the intuitive use of features contained within our app. These adjustments were necessary given that sketch-based prototypes cannot completely capture the full range of interactions that are expected of a mobile app.

At this point, our high-fidelity prototype contained over twenty unique interfaces with many additional variations based on the included prototype interactivity. Furthermore, our prototype fully modeled four unique use cases that we believed best captured the value of our app, including scheduling a meeting through the integrated collaborative calendar, delegating and managing tasks through the collaborative group task board, editing documents through the integrated collaborative resource management functionality, and engaging in video calls with other group members through the fully-integrated video calling feature.

Our next step revolved around us selecting an inspection method that we would use to critically evaluate our high-fidelity prototype to determine recommended design changes that would improve the app's ease of use. We settled on employing a cognitive walkthrough revolving around the four major tasks modeled within our prototype, and after outlining the steps that a typical user would go through to complete each task, we documented our findings and summarized our insights into recommended action items.

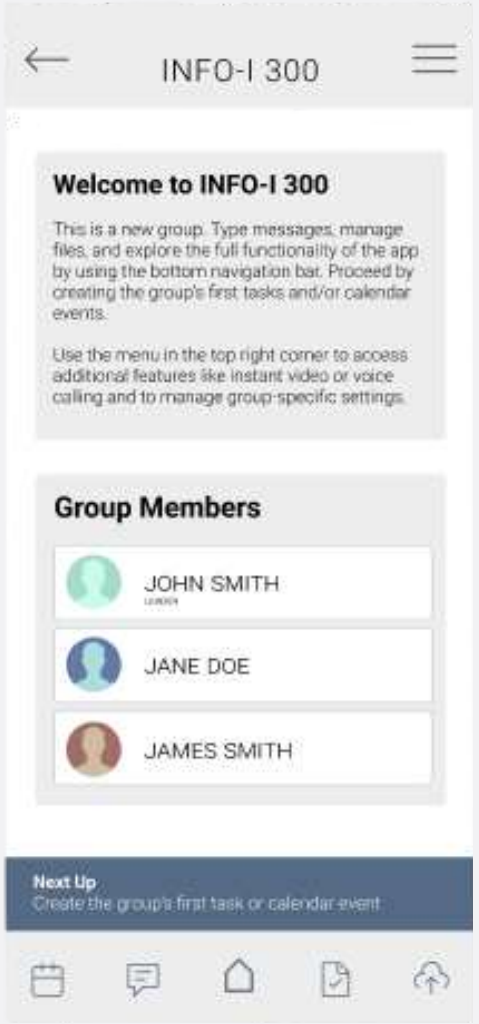
To conclude this stage of the project, we leveraged the findings from our cognitive walkthrough and the recommended action items to make iterations to our high-fidelity prototype. This allowed us to settle on a well-polished product that most adequately served the needs of our intended users while minimizing potential frustrations and challenges in regard to the app's design and interactive functionality. The progress we made with regard to the inspection process will leave us well-prepared for the next phase of the project where we plan on conducting user testing.

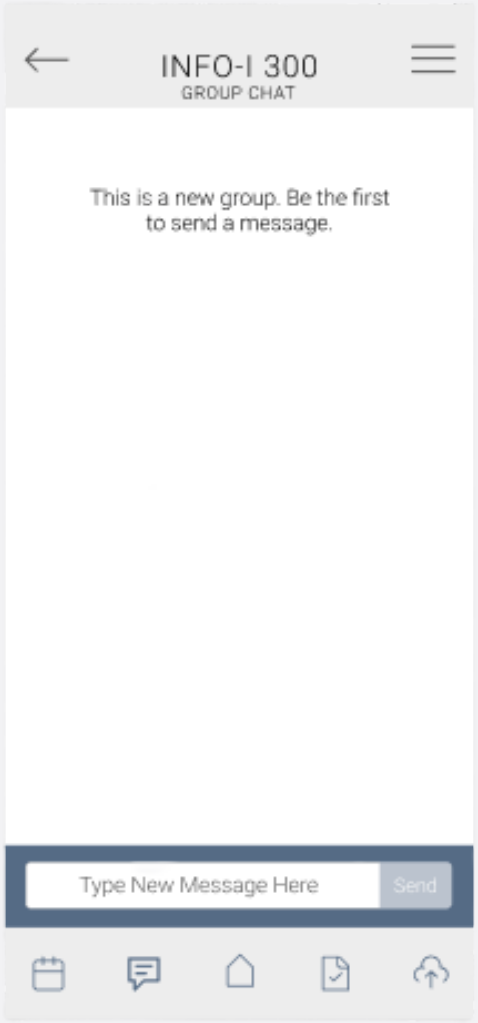
Medium Fidelity Prototype

We chose to iterate on our low fidelity prototype on Figma. We kept most of the functionality of our low-fidelity prototype. We decided to switch out the checklist for group tasks to a kanban board to better facilitate the organization of tasks and accountability in group work. The goal of our medium-fidelity prototype was to add more screens to make the app more functional and fully flesh out our idea.

With the new iteration of our prototype, we added tasks to propose a new meeting with the group's members, create a new task in the group's kanban board, start a group video call, and upload an editable file to the group's cloud storage.

The home screen acts an introductory hub for our application. It provides supplementary instructions, a list of the current group members, and a recommendation for what to do next with the application.

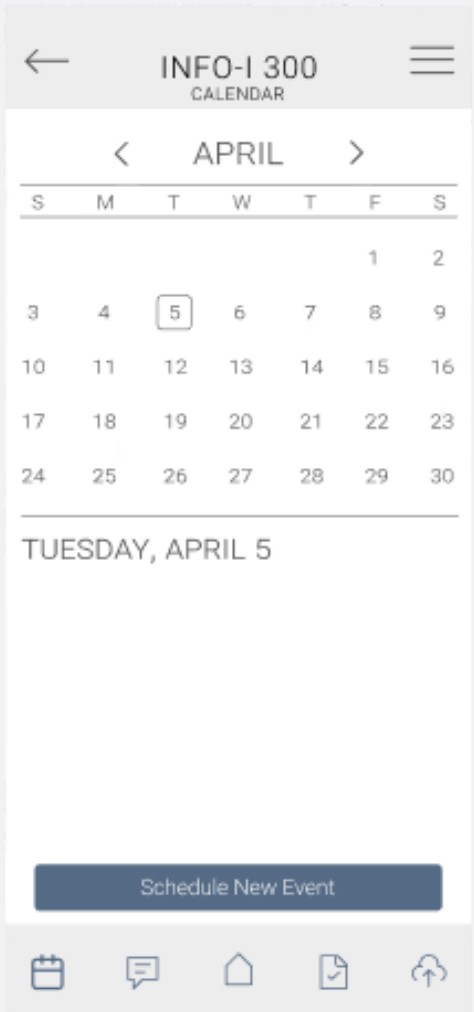


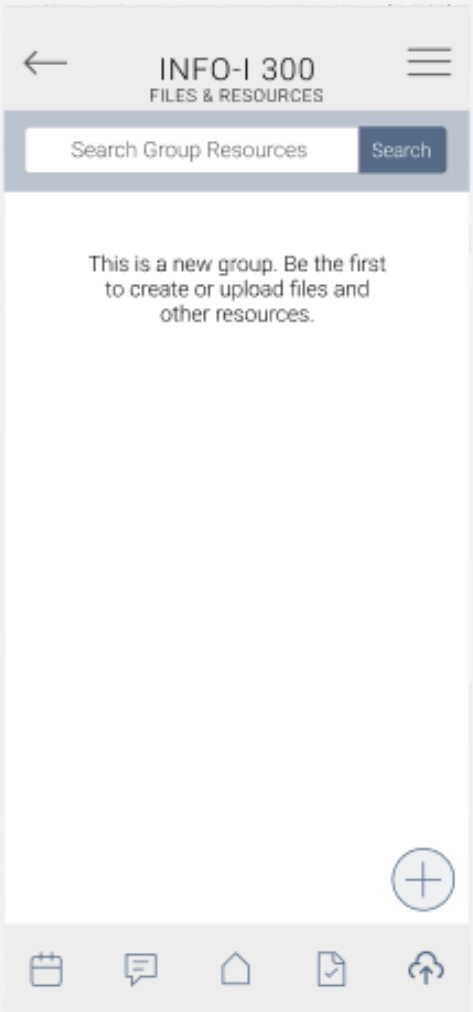


The group chat screen allows for fast and simple group collaboration that can be used for instant messaging, polls, sending documents, and starting video calls.

Medium Fidelity Prototype

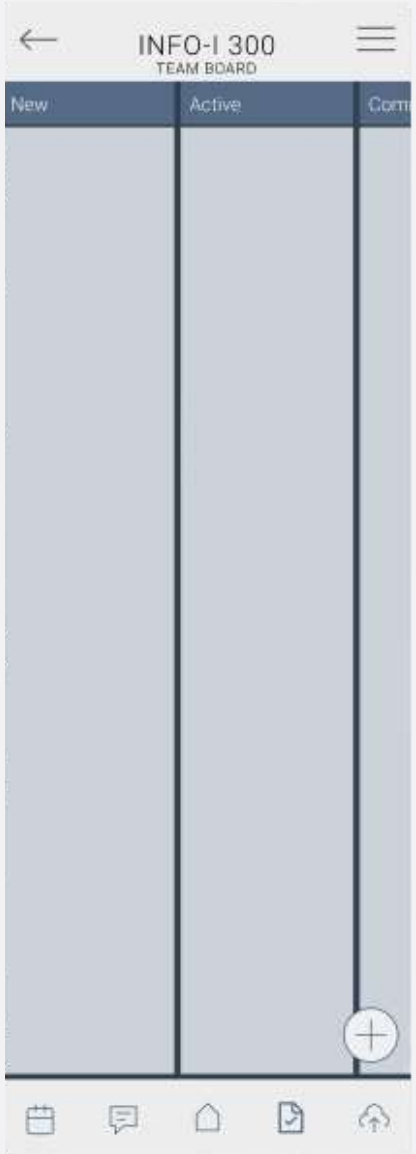
The calendar screen lists the activities of the current/selected date. It can create virtual or physical events, and can recommend the best event times based on group members current calendar events.





The files & resources screen can store all necessary documents needed for the group project. The presentation and text documents are able to be edited and saved in real time.

The team board screen allows for the organization of group tasks. It allows group members to assign work to each other with respective point values based on the expected time it will take along with five separate categories for partial updates on task progress.



High-Fidelity Prototype in Figma: *https://tinyurl.com/I300Team4Prototype*

Inspection Method:

Cognitive Walkthrough

To critically analyze our high-fidelity prototype and the sorts of challenges that users may face when interacting with our app's interfaces, we employed an inspection method and documented our findings. Our team decided on doing a cognitive walkthrough which involves identifying a typical user, setting a task for the user, and walking through the steps the user would go through to complete the task in the most idealized fashion. We decided on employing this particular inspection method since it appeared as though it would be the most efficient and effective way to analyze our interfaces while also taking away some of our own biases. By putting ourselves in the mindset of our app's intended users and going about well-defined processes that embody our tasks, we believed that this would be the most appropriate way to identify potential frustrations and challenges at a very detailed level. Furthermore, the highly-interactive nature of our prototype lent itself well to this approach. In comparison, we thought that a heuristic evaluation would be too broad in its scope and too high-level in its application, making it difficult for us to approach the tasks that our app was designed for from a perspective beyond that of a designer.

With its justification out of the way, we then began structuring our inspection process using the cognitive walkthrough approach. Our high-fidelity prototype was already designed with four distinct tasks in mind, ranging from scheduling a meeting to engaging in video calling, file editing, and task management. Therefore, we decided to use these tasks and evaluate them by making note of the typical users who would engage in the task and the range of steps that are involved. We would follow these steps from the perspective of the user during the evaluation period, all while considering three questions at each step in the process - Will users know what to do? Will they know how to do it? Will they understand from feedback whether the action was correct?

The insights we gained from our walkthrough have been summarized into recommended action items. These recommendations have been incorporated into our high-fidelity prototype through iterations we have made to the interfaces.

Task One:
Scheduling a Meeting

The first task we conducted a walkthrough of involved scheduling an upcoming team meeting by proposing potential meeting times and locations that other group members could vote on. This was an essential component of our app that we believe will provide value to students who desire a more efficient and hassle-free way of scheduling meetings that fit into everyone's busy schedule.

Takeaways:

Users who already have a date/time decided on for a meeting may be confused as to whether they can schedule it on the group's calendar without having to send out the availability poll.

→ We could address this by instructing users to provide only one proposed meeting time if they already have a date/time decided on.

The design of the "+" button to add potential meeting time/location options is not consistent with that of other buttons, and if the user fails to take time and read the instructions, they may be confused as to whether this actually functions as a button.

→ We could address this by employing greater consistency in our design and adding a more descriptive label to the button, such as "Add Meeting Time/Location"

There are multiple separate screens necessary for the process of adding a new event time/location, although this is not immediately obvious to the user and they therefore may be confused as to where to input the time and location while selecting the date.

→ We could address this by making the "Continue" button more descriptive to notify the user that additional information pertaining to the time and location will be entered on the next screen.

In its current state, there is no functionality that allows the user to enter a custom deadline for when other group members need to respond to the availability poll, which could limit its practicality if the automatic deadline is too strict or too lenient based on the needs of the group.

→ We could address this by providing an option to set a deadline prior to sending out the availability poll.

Cognitive Walkthrough

Typical User:

The typical user that would likely volunteer and take the initiative to set up a potential meeting would be the natural "leader" in the group (persona one). This individual tends to use their extroverted nature to initiate actions within the group. They deeply value organization and accountability, and although they are competent with technology, they will refrain from using certain features if they are not intuitive and accessible by all members of the group.

Task:

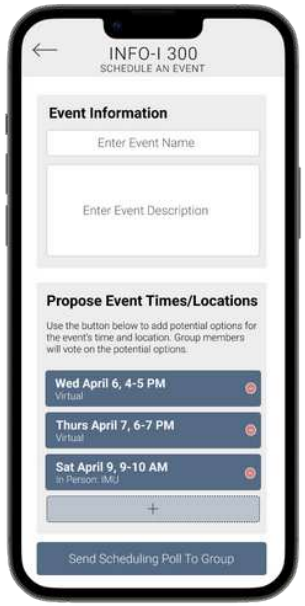
Propose a new meeting in the INFO-I 300 group with a few different options for potential meeting times, both virtual and in physical locations, and send this poll to the other group members.

Walkthrough of Steps:

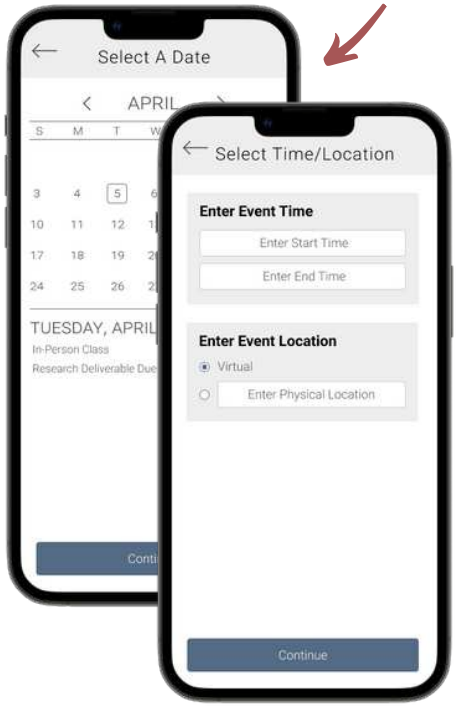
1. The user begins by opening the app on their phone where they will see the "My Groups" home screen that lists out the groups in which they are a member.
2. The user clicks on the group in which they would like to arrange a meeting.
3. The group's homepage appears on the screen with a navigation bar at the bottom. The user proceeds by selecting the calendar icon on the far left side of the navigation bar to access the group's interactive collaborative calendar.
4. The calendar appears on the screen with the current date selected and the day's events listed on the screen. The user proceeds by selecting the "Schedule New Event" button towards the bottom of the screen...

The remaining steps of this cognitive walkthrough can be found in Appendix A

The "+" button to add additional proposed event times and locations doesn't adhere to the standard button design found consistently throughout the app; users may be hesitant to click it. Furthermore, the proposed event times are formatted as buttons even though they don't function as buttons, adding to potential confusion.



The process of adding a new proposed option for the event time/location spans two screens. To avoid the user from looking for something that doesn't exist in this particular interface, the "Continue" button should be made more descriptive to inform users that they will enter additional information pertaining to the event time and location in a future interface.



Task Two:

Creating a New Task in the Team Board

The second task is to create a new item on the INFO-I300's team kanban board. The task will need to have a title, description, whom the task is assigned to, and finally a score on the time it will take to get done. This feature of our app helps students organize and keep track of the work that is completed and what needs to be done. The point ranking system also allows for a team to have a fair distribution of work.

Takeaways:

The kanban board is very cluttered with board items and categories. The "+" button blends into the background, and the user could be confused with the new category as the button for a new item.	We could address this issue by changing the colors of the "+" button to make it stand out more for all occurrences in the app.
The kanban board/task icon in the navigation bar could be a better representation of a kanban board. With the current logo, the user could be expecting a task list instead of an organization board.	We could address this issue by changing the current logo from what looks like a document and a checkmark to a kanban board icon.
The input overlay for creating a new task item has the user fill out a description, but with our current screen, there is no way for the user to look at it.	We could address this issue by adding a new overlay to show the title, description, item points, and who it is assigned to after clicking on a task.
In its current state, there is no functionality that allows the user to edit the task to add more item points, change the title, who it is assigned to, the description, or to delete the task. This would be very problematic if any user makes a mistake on creating a task item.	We could address this issue by adding an edit option for when the user clicks on tasks to view them.

Cognitive Walkthrough

Typical User:

The typical user for this task would be the group leader represented by persona one. This user takes action and will instruct others on what to do. They value accountability of work and would call/message a fellow group member if they are falling behind on their tasks.

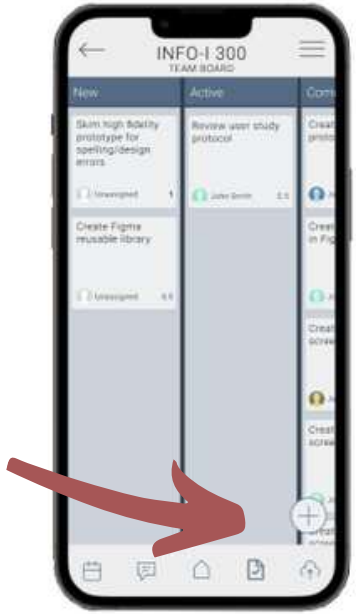
Task:

Create a new item in the INFO-I300's team kanban board, and assign the task to one of the group members.

Walkthrough of Steps:

1. The user begins by opening the app on their phone where they will see the "My Groups" home screen that lists out the groups in which they are a member.
2. The user clicks on the group in which they would like to create the new kanban board item.
3. The group's homepage appears on the screen with a navigation bar at the bottom. The user proceeds by selecting the task icon which is to the right of the home icon in the navigation bar to access the group's interactive kanban board.
4. The kanban board is now shown with tasks in categories New, Active, Committed, Test, and Completed. The user will hit the "+" button in the bottom right corner.
5. A window will pop up for a new task and have input boxes for the title, description, and item points. The user will then click on the down arrow next to assigned.
6. Another overlay will show, and the user should click on the user "John Smith".
7. Finally, the user needs to tap on the "Create Item" button, and it will show the new task on the kanban board.

The "+" button to add additional tasks blends into the environment especially when many tasks are present. This might be confusing when first learning the application.



After a new item is created on the board, there is no way for the user to open and view it or even edit it. Allowing for editing will allow for fixing mistakes, and the overlay view will give purpose to the description input.

Task Three:

Sharing a Screen on a Video Call with Teammates

The third task we conducted a walkthrough of involved creating a video call in the INFO-I 300 group and sharing a screen with your group members. This was an essential component of our app that we believe will provide value to students who desire a more efficient way of viewing and editing group work collaboratively without the need for external video-calling platforms.

Takeaways:

User would often click through all tabs on the navigation bar, thinking one would start a video call, which none of them do.	→ It may benefit to keep the video call feature in a fixed place on all pages so users don't click around as much to find it.
User would click on the messaging tab and then click away from it without noticing that the video call feature was on the top right of that page.	→ It would make more sense to prompt the user with words rather than a small picture to indicate the video call feature.
User would click on the hamburger menu on all pages to see if the video call feature was included there.	→ Putting the video call feature in the hamburger menu makes sense because it would be in the same spot on all pages.
At the current state there is no functionality in how users can share different screens which caused a little confusion with users.	→ In the future we could add an option of what screen users want to share.

Cognitive Walkthrough

Typical User:

The typical user that would likely volunteer and take the initiative to begin a video call would be the natural "leader" in the group (persona one). This individual tends to use their extroverted nature to initiate actions within the group. They deeply value organization and believe that a video chat is a good way to keep everyone in the group organized and on the same page. They like the idea of completing and reviewing work on a shared screen because it gives everyone in the group a chance to contribute equally.

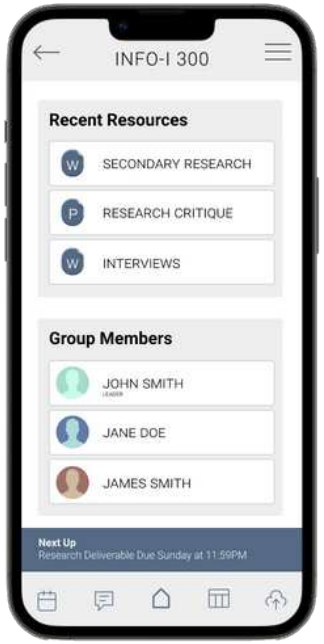
Task:

Create a video call in the INFO-I 300 group and share a screen with your group members.

Walkthrough of Steps:

1. The user begins by opening the app on their phone where they will see the "My Groups" home screen that lists out the groups in which they are a member.
2. The user clicks on the group in which they would like to arrange a meeting.
3. The group's homepage appears on the screen with a navigation bar at the bottom. The user proceeds by selecting the messenger icon on the left of the navigation bar to access the group's interactive collaborative messenger.
4. A video call icon will pop up in the top right corner that the user will select.
5. The user will be directed to a video call with the option of "Share Screen" on the bottom. After this button is selected, the task is complete.

Users would click on the messaging tab and then click away from it without noticing that the video call feature was on the top right of that page. This might be due to there being a hamburger menu in this location on other pages. Also It may not be clear that this is a button used for starting a video without some text implying that this is the purpose of the button.



User would click on the hamburger menu on all pages to see if the video call feature was included there. Putting the video call feature in the hamburger menu makes sense because it would be in a fixed location on all pages. Also if the video call feature was in the hamburger menu, it would allow us to prompt the user with words rather than a small picture to indicate the video call feature.

Task Four:

Uploading and Editing a New File

The final task we conducted a walkthrough of involved uploading and editing a new file to the group's cloud-based resource management system. This was an essential component of our app because it effectively demonstrated how our workspace would be all encompassing regarding the necessary functionality of most group work in a college environment. Not only would the app be able to manage group chats and video calling, but it would also fully integrate collaborative file editing, meaning that group members would never need to leave the app.

Takeaways:

User may overlook the "+" icon used to upload and create new files due to the fact that is blends in with the general aesthetics of the rest of the interface. This may confuse the user and cause them to needlessly look through additional menus.

→ We could address this issue by changing the colors of the "+" button to make it stand out more for all occurrences in the app.

The button to complete the process of uploading a file appears above another button to add additional files. Because the user's eyes will naturally gravitate towards the bottom-most button on the screen, this could cause confusion.

→ We could address this by rearranging the buttons. The button to complete the process should be at the bottom of the screen.

Button labels on the file upload screen can cause confusion, as the user may be tempted to select the "Add additional file" button since they see the word "Add" and think that this will complete the upload process.

→ We could address this by providing more descriptive labels to the buttons. For example, we could change "Upload" to "Complete the Upload"

Cognitive Walkthrough

Typical User:

The task of creating and editing documents likely involves all group members with no weight given towards anyone in particular, although we will consider it from the perspective of someone who takes on more of a supportive role (persona two). This is because these individuals will likely have comparatively less initiative than the group's leader, meaning that this sort of task must cater to them in an efficient and accessible manner. Simply put, these sorts of group members need to easily be able to accomplish their delegated tasks without taking as much initiative as the group's leader.

Task:

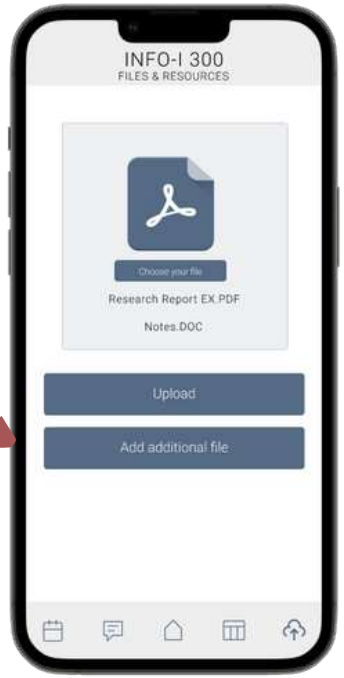
Upload a file and allow other group members to edit that file on the app.

Walkthrough of Steps:

1. The user begins by opening the app on their phone where they will see the "My Groups" home screen that lists out the groups in which they are a member.
2. The user clicks on the group in which they would like to conduct file editing.
3. The group's homepage appears on the screen with a navigation bar at the bottom. The user proceeds by selecting the file management icon on the far right of the navigation bar to access the group's cloud storage.
4. The user then taps the "+" button at the bottom right corner of the screen to upload a new file.
5. A new screen will appear for the user to choose a file or multiple files. The user taps the "choose a file" button and uses their device's native file explorer to browse for and select the intended file.
6. The user taps the upload button when they are finished and they will be redirected to the cloud storage screen where the new file will appear.
7. The user taps the new file to open it in the interactive editor.

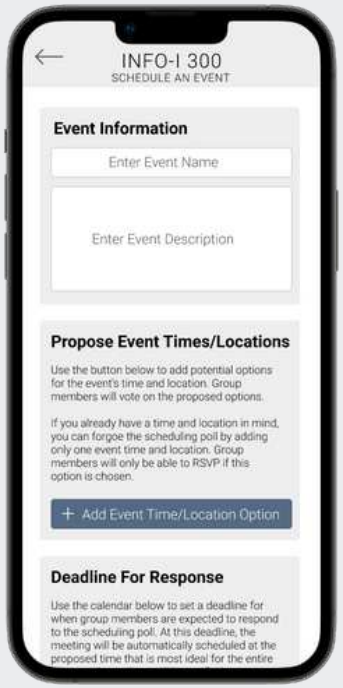
As previously discovered during our walkthrough of the kanban board, the "+" button to upload new files blends into the environment, especially when many files are already present. This might be confusing when first learning the application.

The user's eyes will naturally gravitate towards the bottom button when they are finished selecting files and are ready to complete the upload process, so they may be confused to find that button being used for selecting additional files.



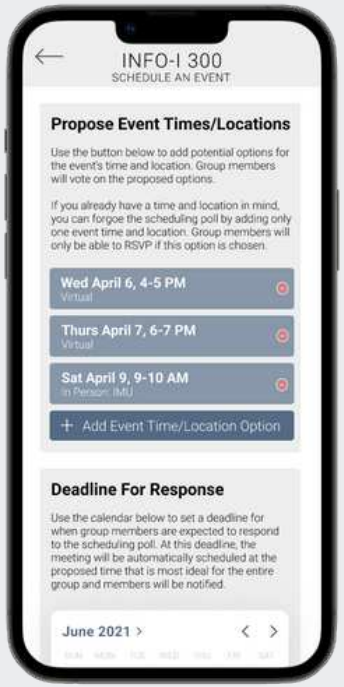
Iterating Our High-Fidelity Prototype

Scheduling a Meeting

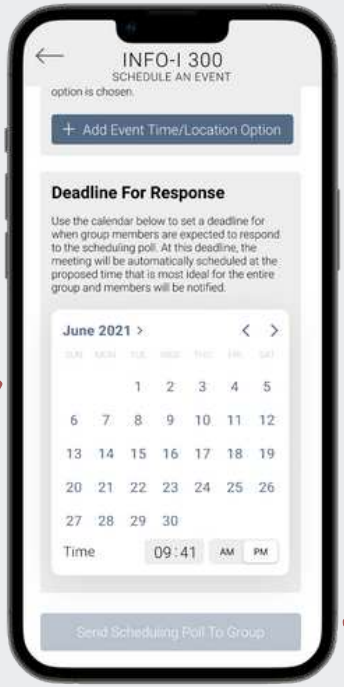


Based on the findings from our cognitive walkthrough, we provided a more detailed explanation for the user so that they better understand when to propose multiple event times/locations as opposed to providing only one option if a time and location has already been settled on. A better description of the scheduling poll and RSVP functionality was also provided as to alleviate confusion. The button to add event time/location options was also made more descriptive rather than being a simple plus icon so that users could immediately understand its function at a quick glance. The button also conforms to the design standards found consistently throughout the rest of the app.

The event times and locations that the user has already entered have been reformatted so that they don't appear as though they are buttons. This will help ensure that users are not misled by their functionality. Furthermore, this helps the button to add additional event time/location options better stand out to the user.

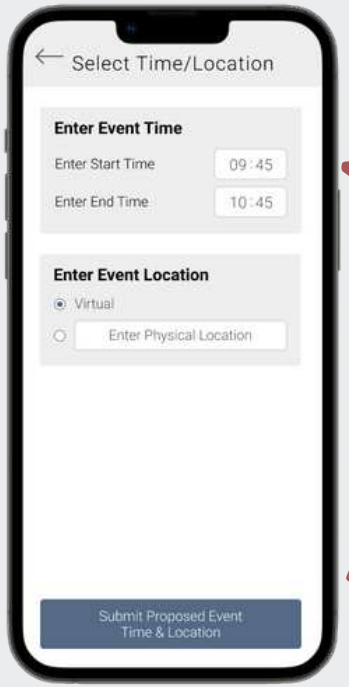


It was noted that users may want to have the option to set a custom deadline for when they'd expect other group members to respond to the scheduling poll as to cater to the dynamic needs of group work. Therefore, we added a section to the "Schedule an Event" page that instructs users to select a date and time for the deadline. The included text also provides the users with a better explanation of the automated functionality of the app to schedule the meeting at the most ideal time once the deadline is met. This will help ensure that users know that they no longer need to concern themselves with setting up a virtual meeting once the poll has been sent to the group.



Button labels were made more descriptive as to suggest to the user that there are more steps involved in a particular process. This will hopefully help avoid potential confusion if users are wondering where they input the event start and end time as well as its location. The design of the calendar was also updated to more prominently highlight the selected date.

The "Send Scheduling Poll To Group" button was grayed out to signify that it is in a disabled state due to the fact that the user has yet to provide any proposed event time/location options. The button will restore its color and functionality once an option has been provided.



The section to enter the event start and end times has been updated to make use of standard time-entry input fields that a user will likely be more familiar with. This will better help with formatting the content and data entry while also making the process more intuitive and recognizable to the user.

The button label has been updated. Since this is the final step in the process of proposing a new event time/location, it is more appropriate to use the word "Submit" rather than "Continue". The button was also made bigger to stand out, which was deemed necessary with the larger amount of white space on this particular interface.

High-Fidelity Prototype in Figma: *https://tinyurl.com/I300Team4Prototype*

Iterating Our High-Fidelity Prototype

Creating a New Task in the Team Board

The previous button for the kanban board represented well that it was meant for tasks. However, we believed the icon was misleading because the kanban board is more than a checklist. We updated the logo to better represent what the screen looks like.

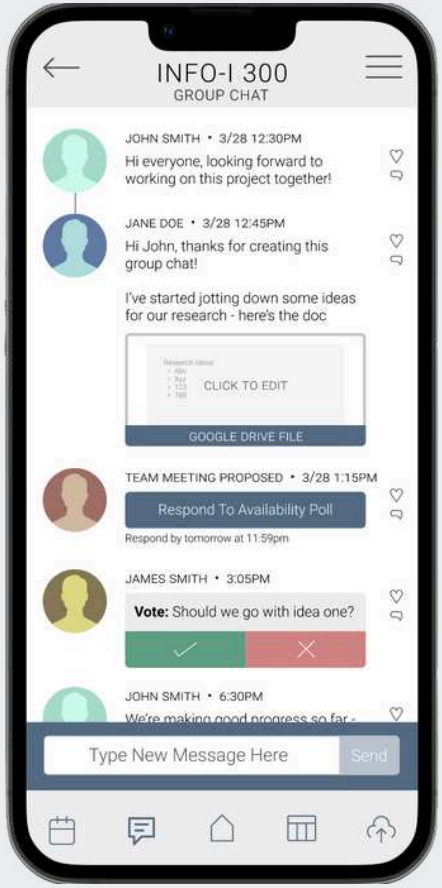
Based on the results from the cognitive walkthrough, we decided to update the UI for the "+" meant to add a new item to the kanban board. It seemed as though it blended into the background and could be easily overlooked. To fix this, we decided to invert the color scheme for this button. We also decided to change the color to green to hint that the button is used for creating/adding.

The kanban board was also updated to add view functionality for items. This was to give purpose to the description in the creation of the item. We used it as a opportunity to add editing as well. The user is now able to edit the title, description, who the task is assigned to, and the item points. The user is able to cancel their changes if they don't like them. Finally, the user can even delete a task if they find it is unfit for the group.

High-Fidelity Prototype in Figma: *https://tinyurl.com/I300Team4Prototype*

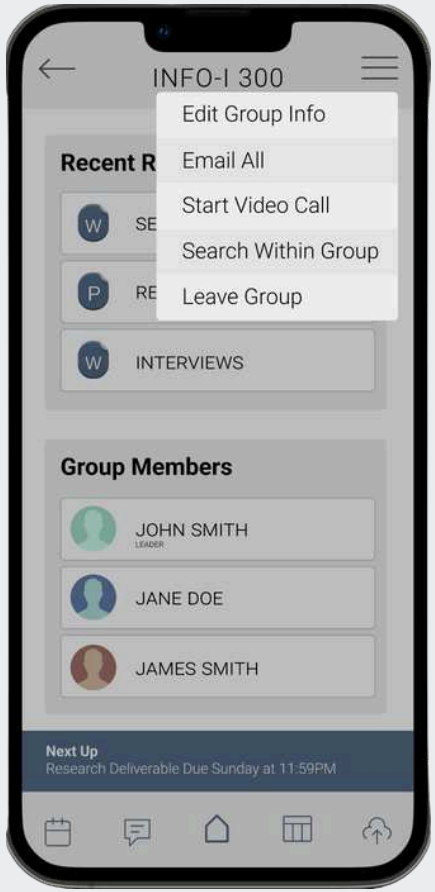
Iterating Our High-Fidelity Prototype

Sharing a Screen on a Video Call with Teammates



After the cognitive walkthroughs, we decided to put another hamburger menu on the messaging page instead of implementing the video call feature only on the messaging page. This way all of our pages will have a similar flow and the top and bottom of each page will have a uniform look that will be easier to navigate.

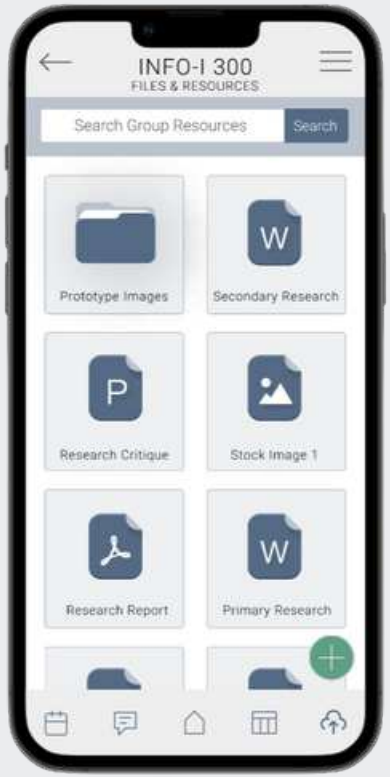
Performing the cognitive walkthroughs allowed us to easily decide to add the "Start Video Call" to our dropdown hamburger menu that is present in the top right corner of every page. This way it is possible to start a video call from any page in the app by simply selecting the dropdown menu. After the cognitive walkthrough, we also decided that it would make more sense to prompt the user with words rather than the small icon we used earlier to indicate the video call feature. This way there will be no confusion about what button initiates what action and this will make the process of creating a group call and sharing a screen much more efficient.



High-Fidelity Prototype in Figma: *https://tinyurl.com/I300Team4Prototype*

Iterating Our High-Fidelity Prototype

Creating and Editing a New File



Our cognitive walkthrough noted that users may find difficulty in distinguishing the design of the "+" button from the general aesthetics of the files page. We addressed this by implementing a new design for the "+" button that is consistent with other occurrences found throughout the app. The more vibrant appearance and the use of the color green will better catch the users attention while signaling what the intended purpose of the button is.

The arrangement of the buttons on the file upload screen was addressed in our iterations. It was noted that users will naturally gravitate towards using the bottom-most button when they want to complete the process, especially since the uploaded files are listed on the upper half of the screen. Therefore, we moved the "Complete the Upload" button to the bottom of the screen and placed the button to "Add an Additional File" above it. The button labels have also been made more descriptive as to ensure that the user knows immediately their intended purpose.

The redesigned "+" button was also incorporated into the interface that demonstrates integrated collaborative file editing, specifically in regard to a PowerPoint file. On this interface, the "+" button is used to add additional slides, and because it is using a more vibrant color scheme, it will better stand out against the gray background.

High-Fidelity Prototype in Figma: *https://tinyurl.com/I300Team4Prototype*

Works Consulted

Secondary Research Sources:

DiGrazia, T. (2021, November 8). What efficiencies can tech consolidation bring to Higher Ed? EdTech. Retrieved March 1, 2022, from https://edtechmagazine.com/higher/article/2021/11/what-efficiencies-can-tech-consolidation-bring-higher-ed

Maiorca, D. (2021, September 13). Google Workspace vs. Microsoft 365: Which is better for productivity? Make Use Of. Retrieved March 2, 2022, from https://www.makeuseof.com/google-workspace-vs-microsoft-365/

Nowak, Krzysztof, Anna Olga Kuzminska, and Katarzyna Kinga Kowalczyk. (2018)"The effect of overflow at workplace on employees productivity and well being." Retrieved March 2, 2022, from https://www.researchgate.net/profile/Maciej-Urbaniak/publication/329170720_THE_ROLE_OF_PROCESS_IMPROVEMENTS_TOOLS_IN_BUILDING_RELATIONSHIP_BETWEEN_SUPPLIERS_END_INDUSTRIAL_CLIENTS/links/5bf9b085458515a69e39c362/THE-ROLE-OF-PROCESS-IMPROVEMENTS-TOOLS-IN-BUILDING-RELATIONSHIP-BETWEEN-SUPPLIERS-END-INDUSTRIAL-CLIENTS.pdf#page=331

Why mobile app design is critical to your app's success. Il Blog sul Mobile, Cloud e IoT. (n.d.). Retrieved March 13, 2022, from https://blog.duckma.com/en/mobile-app-design-critical/

Primary Research Sources:

Participant 1. Personal Interview. 22 February 2022

Participant 2. Personal Interview. 4 March 2022

Participant 3. Personal Interview. 5 March 2022

Participant 4. Personal Interview. 25 February 2022

Participant 5. Personal Interview. 6 March 2022

Observation 1. Personal Observation. 6 March 2022

Observation 2. Personal Observation. 6 March 2022

Observation 3. Personal Observation. 4 March 2022

Observation 4. Personal Observation. 24 February 2022

UI Kit Sources:

SWM Icon Pack by Software Mansion S.A. and Daniel Wodziczka. Retrieved April 19, 2022, from https://www.figma.com/community/file/942053544758339202

Folder Icons by Chocoball. Retrieved April 19, 2022, from https://www.figma.com/community/file/990495991998292968

iOS 15 UI Kit for Figma by Joey Banks. Retrieved April 19, 2022, from https://www.figma.com/community/file/984106517828363349

Free Icon Pack 1300+ icons By Leonid Tsvetkov. Retrieved April 22, 2022, https://www.figma.com/community/file/886554014393250663

Appendix A - Cognitive Walkthrough

Scheduling a Meeting

Walkthrough of Steps:

(continued from page 5)

5. A new page appears with fields for the user to input the event name and a description.
6. The user then begins proposing potential event times/locations by clicking the "+" button to add a new option.
7. A calendar appears on a new screen for the user to select a date for the proposed meeting. The calendar is interactive, so when the user selects a new date, the events already scheduled for that day will appear on the bottom half of the screen as to keep the user informed of any potential conflicts. Once a date is selected, the user proceeds by clicking the "Continue" button at the bottom of the screen.
8. Another screen appears prompting the user to enter the start and end times for the event and the planned location (either virtual or at a physical location that can be inputted as a text field). Once this information is entered, the user selects the "Continue" button.
9. The user repeats the previous few steps to add additional potential meeting times that other group members will rank in regard to their availability/preference.
10. When the user is satisfied with the proposed options, they complete the scheduling process by clicking the "Send Scheduling Poll To Group" button at the bottom of the screen. The process from this point onward is now reliant on other group members responding to the availability poll integrated within the group chat and once the deadline has passed, the app will automatically finalize the scheduled event based on the time that is most ideal for the group members; the event will automatically appear on the calendar, a notification will be sent in the group chat as well as an RSVP feature, and if the meeting is virtual, the meeting will be automatically created and integrated within the app.