Final Design Report: Northwestern University Biomedical Engineering Ph.D. Recruitment 2.0

Prepared for:

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Date:

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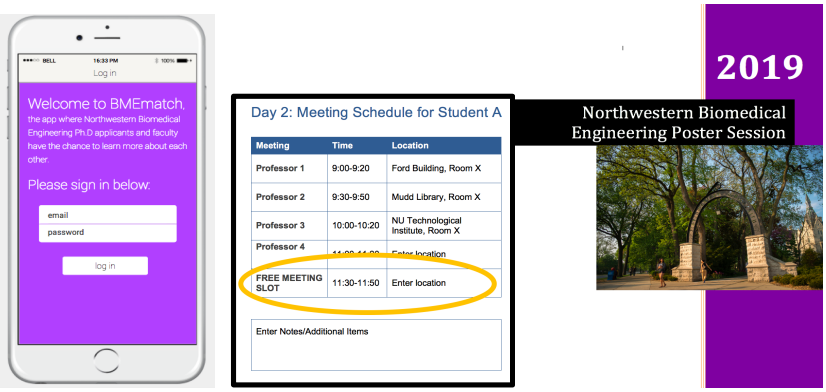
Executive Summary

Our client, Professor Malcolm MacIver, presented us with the following design challenge: to improve the admissions process of Northwestern's BME graduate program. Our project recommends changes to the overall recruitment process and timeline, as well as specific new programs to add to the two-day recruitment campus visit.

Our research and testing consisted of many interviews with user groups, which include students, faculty, administrative staff, and Professor MacIver. From these interviews, we were able to identify unique requirements to fulfill and compile detailed information concerning all steps of the recruitment process. Our design, PhD Recruitment 2.0, consists of nine components in a final product that addresses multiple qualms and issues within the PhD recruitment process and primarily focuses on increasing efficiency and faculty-applicant engagement. These deliverables not only worked to address current inefficiencies but also served to satisfy our client requirements as explained below:

- **Easy-To-Use:** BMEmatch, the brochure, and Follow-Up interview setup will all be made very clear and incorporate step-by-step instructions to complete.
- **Dynamic/Interactive:** All faculty members, applicants, and administrators will engage with the app in order to set-up the on-campus and follow-up interviews. The app will also have the most up-to-date information for students.
- **Maintainable:** This design will be able to be reused independently without our team for at least the next two years and can be updated easily.
- **Time-Efficient:** Our app, centralized interview location recommendation, moratorium on cover letter pulling, and graduate assistance recommendation are focused on reducing the total time it takes in the process while other changes will only add a maximum of a two hours to each user group.
- **Data-Centric:** Extensive information on timelines and process information are detailed within this report and were used in deciding on our final designs.
- **Beta-Testable:** Our app is able to be beta-tested in next cycle (Fall 2018-Winter 2019)



Introduction

Northwestern University has one of the top graduate biomedical engineering programs in the country, and the directors of the Phd program are currently looking to revise their recruitment process. The current recruitment program lacks in integration of technology, time efficiency, updated information for graduate prospects, and faculty engagement. As it stands, the current process relies on methods used during the last decade and is in need of reform.

Our solution consists of multiple deliverables:

- A report detailing all changes to BME recruitment and the rationale behind these ideas
- A poster detailing overall process changes
- An app to enable dynamic matching between students and faculty labs
- A pamphlet explaining all new changes to the process with suggestions for implementation

This report includes detailed information concerning user requirements and groups within the process and limitations/future steps. Its appendices include user interviews conducted to provide information to inform our decisions, user and performance testing to receive feedback on our ideas, and descriptions and instructions on how to implement/use our deliverables. This report will hopefully clarify the complex recruitment process, demonstrate the need for cooperation in the process, increase engagement from all parties, and improve the overall experience for applicants.

Users and Requirements

Main Users of the Design

Prospective graduate students: One main user group includes students applying to Northwestern's Biomedical Engineering graduate program. They will interact with some components of the design in order to have a more enjoyable recruitment visit and a smoother recruitment process overall.

Administrative staff: Administration for the graduate biomedical engineering department coordinate the logistics for the recruitment visit and the overall process, so some components of the design will help aid in their work in order to consolidate and simplify some aspects of the process. Our client, Professor Malcolm MacIver, also falls into this user category.

Faculty: Another key user group is BME faculty, who are required to be involved during recruitment visit, as well as serve as a resource for prospective students during the recruitment process. Faculty will use some components of the design for before, during, and after recruitment visit, without adding excessive time to their busy schedules. A smaller subset of faculty make admissions decisions, and will thus be affected by overall recruitment process changes, as well.

Key Requirements

The following requirements are listed in order of priority:

Easy to Use: These designs will be used by many users and implemented into an already existing process, so they must be intuitive and easy to implement to ensure user groups can use the design easily without extra time or effort. If extra effort is needed, the designs will not be used and thus rendered useless.

Dynamic/ Interactive: The design should encourage user participation in an engaging manner in order to maintain interest and excitement.

Maintainable: Given that graduate recruitment occurs every year, the design should be able to be used for multiple years without external help needed to keep the design functioning. In addition, users should be able to fix potential flaws on their own and keep information updated year-to-year.

Time-efficient: Our design should not drastically increase the amount of time put in by any user group, but rather help make the process more efficient and streamlined.

Data-Centric: The design should use data to optimize the given goal in order to have concrete evidence to justify design decisions and final deliverables.

Ready/ Nearly Ready to be Beta Tested: During the next cycle of BME graduate recruitment, users will utilize the design to a limited and controlled capacity during the actual process.

For additional information about users and requirements, please refer to Appendix A: Project Definition.

Design Concept and Rationale

Design Overview

Our design is a new recommended process for BME PhD recruitment at Northwestern University. An overview of the recruitment process along with the recommended changes of the design is included in Figure 1.

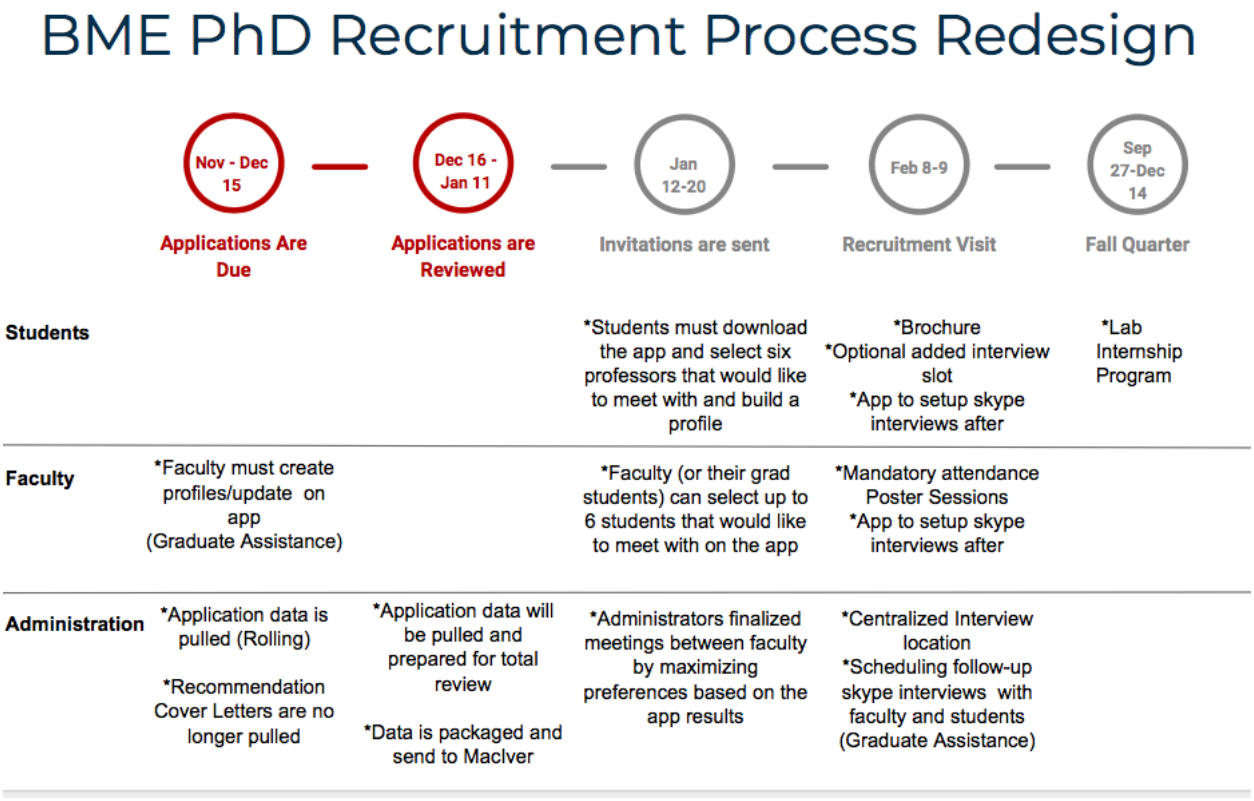


Figure 1: BME PhD Recruitment Process Redesign

We propose the following main additions or changes:

1. Application Review Changes: These changes will take place before recruitment visit (the two-day campus visit for prospective students) and include reducing BME administration workload, stream-lining the application process, and reducing faculty workload.

2. BMEmatch App: An app will be created where students and faculty can learn about each other and select who they would like to meet with before recruitment visit, update

preferences during recruitment visit, and organize follow-up video chats after the students' visit to Northwestern.

3. Recruitment Visit Changes: We are also recommending other important changes throughout recruitment weekend. These changes include implementing the BMEmatch app into the process, creating a brochure for the poster session, holding student-faculty meetings in a centralized location in Evanston, and adding a "free interview" slot to students' and faculty members' schedules.

4. Video Chat Option: After recruitment visit, prospective students will be given the option to formally request a video chat with faculty members before final decisions are made.

5. Lab Internship Program: Once students accept their offer to come to Northwestern, in the fall, students will have the opportunity to participate in either a ten-week lab internship or two five-week lab internships.

The following five sections will detail the design concepts and rationales for the initial key changes: application review changes, BMEmatch app, recruitment visit changes, and post-recruitment visit changes.

Design Feature 1: Application Review Changes

Process changes at the beginning of the recruitment cycle were designed around two main elements and improvements:

- Reducing workload for the administration and faculty: Since many of the other process design changes are slightly more student-centric, the vast majority of the following changes are directly focused on improving the process specifically for the administration or faculty (see Appendix B: User Interview Summaries).

- Increasing student-faculty interaction: This is in order to increase student satisfaction and increase faculty engagement, both of which are goals specified by administration (see Appendix B: User Interview Summaries).

Change 1: Eliminate data-pulling from letters of recommendation

For the next recruitment cycle, the BME administration should not have to pull data from the cover sheet of recommendation letters in December and January, which is an extremely time-intensive procedure with few concrete benefits (see Appendix B: User Interview Summaries). Currently, the recommendation letter writer fills out quantitative data ranking the applicant; this information is attached as a cover sheet to the recommendation letter. Because the data is included in the .pdf file of the recommendation letter, the administration must manually open up each of the 400-600 applications and "pull" the data from each .pdf file. This data is then used in an algorithm that eliminates about five to ten Ph.D. applicants from the recruitment cycle. While this information is useful, multiple faculty members will already be later reviewing the cover letter data when reading the recommendation letters and will also use this data to inform their admission decisions. As a result, it is recommended that the data pulling step is removed from the process. Figure 2 displays where this recommendation is located in the recruitment cycle.

Rationale

With the increased amount of extra time freed up from removing this task, the administration should be able to oversee our other proposed process recommendations, which will be detailed later in this report, without additional stress. The number of applicants that are eliminated during this process does not justify the number of hours of work that the BME administration must complete. Also, this information will already be reviewed later on by faculty members, who are the ones that make admission decisions. In addition, our client, who oversees the BME administration, agreed that this was a change he would be able to make for the next recruitment cycle (see Appendix C: User Testing Report).

	Nov - Dec 15 Applications Are Due	Dec 16 - Jan 11 Applications are Reviewed	Jan 12-20 Invitations are sent	Feb 8-9 Recruitment Visit	Sep 27-Dec 14 Fall Quarter
Students			*Students must download the app and select six professors that would like to meet with and build a profile	*Brochure *Optional added interview slot *App to setup skype interviews after	*Lab Internship Program
Faculty	*Faculty must create profiles/update on app (Graduate Assistance)		*Faculty (or their grad students) can select up to 6 students that would like to meet with on the app	*Mandatory attendance Poster Sessions *App to setup skype interviews after	
Administration	*Application data is pulled (Rolling) ***Recommendation Cover Letters are no longer pulled***	*Application data will be pulled and prepared for total review *Data is packaged and send to MacIver	*Administrators finalized meetings between faculty by maximizing preferences based on the app results	*Centralized Interview location *Scheduling follow-up skype interviews with faculty and students (Graduate Assistance)	

Figure 2: Recommendation letters will no longer be pulled by administration

Change 2: Rolling Application Data Processing

The administration should devote a portion of their time while verifying application completeness to also processing and file application data. Applications typically trickle in from the beginning of November to December 10th, and by this time, around 200 applications will have been sent in. Administrative staff members determined that processing and pulling data for these applications as they come in will be very feasible and will enable verification and director review to begin as early as January 3rd (see Figure 3). This will save up to a week's worth of time and enable either more time for faculty review or earlier invitations for recruitment weekend being sent (see Appendix B: User Interview Summaries).

Rationale

After speaking with the administration and discussing this change, we were given approval and support for this endeavor and were told that administrative work would not increase by much during this time. By having more time, faculty and administrators can work on other aspects of recruitment or send out student invitations to recruitment visit at an earlier date, which gives Northwestern an edge against other schools' graduate recruitment (see Appendix B: User Interview Summaries).

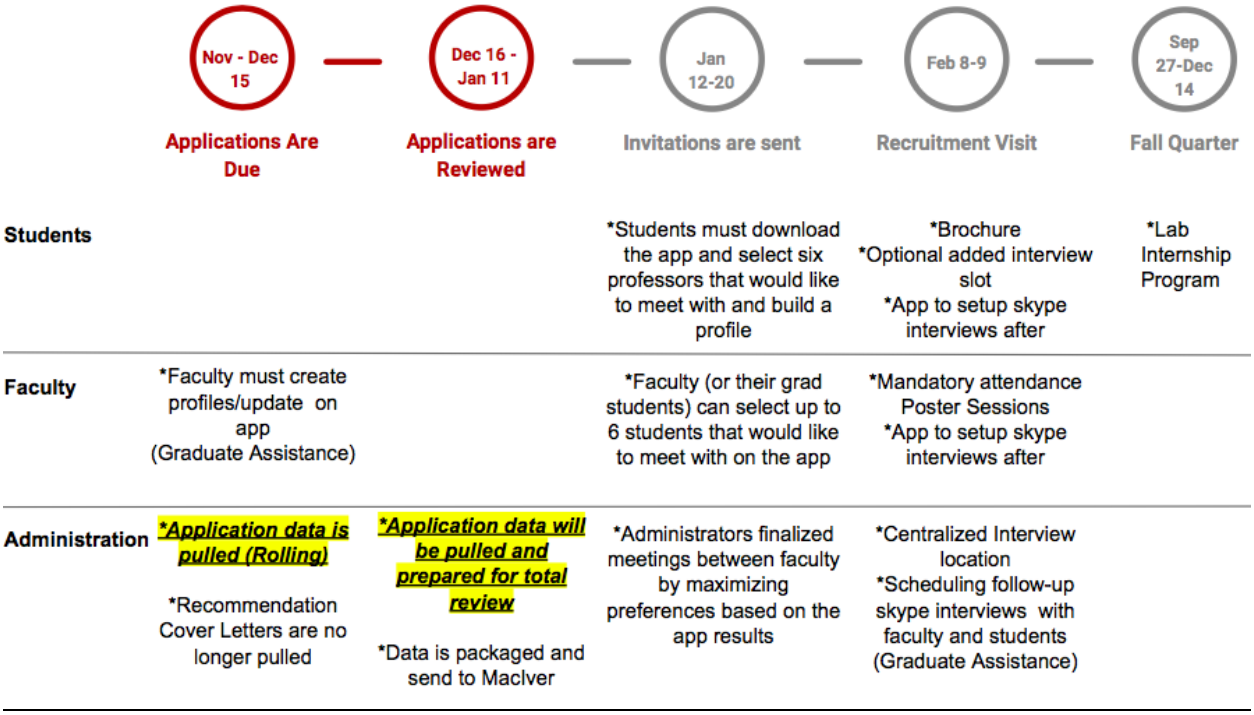


Figure 3: Rolling application data processing in the recruitment process

Change 3: Graduate Student Assistance

The BME faculty should enlist their graduate students to help with specific commitments that do not directly require BME faculty to contribute. This includes setting up follow-up interviews and profiles for professors on the BMEmatch app, which will be described later in this report.

Rationale

Understandably, the BME faculty will not necessarily have the time to complete or be completely up to date on the new tasks that BME faculty members will be asked to do. Borrowing from a recruitment method used by Northwestern University's Department of Chemical and Biological Engineering (see Appendix D: Expert Interview Summary), we propose utilizing graduate students in all stages of recruitment (see Figure 4). This change will ensure that the new changes will not overburden faculty members. During user testing, the administrative staff appreciated this idea because it would help lessen their workload of coordinating logistics (see Appendix C: User Testing Report).

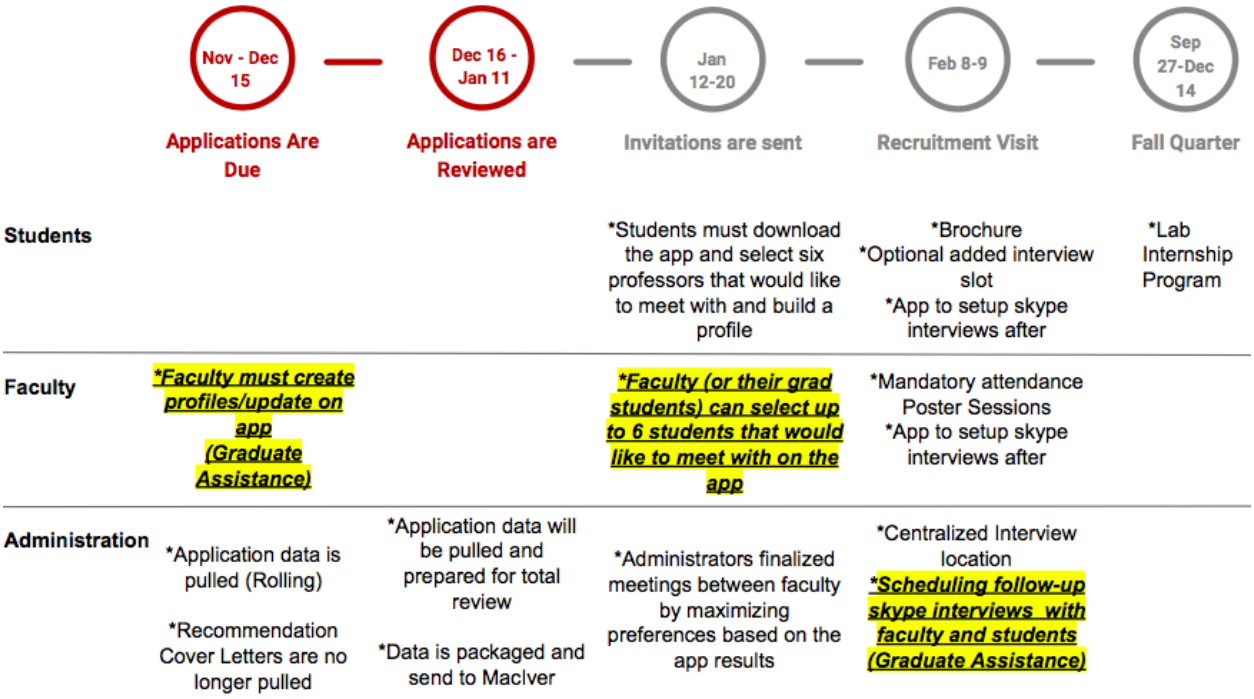


Figure 4: Graduate student assistance in the recruitment process

Design Feature 2: BMEmatch App

Use and Specifications

An app will be incorporated into the overall recruitment process as a way of creating better, mutually-satisfactory student-faculty matches (see Figure 5). The functionality of the app is multifold. It will be used by students as a centralized location for researching Northwestern faculty and labs. In addition, it will be used by applicants and faculty to "match" with one another in order to create optimal student-faculty meetings during recruitment weekend, as well as optimal student-faculty matches for the fall internship program, which will be detailed later in the report.

Also, students and faculty members will be able to update their preferences for meetings after the first day of recruitment visit because they may meet someone of interest whom they had not considered at first. An in-app algorithm will match meeting times and preferences in order to create student and faculty itineraries. Finally, the app will be used to coordinate follow-up video chats between students and faculty before final decisions come out.

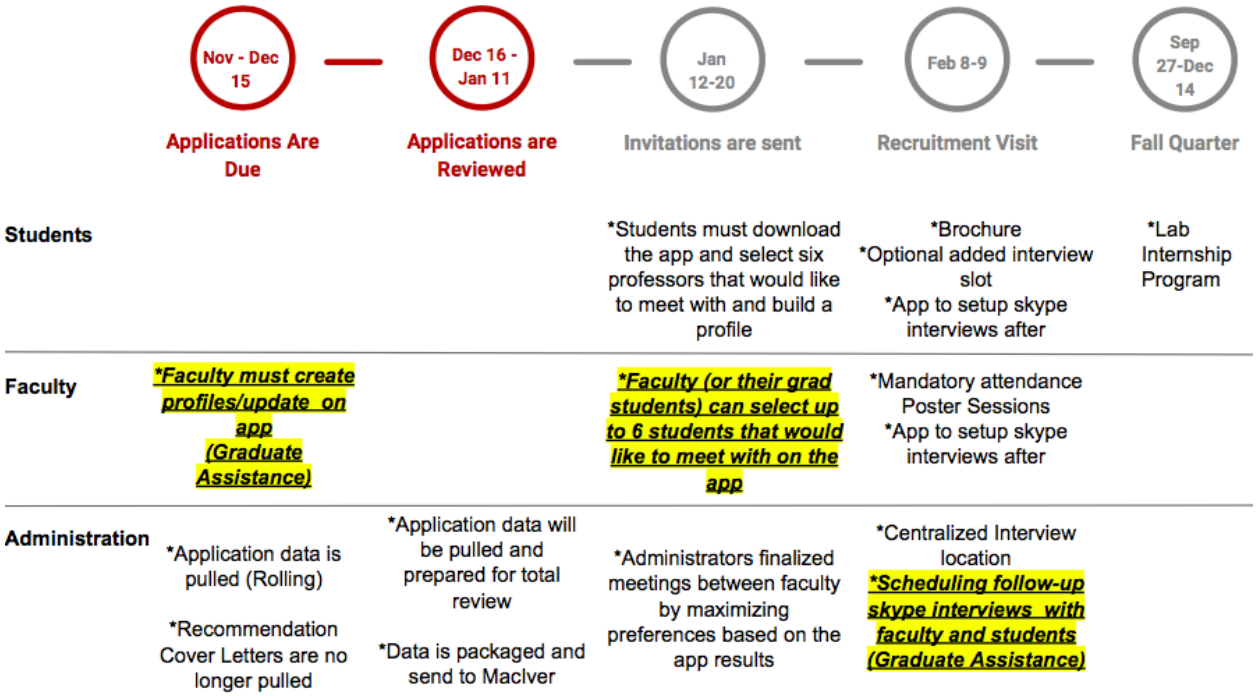


Figure 5: BMEmatch app in the recruitment process

First, the administration will be in charge of sending out the link to either download the app or open a web-based version of the app to applicants and faculty about three weeks before recruitment weekend. This can be contained in the initial email that they send out inviting all students to recruitment weekend, and can be sent in a separate information email to all BME faculty at the same time.

Once students and faculty have opened the app, they will log in using their email, as well as creating a password for their account (see Figure 6).

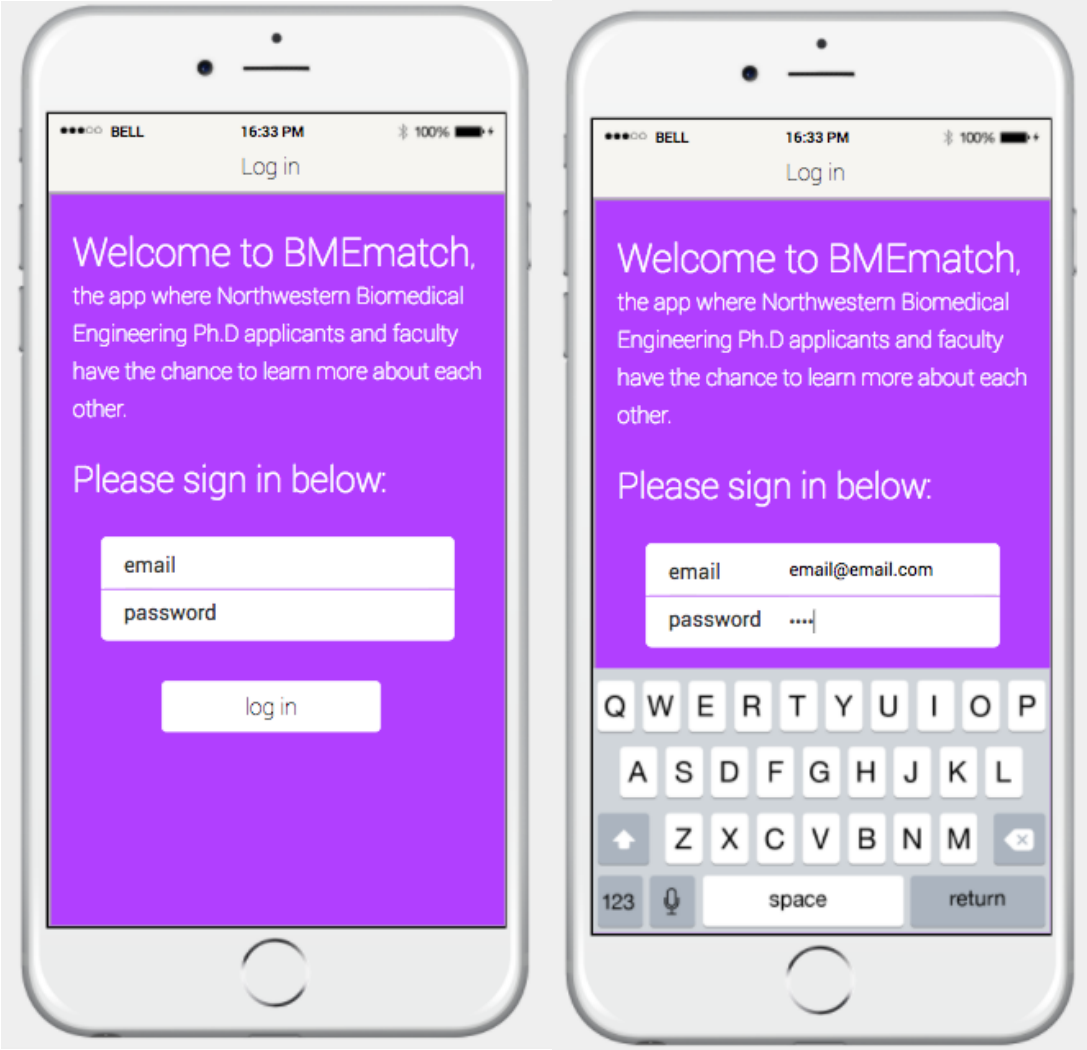


Figure 6: Login Screen for BMEmatch for both Students and Faculty

Next, both professors and applicants will fill out a quick profile, with the option to add a link to their official website (professors) or to insert their statement of purpose (students). Figure 7 illustrates the two profile pages: the left frame shows the student's view of their own profile page; the right frame shows the faculty view of their own profile page. In addition, both students and faculty can upload profile pictures to their profiles.

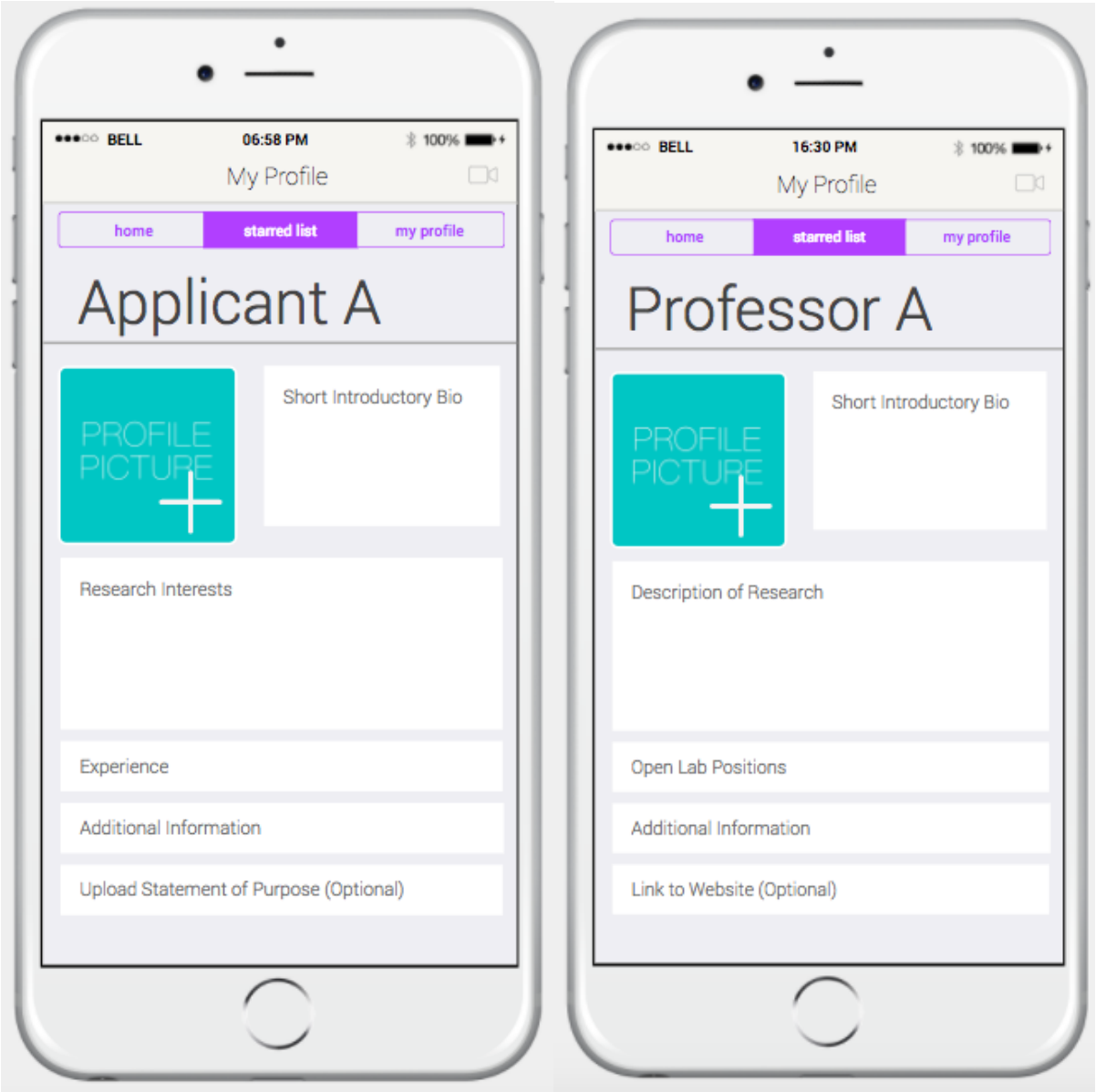


Figure 7: BMEmatch App "Profile" page

Professors will then be able to view a scroll-through list of all (approximately 40) applicants and star the applicants that appear to have compatible research interests. Figure 8 shows the left frame for the student's view, showing all professors, and the right frame for the faculty view, showing all applicants.

Meanwhile, applicants will be able to view a scroll-through list of all (approximately 30) faculty and star the faculty members conducting relevant research (see Figure 8). The "Description of Research" category from the professors' profiles will be displayed beneath each professor's name, while the "Research Interests" category from each applicant's profile will be displayed beneath each applicant's name.

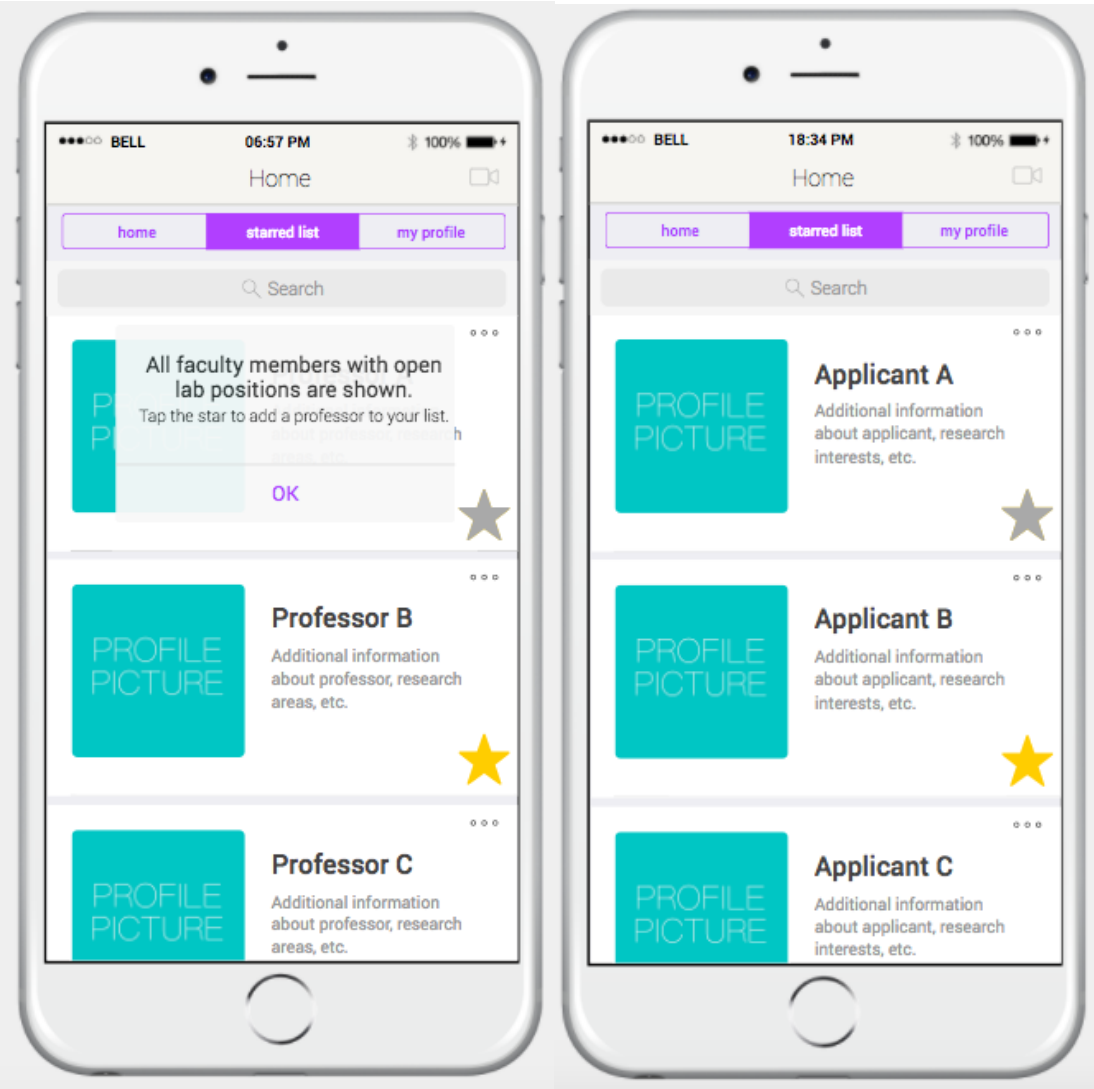


Figure 8: BMEmatch App home screen displaying all professors/applicants

Both professors and applicants will be required to star six applicants or professors respectively. Graduate students who are already in the professors' labs can act as proxies for professors and star applicants for them if the professor does not have sufficient time. The app will send push notifications once a week if less than six stars have been used.

When a professor or applicant's name or picture is clicked, it will bring the user to the professor or applicant's profile page, which will contain additional information. Figure 9 illustrates this view. The left frame shows the student's view, showing professor profiles as well as a descriptive pop-up message; the right frame shows the faculty view, showing applicant profiles.

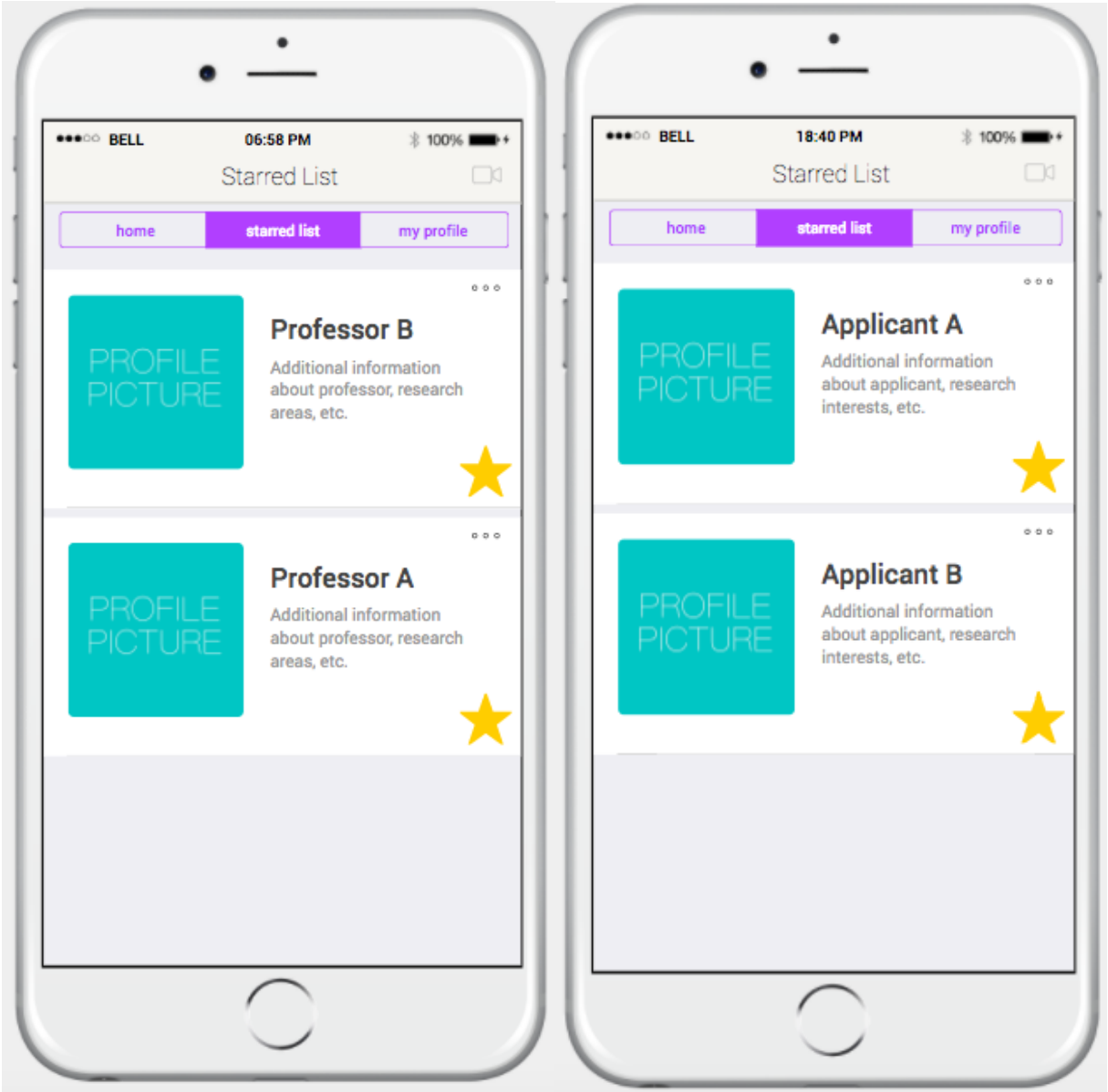


Figure 9: BMEmatch app view of profiles

In addition, the “starred list” page will display only the starred professors or applicants. Users can drag each mini profile to rearrange the professors or applicants in the order of how compatible their research goals are and how interested they are in working with the professor. Figure 10 shows the two views: the left frame shows the student’s view, showing all starred professors; the right frame shows the faculty view, showing all starred applicants.

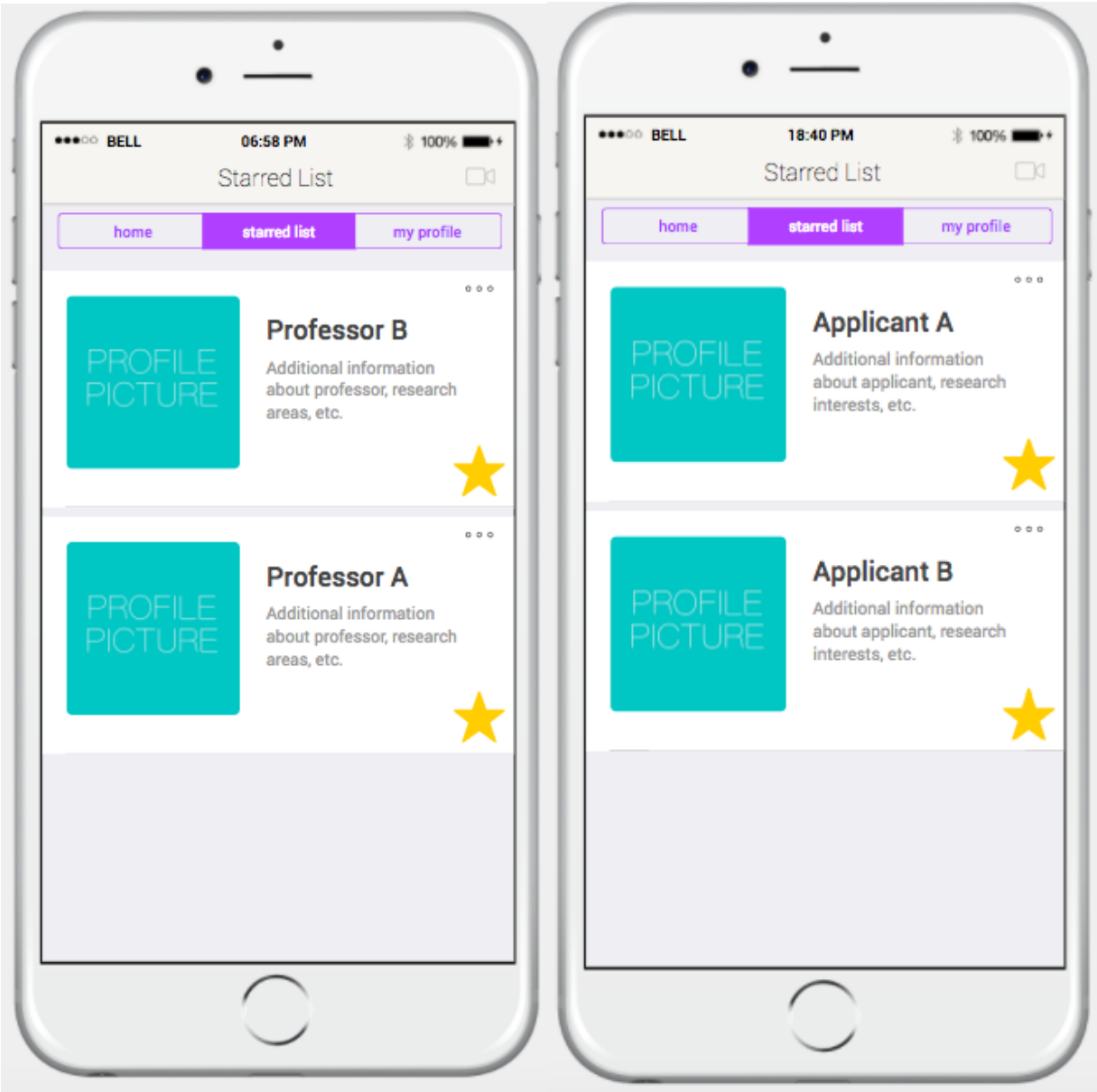


Figure 10: BMEmatch app “starred list”

This matching process will continue until the evening of the first day of recruitment weekend. Two hours after the poster session, an in-app algorithm will generate meeting itineraries for both faculty and students, displaying the meeting itineraries on the app and notifying users with a push notification. During the next day of recruitment weekend, students and faculty will participate in these meetings. After recruitment weekend is over and students return home, students will have the option on the app to request additional video chats with professors in a formal and centralized way (see Figure 11). More detail on the video chat option will be provided later in this section.

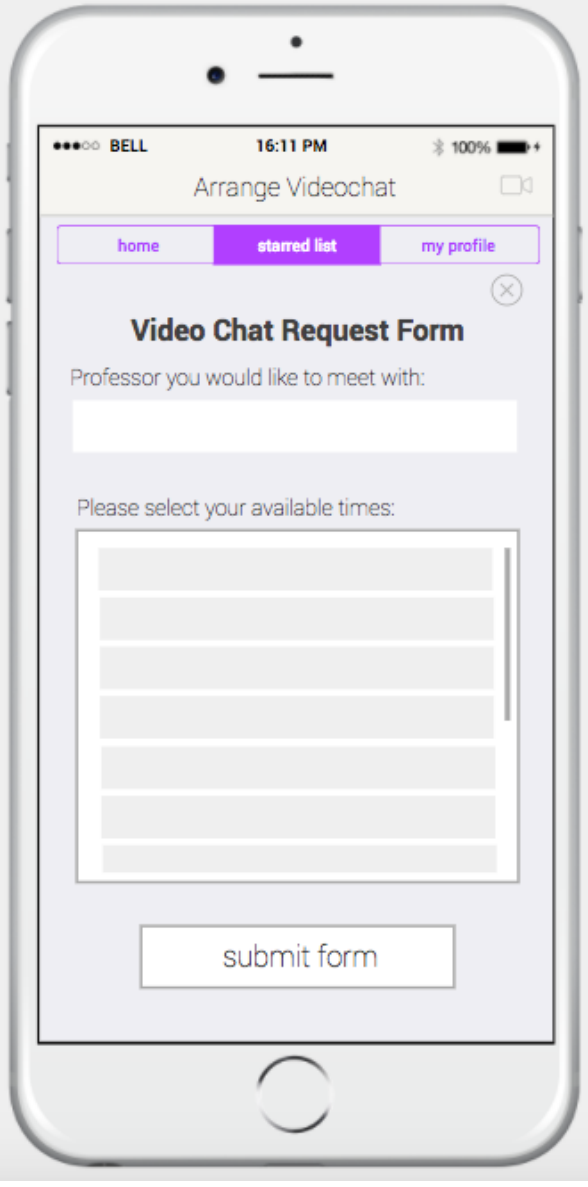


Figure 11: Video chat interview request form

Rationale

Since there are over 30 BME faculty members listed in various locations on Northwestern's BME graduate website, many of them with their own websites, the current information about faculty and labs is decentralized and difficult for students to sift through (see Appendix B: User Interview Summaries). The app will provide a central location for students to research professors, as opposed to being forced to conduct research throughout the web by searching for each professor's individual website and then navigating the different pages of each professor's website to look for key information.

An app was chosen, rather than a survey where students could rank professors, since it fulfilled more requirements in the project definition (see Appendix A: Project Definition and Appendix E: Decision Matrix). Also, the app would have the added functionality of providing information about professors and applicants that the survey would not. In addition, BME administration provided assurance that the implementation of the app would not result in increased administrative burden than the survey, saying they preferred the app over both the survey and the status quo (see Appendix C: User Testing Report). Finally, since the app will automatically generate meeting itineraries, two weeks of additional work will be saved by administration, which would allow them to focus on their other administrative work and making sure the proposed process changes go smoothly.

BME faculty also liked the app better than the status quo of the current compilation of decentralized websites (see Appendix C: User Testing Report). The faculty also especially liked the option for setting up optional interviews, remarking that it would be very useful. Students also said that they would be willing to download the app for recruitment weekend (see Appendix F: Performance Testing Report).

In addition, the use of an algorithm to generate meeting itineraries is feasible because of the proposed process change of moving all faculty meetings to the Evanston campus (more details about this change are provided later in this report). Currently, the meeting schedule has to be done manually due to Evanston-Chicago travel logistics and Intercampus shuttle times, as well as the need to schedule all Chicago meetings back-to-back (see Appendix B: User Interview Summaries). However, without this complication, the only data that must be considered is how each faculty member and student ranks each other, which can be much more easily automated by a sorting algorithm as part of the app.

Several features of the app were added in response to feedback from Mockup Testing and our Design Review (see Appendix G: Mockup Testing Report and Appendix H: Design Review Summary). First, a search bar was added, allowing users to search quickly through the list of professors or applicants. Next, the ability to view the number of stars remaining was added,

helping users keep track of how many people they have starred. In addition, the option for a web-based version for the app was added in order to consider users who may not own smartphones, as well as make it easier to fill out a profile online if the user preferred. Finally, specific input fields for the profile page, such as "Research Interests," were also added to create a more organized and streamlined profile page.

The rationale behind why students must pick six faculty members, and vice versa, is because in previous years, some students only submitted three faculty members they would like to meet with which made scheduling meetings difficult with administration if any of the selected three faculty were unavailable. In addition, the administration mentioned that they would like students to pick six faculty members to be able to ensure students meet with desired faculty (see Appendix B: User Interview Summaries).

Finally, the app will hopefully increase faculty engagement and stimulate faculty interest. Not only will students be able to learn about faculty, faculty members will also have the chance to learn more about students before the recruitment visit. As a result, the faculty will hopefully become more invested in the students once they get to know them first virtually before the weekend. As a result, they will also hopefully become incentivized to participate more fully in recruitment weekend. An added benefit of gaining familiarity with the incoming class of students is that some of these students will eventually be working in their labs.

Design Feature 3: Changes to Recruitment Visit

These process changes will take place during the two-day student recruitment visit, and are more centralized around the theme of facilitating increased interaction between students and faculty. Designs and specifications for each change are combined as follows:

Change 1: Mandatory Poster Session

The poster session on the first day of recruitment visit is an opportunity for students to learn about faculty research and interact with professors and current graduate students. We recommend that the poster session be made mandatory for all faculty with openings in their labs (see Figure 12). Faculty members will be presenting for a half hour during the poster session and then talking to students for a half hour during a networking session afterward.

See Appendix I: Mandatory Poster Session Design for more details.

Rationale

Currently, some faculty members send graduate students working in their labs to present during the poster sessions. However, this cuts down on the number of opportunities students have to interact with the actual faculty and for faculty to get to meet future Northwestern Ph.D. students. As a result, we recommend making this event mandatory, while making other events optional, such as lunch at the John Hancock Center and the bowling night (both during the second day of recruitment visit) in order to respect the time of faculty. Making this poster session mandatory for faculty will enable the event to have the dual function of being a casual, low-pressure networking session as well as an informational poster session exposing students to various research. The faculty will have some time to spend at the poster session because graduate students will be taking over other duties that do not require faculty time, as suggested in Design Feature 1: Application Review Changes.

Graduate student survey results supported this proposal and faculty meetings agreed with both its usefulness and feasibility (see Appendix F: Performance Testing Report). At first, a speed networking event was considered in order to fulfill the same purpose of increasing student-faculty interactions (see Appendix J: Speed Networking Interview Proposed Design). However, based on negative feedback from both students and faculty and the fact that the event would likely increase administrative burden, this idea was removed from our proposed BME recruitment process after careful consideration.

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Faculty	*Faculty must create profiles/update on app (Graduate Assistance)		*Faculty (or their grad students) can select up to 6 students that would like to meet with on the app	***Mandatory attendance Poster Sessions*** *App to setup skype interviews after	
Administration	*Application data is pulled (Rolling) *Recommendation Cover Letters are no longer pulled	*Application data will be pulled and prepared for total review *Data is packaged and send to MacIver	*Administrators finalized meetings between faculty by maximizing preferences based on the app results	*Centralized Interview location *Scheduling follow-up skype interviews with faculty and students (Graduate Assistance)	

Figure 12: Mandatory attendance for faculty at poster session in the recruitment process

Change 2: Creating a Poster Session Brochure

Before the poster session, prospective graduate students will have the chance to pick up a three to five page brochure from any professor's station (see Figure 13). Within this brochure would be a layout of the poster session setup, photos of the professors with brief summaries of their labs and research, and maps of Northwestern to help them navigate campus the rest of the weekend (see Figure 14). The students would be the main users of the brochure, and it will mainly aid in helping them navigate the poster session so students can locate and interact with all faculty they wish to meet, and navigate campus.

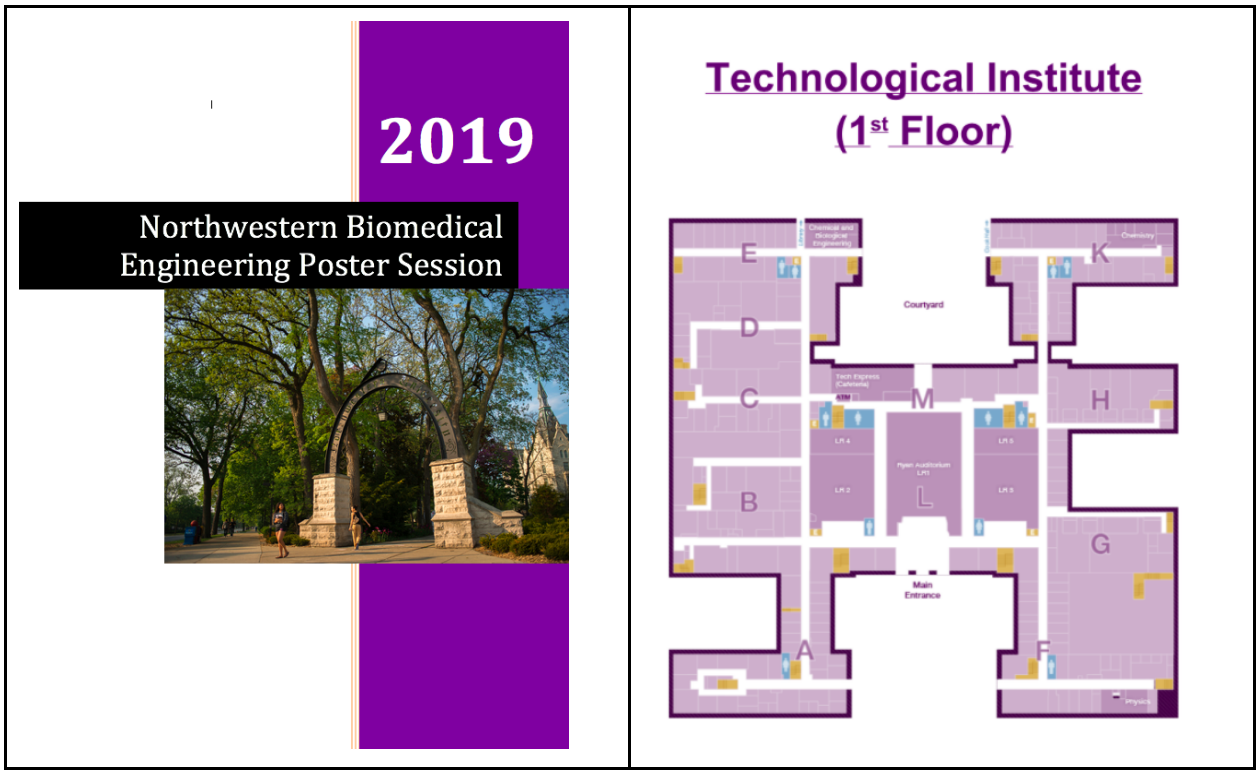


Figure 13: Sample Brochure Pages

Rationale

In the survey given to current BME graduate students, the students supported the idea of implementing a poster session brochure. Around seventy percent of responders voted that they would have preferred to have a brochure of the poster session with them (see Appendix F: Performance Testing). In user testing with a faculty member, the faculty member mentioned that she liked the idea of having a brochure and would like to see it implemented (see Appendix B: User Testing Summaries).

The immediate purpose of the brochure is to help students navigate the poster session, as well as helping them navigate campus with a physical map. Having a brochure, something physical for the prospective graduate students to hold on to, also opens up a more personal connection between the students and the graduate program. In addition, it will be something tangible that the students can keep after the weekend is over, as they may elect to uninstall the app or not participate in the additional video chats with faculty after recruitment weekend.

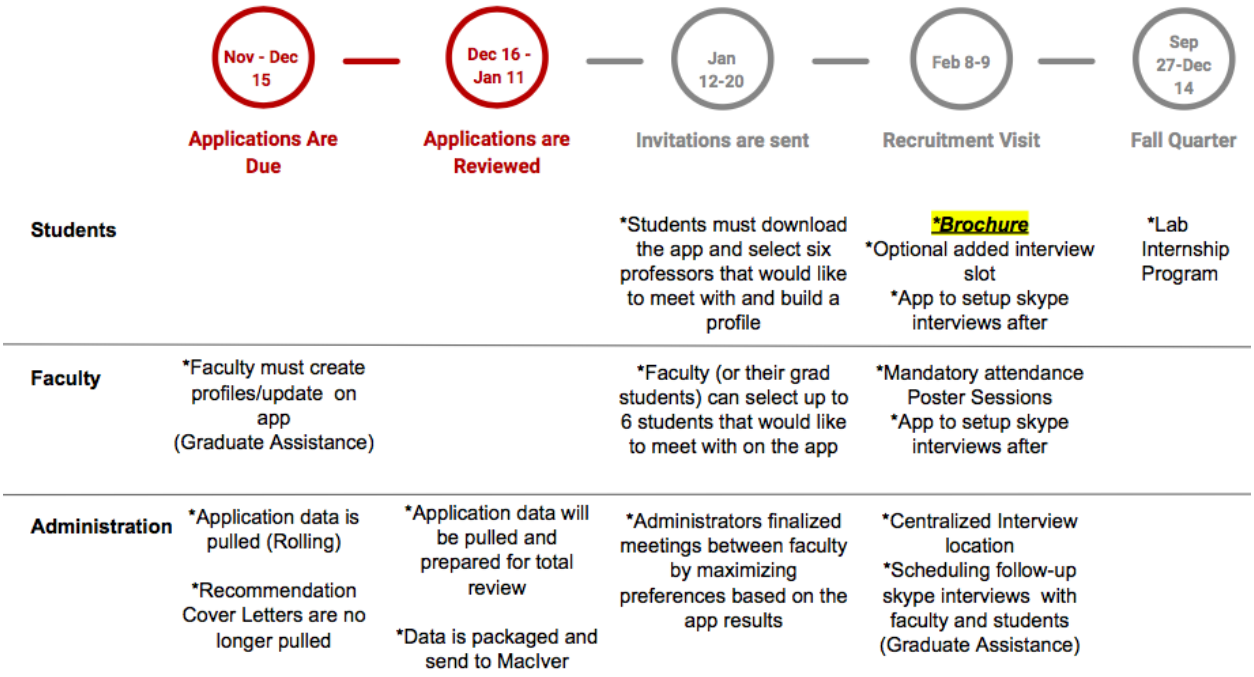


Figure 14: Informational brochure in the recruitment process

Change 3: Centralized Interview Location

Currently, there is a block of time, during the morning of the second day of recruitment visit, for interviews with Evanston campus faculty. Then, students board buses and are taken to the Chicago campus to meet with faculty there. We recommend that all interviews between faculty members and applicants take place on the Evanston campus within the Technological Institute or Ford Design buildings, rather than having some in Chicago and some in Evanston (see Figure 15). The total interview time will still be around three hours.

Rationale

A major complaint, especially due to weather conditions during the 2018 recruitment visit, from all user groups, was that travel between campuses in order for applicants to speak with professors

not only decreased total time applicants had to meet with professors but also disoriented and confused applicants new to Northwestern. By centralizing the interviews to a single building, applicants will no longer have to worry about traveling to and from the different campuses and will have more time and opportunities to interview with the professors they starred on the app (see Appendix B: User Interview Summaries).

In addition, this will reduce administrative burden since logistics are a major consideration in scheduling meetings. For example, currently, administrators must ensure that Evanston student-faculty meetings are scheduled back-to-back and that Chicago student-faculty meetings are scheduled back-to-back for each student, that each student's first meeting is in Evanston, and that these times coordinate with the timings of the intercampus shuttle (see Appendix B: User Interview Summaries).

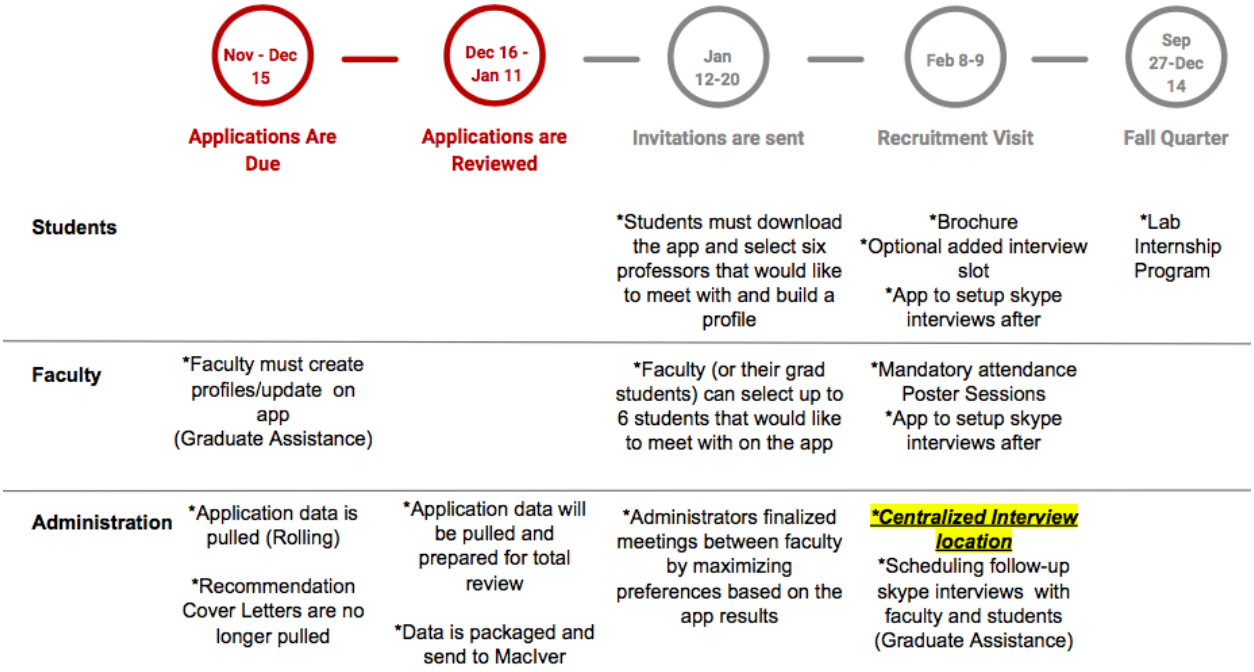


Figure 15: Centralized interview location in the recruitment process

Change 4: Optional Interview Space Added

The idea behind adding an additional interview slot for PhD applicants is that during the three-hour interview session, applicants will be able to schedule an optional interview using the app and selecting a professor with interesting research that they enjoyed while at the poster session (see Figure 16). Students typically have an average of 3 meetings with faculty and no flexible time to either relax or organize another interview on their own (see Appendix B: User Interview Summaries). Students and faculty could make use of this time slot if they meet someone

interesting whom they had not starred on the BMEmatch app, but would really like to have an interview with.

Rationale

Creating an additional interview time slot allows flexibility in students' and faculty members' schedules. As a result, students and faculty can coordinate an additional interview on their own accord if it is not possible for them to meet during the allotted interview times, due to scheduling conflicts. In addition, this change reduces additional stress for the administrative during recruitment visit. This is already a very busy time for the staff, and having to accommodate last-minute meeting requests between students and faculty is not productive. With our improvement, the administrative staff is not involved; it is only up to the student and faculty member to coordinate. Furthermore, centralizing interview locations (see above) opens up additional time for interviews. This allows applicants to explore new research opportunities that they may have been unaware of previously and has been noted as a desirable change from both our faculty interviews and survey results (see Appendix B: User Interview Summaries and Appendix F: Performance Testing Results).

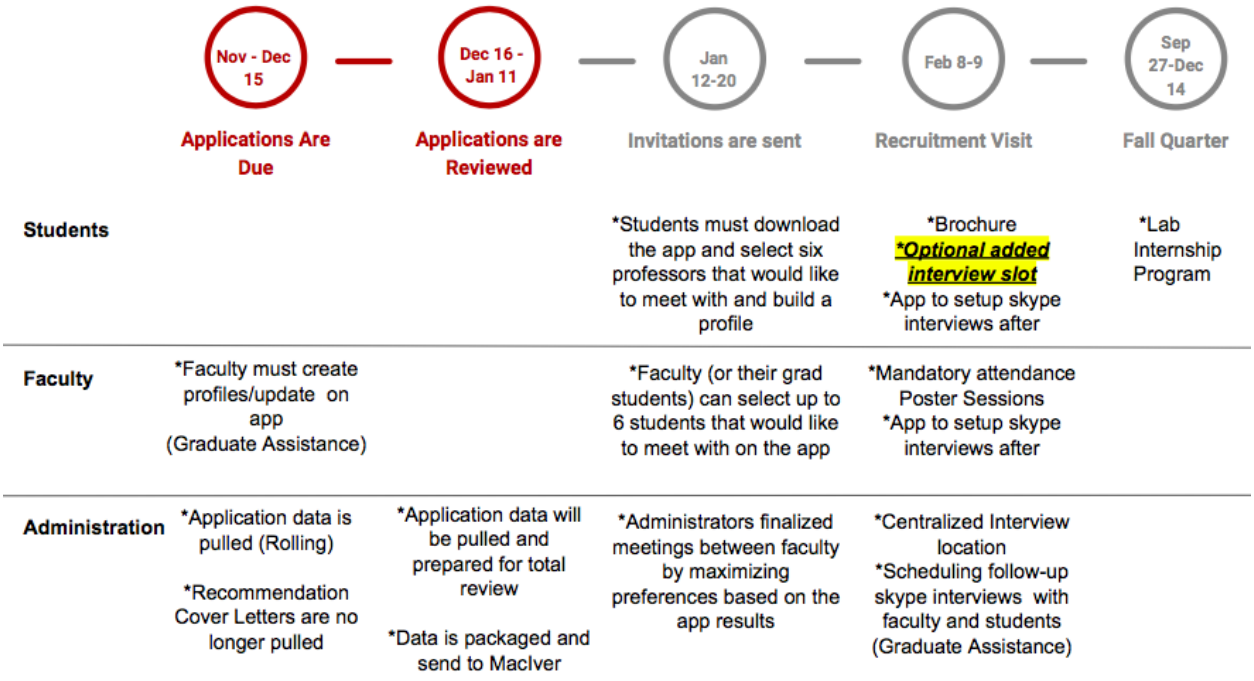


Figure 16: Optional interview slots in the recruitment process

Design Feature 4: Video Chat Option

Use and Specifications

The video chat component allows students the opportunity to have a 15-minute chat with any professors they were not able to talk with during recruitment days, while also keeping a short time slot in professors' calendars to respect their time. After recruitment visit, students may select which professors they would like to talk to via video chat on the BMEmatch app used during the recruitment visit (see Figure 17). Then, administrative staff will schedule a time for the video chat based on faculty availability. It would be easiest for video chats to be made via Google Hangout, because it is easy to log in with one's Gmail account, and Northwestern university faculty emails are through Google. Faculty may also have Google Suite apps to collaborate with students. However, if this is not an option, it is not too difficult to make a video chat account using another program.

For additional details, see Appendix K: Video Chat Process Flow.

Rationale

Current graduate students who were surveyed during performance testing supported this idea, suggesting that students have tried to set up video chat interviews on their own before, but it is intimidating and difficult when there is no real process to aid their efforts (See Appendix F: Performance Testing Report). The respondents also felt that faculty who could not make time for meetings during recruitment days should be required to video chat with students who wanted to meet with them. Finally, all respondents expressed that they were not able to meet with all the professors they would have liked to during recruitment weekend. As a result, we believe that the administration can aid in a fair and informative recruitment process by scheduling video chat interviews, based on professors' schedules, to extend and follow up on recruitment weekend.

This decision was also made by considering beta-testing capability, ease of use, maintainability, and sustainability. For these criteria, we chose to implement video chat interviews into the process in place of the Multiple Fly-In idea (see Appendix A: Project Definition and Appendix E: Decision Matrix).

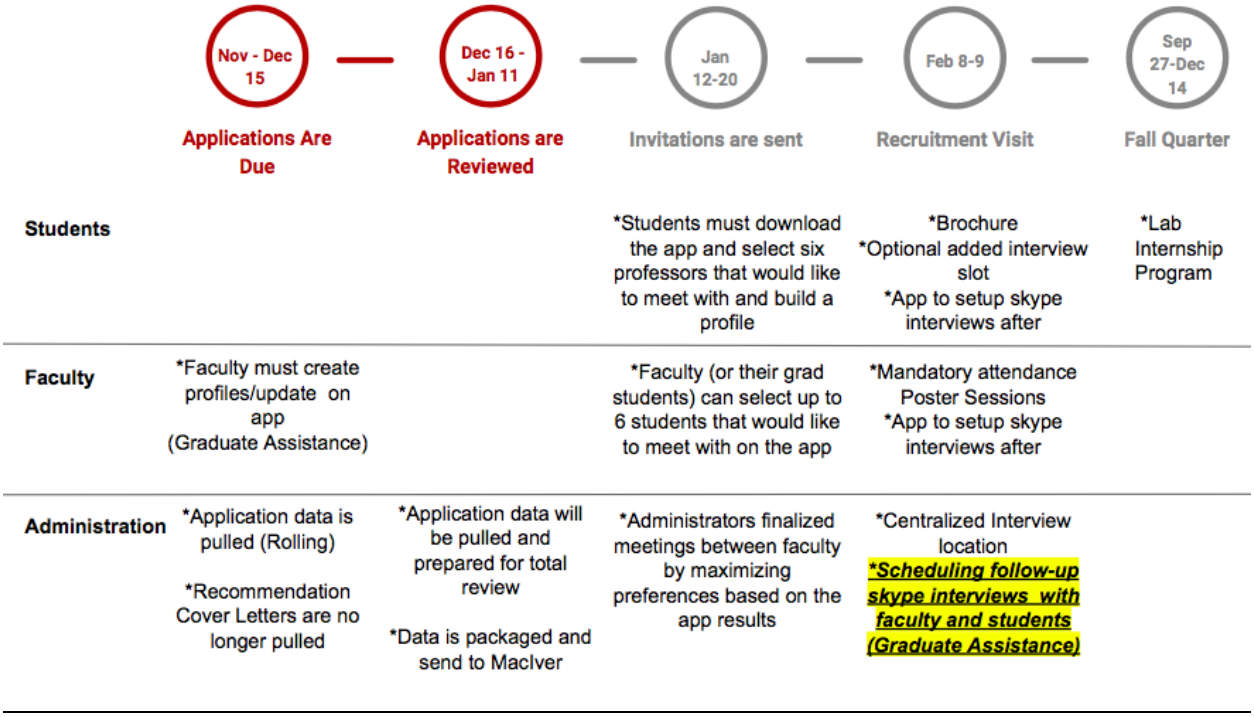


Figure 17: Video chat option in the recruitment process

Design Feature 5: Lab Internship Option

Use and Specifications

The Lab Internship Program is a lab experience for graduate students during their first fall quarter (see Figure 18). This will take place after the overall recruitment process ends, and will occur during the following fall quarter of the academic school year for the Ph.D. candidates who are accepted to Northwestern University. Students would informally come into labs to observe and possibly aid in some work two to three times a week. Professors or graduate students who are heads of labs would work closely with the students. Students would either work in one lab for 10 weeks (the length of fall quarter) or work in two labs for five weeks if the student cannot decide on one lab straight off. At the end of the quarter, the student will meet with the lab tech and faculty member to decide whether or not to work in this lab further.

See Appendix L: Lab Internship Process Flow for additional details.

Rationale

For this program, students who are interested in a specific lab would spend some time working with the professor and other graduate students in order to see if they would work well together and would like to spend the next couple years doing research here. Some faculty members are already doing a similar program but it is very lab-dependent, as one faculty member told us during user testing, so we believe if the process was more centralized, many more first-year graduate students would benefit from the experience (see Appendix C: User Testing Report). This way, if a student does not enjoy the research or does not feel they are a fit with other members of the lab, they still have time to find another professor to work under. Since one of the major goals of the design challenges is to increase retention of grad students at Northwestern, an opportunity to get to know research PI's and fellow grad students before committing to a lab is an important feature.

With regard to the length of time of the internship, performance testing was inconclusive, as half of the current graduate students who responded to our survey preferred two five-week lab experiences, and the other half preferred one ten-week experience (see Appendix F: Performance Testing Report).

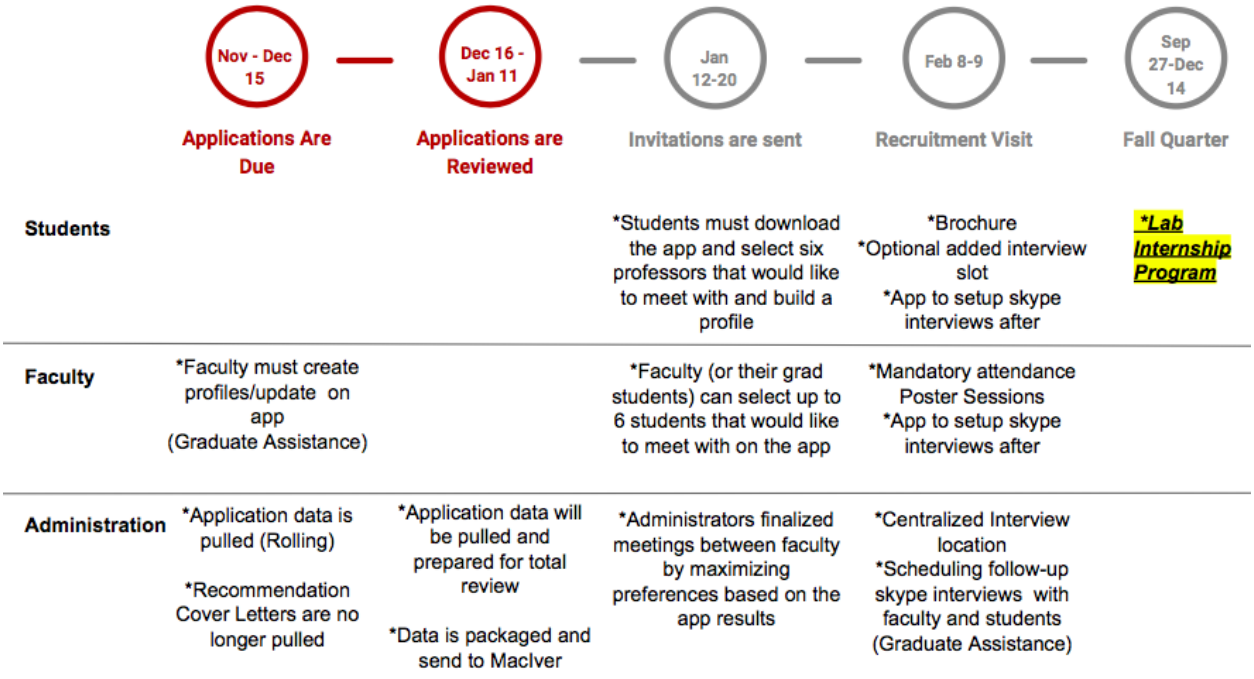


Figure 18: Lab internship option in the recruitment process

For more information on recruitment overall, please refer to Appendix M: Recruitment Data

Future Development

In order to accurately develop this design, the following topics should be carefully considered.

Further Testing

User testing*:* User testing on mockups for this design has been conducted with four different user groups. Each user group looked at different parts of the overall design, with no single group overseeing the entire design. According to user feedback, all of the individual parts of the design are suitable in solving the problem. However, because no one user group has considered how the overall re-design, with all the pieces fitting together, would work, it is difficult to determine how well the design improves the engagement in the PhD matching process of all user groups Additional user testing should be conducted where each user group provides feedback on the entire recommended process.

Beta-testing: All of our testing has taken place by asking what each user group thought about the design. However, no real-time tests of our deliverable have been conducted. Testing has largely been the product of brainstorming because it is not possible to actually test the design until the fall recruitment process begins. So until actual beta-testing can be done, it has to be assumed our solution will satisfy the requirements and specifications of our project (see Appendix A: Project Definition). Once beta-testing is completed, one way to collect data in order to assess the success of this design it to give out surveys to students, faculty, and administration at the end of the process measuring student satisfaction and other metrics. Using the specifications found within the project definition (see Appendix A: Project Definition), the success of different components of the process can then be determined.

Alternative Designs

Project reliability: Before doing beta-testing, it is hard to know how reliable our design is. There are a lot of small moving parts in the overall design; the informational brochure, lab internship program, and a centralized interview location are just a few of these parts. To know if the designs require any improvements, it's probably a good idea to have a solid understanding of all the different parts of the design and what purpose they serve.

New features: Despite the amount of brainstorming and user interviews that have been conducted, there are always potential additional features and complications. With time, different features may be ingrained into the design and BME Ph.D recruitment process that better increases student-faculty engagement and better streamlines the overall process. This might include incorporating some additional activity besides those already provided between faculty and students so that both parties could have more in-person opportunities to get to know one

another. Another feature we haven't considered that could be a potential incorporation into the design would be having interviews with students prior to recruitment days as an additional way of screening applications.

Rejected new features: It's difficult to assess the success of a design without doing any beta-testing on the actual recruitment process. The team tested many different ideas by asking our users what they thought of the ideas before we settled on a design (see Appendix C: User Testing Report). It's entirely possible that one of the ideas we cut from our final design would've made a great fit in the overall project and aided in the process more than another idea or in addition to another idea.

The team chose not to attempt to increase yield rate as a result of our proposed design. As a result, one area of further development could be to observe yield percentages from past cycles and to try to increase Northwestern's yield over time (see Appendix M: Recruitment Data). Since Northwestern guarantees funding to all accepted Ph.D. candidates, it was not desirable for our design to increase the yield rate because this could cause short-term budget concerns (see Appendix B: User Interview Summaries); however, increasing yield could be considered as a long-term project.

Maintenance Issues

Design construction and use: Many of the parts of the design are described with words and a possible flow chart. This is because it is difficult to draw out some of the recommended changes (see Appendix N: Instructions for Administration Implementation). As there are a lot of moving parts in the design, everything needs to be done the right way during beta testing. It is necessary to try and write as clearly as possible, especially for the designs without photos or process flow charts, so that no instructions are misunderstood, and it's clear why each part of the design is implemented the way it is (see Appendix O: Instructions for Use of App).

Conclusion

The revamped BME Ph.D. recruitment process meets the key needs of the user groups, as well as meeting the project constraints and requirements. The design includes a number of changes, summarized by the following main components:

- **Design Feature 1: Application Review Changes**
  - Eliminating Data Pulling: to cut down on an unnecessary data-sorting task to save the BME administration time and stress, as well as allowing them to focus on proposed changes to the recruitment process
  - Rolling Application Data Processing: to save up to a week of time for administration by scheduling two compatible data-related tasks to be performed simultaneously
  - Graduate Assistance: to utilize the help of professors' Ph.D. graduate students, which is already being done by the Chemical Engineering department, to augment our goal of increased faculty engagement and to respect the time of faculty members

- **Design Feature 2: BMEmatch App**
  - To centralize the information about faculty and labs given by Northwestern to applicants, provide more mutually-satisfactory and accurate matches between faculty labs and students and for meetings during recruitment weekend, facilitate faculty engagement, and to set up additional video chats after recruitment weekend

- **Design Feature 3: Changes to Recruitment Visit**
  - Mandatory Poster Session: to have faculty present during their poster session presentations and after the event for a casual, low-pressure networking event to increase student-faculty interactions
  - Poster Session Brochure: to provide additional guidance and information for prospective graduate students to help them better navigate the poster session, and explore campus
  - Centralized Interview Location: to reduce the travel time, travel complications, and scheduling difficulties associated with having interviews take place on both the Evanston and Chicago campuses
  - Optional Interview Space Added: to provide additional time for students and faculty to meet in order to increase student and faculty satisfaction, as well as reduce last-minute scheduling complications for administration

- **Design Feature 4: Video Chat Option**
    - To satisfy the student demand for additional student-faculty interaction as well as creating a formal and structured process for video-chatting so that video chats are a viable option for students, who expressed nervousness at the idea of trying to set up video chats on their own

- **Design Feature 5: Lab Internship Option**
    - To utilize the time in the fall for students to experience different labs at Northwestern, ultimately resulting in a more informed lab match between students and faculty

The BME Ph.D. recruitment process needs to engage more of the user groups in the process. The combination of the BMEmatch app, as well as video chats, mandatory poster session, and lab internships, will increase the engagement of user groups without wasting their time by requiring an excessive time commitment.

The recruitment process also needs to be more time efficient for administrators so they may spend their time on meaningful and effective components of the process. This includes removing cover sheets from applications and looking at the data from applications on a rolling basis rather than waiting until December 15 when all applications are due. The app also allows for faster interview scheduling.

These changes are easy to implement in the current process, meaning there is a high potential for beta-testing capability. In addition, as the proposed process considers the timeline of the process in a data-centric way, the process is highly maintainable from year-to-year.

Overall, the combination of these process modifications and additions contribute to the overall goals of streamlining the efficiency of the process while simultaneously increasing student-faculty engagement.

APPENDIX A: PROJECT DEFINITION

Project name: Ph.D. Recruitment 2.0

Client: Malcolm MacIver, Northwestern University

Team members: Kevin Bai, Shana Capur, Elise Lee, and Dave Washington

Date: 5/24/18

Version: 5

Mission statement: To improve the two-day campus visit for prospective graduate students applying to Northwestern University's Biomedical Engineering program, while better engaging both the applicants and faculty in the entire recruitment and matching process.

Project deliverables: A revamped process for recruiting graduate students into Northwestern's Biomedical Engineering program, focusing specifically on the two-day campus visit. In addition supplementary materials for implementing the new process will be designed in the form of a pamphlet. Lastly, a final report and presentation on our findings will be developed.

Constraints:

- Our final deliverable is bounded by a $100 limit
- Our final prototype is due May 31st

Users and stakeholders:

- Primary users
    - The client, Malcolm MacIver, conducts the first round of admissions decisions and thus will use the deliverable.
    - Administrators will use deliverable to better the admissions process.
    - Faculty in the BME department, particularly those looking to recruit new students, will use deliverables to engage students.
    - Students applying for Northwestern's Biomedical Engineering graduate school will interact with the deliverable during the admissions process.
- Stakeholders
    - Northwestern University, specifically the Department of Biomedical Engineering

Table 1: Requirements as defined above and specifications to fulfill the requirements

Requirements	**Specifications**
Easy to use ● Design is easy for users to implement in the current process; intuitive	● A brochure will add as additional material to inform students about current faculty members and is easy to understand ● The app functions very similarly to tinder and has clear instructions as well as a simple interface. Instructions will also be given out by administrators ● video chat Follow-Up Interviews setup will be made very clear by the administrators and also will incorporate usage of the easy-to-use app ● The process flow will be useful in mapping out all information chronologically and relevant to the current and proposed changes onto one page
Dynamic/Interactive ● Encourages user participation	● Approximately 30 faculty members will interact with the design ● Approximately 40 prospective students will interact with the design ● Two or more BME administration faculty members will interact with the design ● Increase total amount of time average faculty member spends interacting with students from four to six hours
Maintainable ● External help is not needed to keep design functioning ● Users will be able to fix potential flaws in design on their own	● Design is able to be reused independently, without the aid of our team, for at least two years

• Users will be able to keep information up to date within the given system	
Time-efficient • Doesn't drastically increase amount of time commitment needed by users	• Faculty and Graduate Assistants should not need longer than one hour to create/update profiles on the app • Administration should not need more than six collective hours from November to December 15 to process rolling applications and pull data from (also reduced by the fact that administrators will not need to pull recommendation cover letters) • Applicants (Students) should not have to spend any longer than two hours in creating a profile on the app and selecting professors to recommend • Faculty and Graduate Assistants should not have to spend more than thirty minutes in reviewing and ranking students • The app should reduce time in creating interview itineraries for students by upwards of five hours as all the data and interview changes are reviewed on a central platform • Administration should not need more than one hours each year updating the brochure with relevant information on professors and locations • The mandatory poster session attendance by faculty should not add more than one hour of additional work • Centralizing the locations into one area and adding an additional optional interview slot should add a net zero hours to the overall process • Traveling to Evanston and back to Chicago should not require more than thirty minutes to an hour of travel for

	Chicago campus-based professors ● Faculty and graduate assistants should spend at most two hours scheduling follow up interviews
Data-centric ● Uses data to optimize given goal ● Incorporates the use of quantitative data in the design in at least two concrete and identifiable ways	● Currently, we know the follow pieces of information ○ 400-450 applicants apply each year ○ It is usually takes up until Jan 1st for administrators to make sure that all applications are completed ○ It takes an one week for administrators to pull data and info ○ It takes Professor MacIver three days to sort these applicants to 350 and disperse the applications across the different research area ○ Each research area gets an appropriate number of applications based on their needs for that year (Imaging received 150 this year) ○ Two faculty members review and rank the applicants in less than a week and narrow down the total field down to forty-fifty ○ Forty applicants are invited and accept the visit to recruitment weekend ○ Practically all applicants invited are sent acceptance letters and around twenty of them accept ○

Ready/Nearly Ready to be Beta-Tested ● Users will utilize the design to a limited and controlled capacity to ensure that the testing is done under controlled variables	● Able to be beta-tested in next cycle (Fall 2018-Winter 2019) of Ph.D. applications

The specifications above, as well as the project definition as a whole, will help guide our design process and final deliverables.

APPENDIX B: USER INTERVIEW SUMMARIES

In order to learn more about the Biomedical Engineering (BME) Ph.D. recruitment progress, our team interviewed Northwestern BME administrative staff members, as well as a Northwestern faculty member. For both interviews, this appendix contains a description of the interview's format, as well as a summarization of the information, problems, and suggestions given during the interview.

BME Administrative Staff

Kevin Bai and Elise Lee interviewed two members of the Northwestern Biomedical Engineering (BME) administrative staff at the Northwestern Technological Institute for an hour on Tuesday, April 17, 2018. The interview was conducted in order to learn more about the administrative work associated with BME Ph.D. Recruitment at Northwestern University–more specifically, the logistics of the two-day campus visit for the top prospective students.

Methodology

The interview took place in the BME conference room, where Kevin Bai and Elise Lee discussed the logistics of the Ph.D. recruitment process with Mr. Magenta and Ms. Brown for approximately 45 minutes. After the interview portion, a demonstration of the software used to keep track of student-faculty meetings during the two-day campus visit took place in Ms. Brown's office.

About the Users

The staff members in attendance were Ian Magenta, the BME graduate program coordinator, and Maddy Brown, a BME program assistant who works closely with Mr. Magenta. Mr. Magenta is the office administrative lead for the recruitment process. Ms. Brown primarily oversees the recruitment weekend student itineraries, as well as arranging the specific logics of the two-day campus visit for prospective students. Both Mr. Magenta and Ms. Brown have held their respective positions for approximately one year as of May 21st, 2018.

Information about Applicant Process

From the interview, the users explained the outline of the Ph.D. applicant sorting process in-depth, which is as follows:

1. Students submit applications to CollegeNet, an online applicant tracking system.
2. Once the deadline for submissions (December 15th) passes, the administration must "complete" applications, which is required by The Graduate School.

    a. “Completing” an application means ensuring applications meet department criteria, such as verifying that there are two Letters of Recommendation or that there is an accurate transcript.
    b. The staff manually reads every application to check for “completeness”; normally, there are 400-500 applications per year. Last year, there was an unexpected spike to 600 applications, but BME is expected to go back to the average of 400-500 applications for the next few years.
3. These “complete” applications are sorted into the three subareas of potential BME research: Biomaterials and Regenerative Medicine, Imaging and Biophotonics, or Neural Engineering and Rehabilitation.
    a. Sorting is done by reading through the Letters of Recommendation.
    b. During this phase, extensive data on each candidate is also pulled from CollegeNet, which Professor MacIver, our client, uses to sort out additional applicants using his own algorithm; about 5-10 applicants from each subarea are “weeded out” and removed from consideration.
4. The remaining applicants are given to the subarea heads for the BME department. The faculty heads distribute the letters to core faculty, who review the applications for about a week and update the administration with their top picks.
5. The top picks, usually 40 students per year, are invited to a recruitment weekend. More details are provided below on the logistics of this weekend.
6. After the recruitment weekend, acceptances to the Ph.D. program are sent out to almost everyone who attended the recruitment weekend. About 50% of attendees, which was 19 students last year, will accept the admission offer.

Applicant Process User Interview Table

Mr. Magenta and Ms. Brown identified the following problems, detailed in Table 2.

Table 2: Applicant Process: Information, Problem, and User Suggestions

Information Given	Problem	User Suggestion	Follow Up
CollegeNet is an extremely difficult interface to work with, as the software is relatively old and built in Flash.	It is overly time-consuming to have to manually pull data from scanned pdf files of cover sheets for Letters of Recommendations, which contain quantitative data such as 1-10 rankings from faculty about the student.	Have CollegeNet allow an option for faculty members to input the data for the cover sheets directly into CollegeNet, and allow the data to be directly imported into Excel.	Research CollegeNet to determine if there are viable paths for potential change to the pre-existing CollegeNet system)

Information about Recruitment Visit

Mr. Magenta and Ms. Brown also focused on the process of organizing recruitment weekend, which is as follows:

1. Mr. Magenta and Ms. Brown invite approximately 40 applicants to the recruitment weekend.
2. Students are given a Google survey before the weekend, containing information about logistics such as travel and accommodation preferences.
    a. The survey also asks students to list their top 3 to 6 faculty members in order of preference, which is later used to set up half-hour student-faculty meetings.
3. Mr. Magenta and Ms. Brown create personalized schedules for each applicant visiting campus, which ideally includes 3-4 faculty meetings per student.

The users gave a demonstration of the software they used to organize meetings, which was a combination of several extensive Excel spreadsheets. See Figure 19 for a re-creation that shows the format of one of the primary sheets on the Excel spreadsheet:

Name of Campus (Evanston or Chicago)	Faculty Member 1	Faculty Member 2	Faculty Member 3
9:00	Student 1	Student 4	Student 2
9:30		Student 2	
10:00	Student 2	Student 1	Student 3
10:30	Student 4	Student 3	Student 1
11:00	Student 3		Student 4
11:30	(rest of spreadsheet populated with student names)		
12:00			
12:30			

Figure 19: Template for Scheduling Meetings in Excel

In addition, Mr. Magenta and Ms. Brown sent a copy of the Excel spreadsheet used during the 2016-2017 recruitment cycle to our team for future reference.

Recruitment Weekend User Interview Table

Mr. Magenta and Ms. Brown also identified the following problems with recruitment weekend specifically, as listed in Table 3.

Table 3: Recruitment Weekend: Information, Problem, and User Suggestions

Information Given	Problem	User Suggestion	Follow Up
As students meet different faculty members during the weekend, they discover new faculty that they want to meet with. Faculty members also identify new students they would like to meet with.	It was difficult to rearrange the pre-existing itineraries to accommodate these requests; Mr. Magenta and Ms. Brown might have to move 3-5 other people to make a new schedule work.	Create a real-time meeting arrangement tool that creates meeting itineraries after the student and faculty members have interacted in person; these would be distributed as late as the night before the meetings.	Research existing technologies that may be utilized or modified in order to meet the administration's needs.
Ms. Brown must manually input information from the Google survey to the spreadsheet.	This data transfer is a time-intensive process.	Improve the data flow between the survey and spreadsheet.	Discuss and brainstorm solutions to improve data flow, as well as researching other methods of inputting data.

About 30-40% of the BME faculty are located in downtown Chicago and not on the Evanston Northwestern campus.	Travel between downtown Chicago and Evanston creates scheduling complications.	Work around this constraint, as professors are not able to come to one central location due to responsibilities on their respective campuses.	Follow up with professors to see if there is any possibility of faculty members congregating in one central location or perhaps multiple centralized locations
All of the student-faculty meetings take place on Friday morning and afternoon within a 4-5 hour time slot. In addition, the deadline for the surveys to be returned is two weeks before the recruitment weekend.	It is difficult to schedule so many meetings in 4-5 hours, especially manually within only two weeks. Mr. Magenta and Ms. Brown also have other job responsibilities, and they spend the majority of the two weeks scheduling meetings.	Create an algorithm that can automatically generate meeting itineraries once given student and faculty preferences for meetings.	Complete research to see if there are any open-source meeting arranging algorithms that could be potentially altered.

Northwestern Faculty Member

Shana Capur and Kevin Bai interviewed a BME faculty member at the Northwestern Technological Institute for an hour on Wednesday, April 25, 2018. The purpose of this interview was to gain more perspective on the point of view of faculty members in the BME Ph.D. recruitment process, as they may be potential users of the final design.

Methodology

The interview took place in Professor Kamat's office, where members of another team working on the same project were also in attendance. The interview took place in an open-discussion format, with members from both teams asking questions to Professor Kamat.

About the User

The user interviewed was Professor Neha Kamat, an Assistant Professor of Biomedical Engineering at Northwestern University. She was a NASA Postdoctoral Research Fellow at Harvard University and received her Ph.D. in Bioengineering from the University of Pennsylvania. She joined the BME department as an Assistant Professor beginning January 2017 has been an assistant professor at Northwestern for almost year and a half.

According to our client, Malcolm MacIver, Professor Kamat has been heavily involved in the recruitment process at Northwestern since her arrival. In addition, Professor Kamat runs the Kamat Group, a "SynBioMaterials" lab intended to connect synthetic biology and biomaterials research. Within her lab, Professor Kamat oversees six students and three Ph.D. candidates.

Information from Interview

Professor Kamat gave a brief overview of the admission process from her point of view:

1. Professor MacIver oversees the first round of processing applications
2. The applications are sent to the three area heads, who narrow down the number of applications and evaluate applications based on "fit"
3. Applications are also sent to faculty members
    a. Students are evaluated on a 1-5 rating system, where applicants with a rating of 1 get automatic invitations, and applicants with a rating of 1.5 get revisited
4. A poll is sent out to faculty to see the minimum and maximum number of students that they are able to accept in their lab
5. There is a fast turnaround for evaluating applications; invitations to prospective students are sent in early January.

In addition, Professor Kamat highlighted a few aspects of the process that she especially enjoyed:

1. Interacting with students during recruitment weekend
2. Unexpected connections between students and faculty during recruitment weekend
3. "Poster sessions," where graduate students presented different labs to the prospective students
4. Having graduate students at events during recruitment weekend

Faculty Member Interview Table

Professor Kamat mentioned several problems and potential improvements for the BME Ph.D. recruitment process, detailed in Table 4.

Table 4: Faculty Member: Problems and Potential Improvements

Problems	Potential Improvements	Follow Ups
<u>CollegeNet (the applicant tracking software)</u> 1. CollegeNet has a web interface that is not user-friendly or intuitive 2. CollegeNet does not have a system to sort applicants into the three subareas <u>Other problems</u> 3. There is a lack of communication between area heads and other professors 4. Sorting of students into subareas is only completed by two people 5. While students are evaluated one by one, applications are still subject to the anchoring bias (a cognitive bias that involves placing too much emphasis on the first piece of information offered)	<u>During recruitment weekend</u> 1. Students should feel more "taken care of" during recruitment weekend, such as having a graduate student walk them to classes 2. Students should have a chance to hear what professors are working on earlier during the weekend 3. In conjunction with #2, poster sessions, which is when faculty research is presented to students, should be earlier in the week 4. There should be a career-fair-style map at the poster session to help direct students 5. There should be more "wiggle room" to schedule more meetings with professors during recruitment weekend <u>Other areas for improvement</u> 6. Students should be able to say which subarea they wish to be a part of when applying. 7. Faculty and current graduate student engagement should increase; Professor Kamat believes that this would also increase yield.	1. Brainstorm ways to increase faculty engagement 2. Potentially create a brochure map at the poster session to help direct students 3. Weigh pros and cons of moving the poster session up to earlier in the weekend 4. Discuss with the team whether we should add an option for additional "wiggle room" to schedule more student-faculty meetings, such as creating an hour of free space during the meeting itineraries 5. Research whether is is viable to add an option on CollegeNet for students to declare a BME subarea when applying

Conclusion

While we have gained substantial information from the current pool of user groups, we are still looking to schedule follow-up interviews and initial interviews with graduate students in order to verify our process and gather more information. In addition, we will continue to follow up on areas identified in the "follow-up" columns of our user problem tables (see Table 2, Table 3, and Table 4).

APPENDIX C: USER TESTING REPORT

This appendix summaries the finding of our user testing.

Purpose

Our user testing was used to further understand our problem, get critiques about our designs, hear ideas from the users about what other solutions can be enforced to help achieve our final deliverable, and further discuss these ideas with other user groups. An overall process flow chart was shown, two mockups, an app and a survey, were created, and five ideas were discussed for testing. These ideas not only focus on the recruitment days, our main focus of the process, but spanned across all sections of the recruitment process. Our mockups were an app and a survey. The ideas discussed were a video call between student and professor, a speed networking event, having more times for interviews, using graduate students as proxies, and a series of proposed faculty changes. Throughout user testing, every user group was tested with a different set of mockups. This is due to our changing of the design between each user testing group.

Tested Designs

The tested designs are split into three categories: Process Flow Chart, Mockups, and Proposed Ideas. There are a total of eight items.

Process flow chart

1. Figure 20 is an extensive chart depicting the process of the overall Biomedical Engineering recruitment process. This chart aids in explaining the other mockups and entire recruitment process.

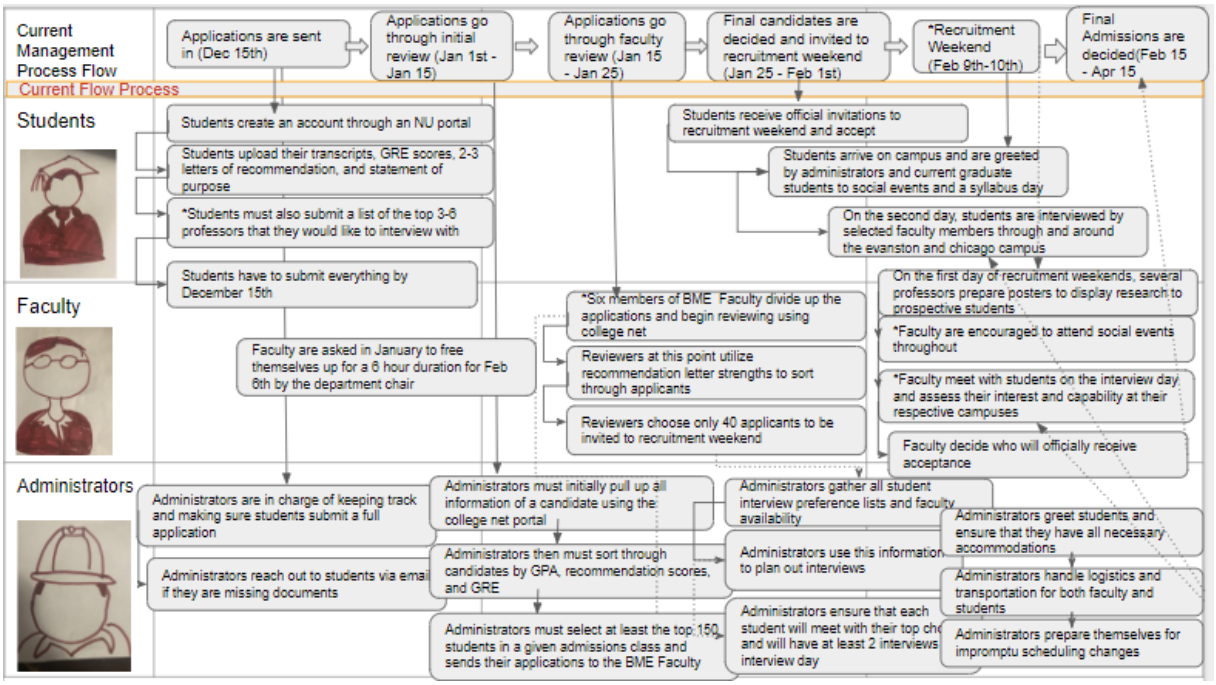


Figure 20: Process flow chart

Mockups

2. Matchmaker App - This app is to allow students to pick the professors they want to meet with the following day during recruitment days and vise versa. It would ideally be used up through the end of the first day, giving the administration a chance to update schedules as appropriate. Figure 21 shows what an applicant or professor would see as their own profile if they were logged on. Figure 22 depicts the ranking process they'd use to rank each other in order to help schedule an interview with each other.

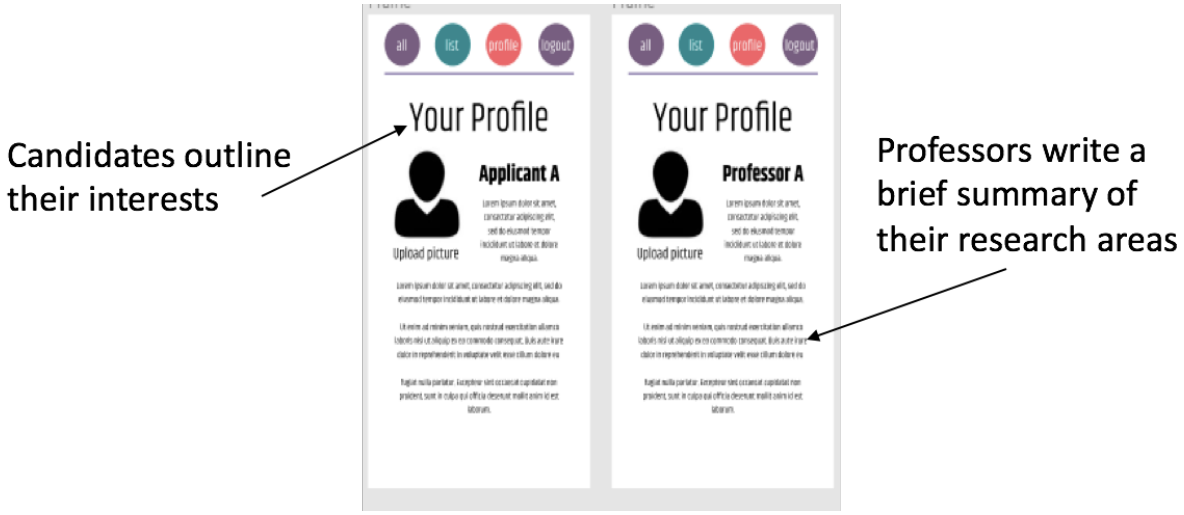


Figure 21: Applicant and professor profiles

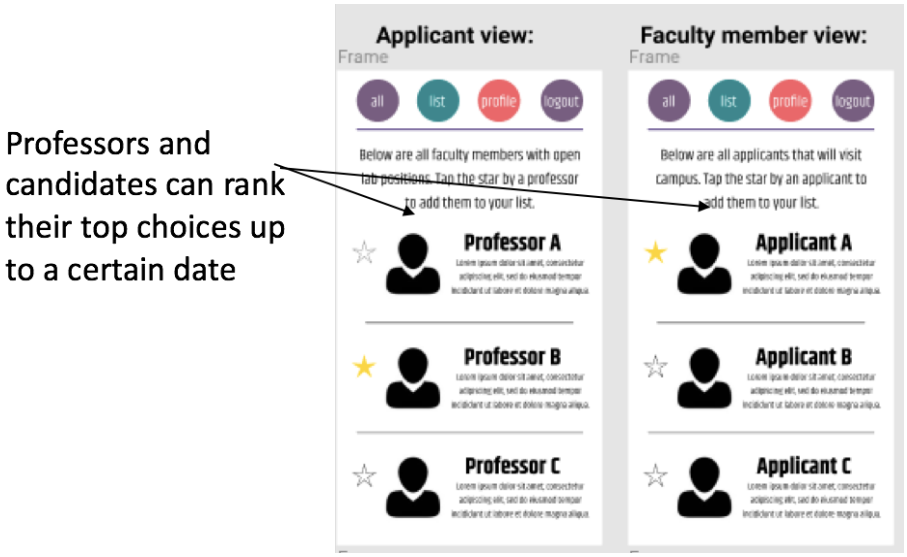


Figure 22: Viewing and ranking professors/applicants

3. First Day Check-in survey - at the end of the first day, the students would take a survey to show which professors they like would like to meet with if they aren't already meeting with them and which labs they enjoyed. Some questions asked would be if a student wants to interview with a professor not originally on their schedule and what labs they like (Figure 23).

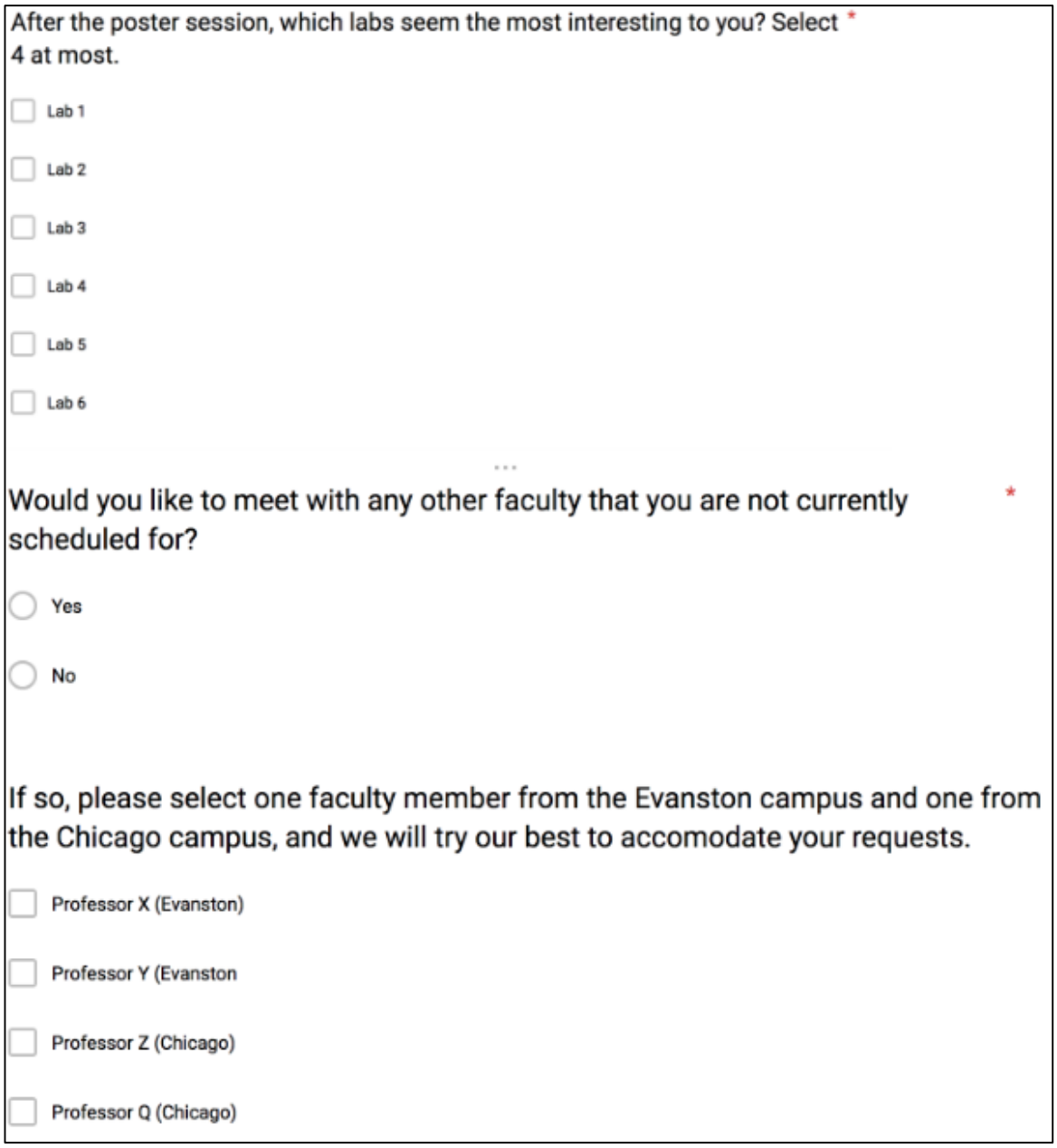


Figure 23: Sample survey questions

Proposed Ideas

4. Video Chat interviews - Following recruitment days, some students would have the option to have one-on-one interviews with professors in order to get more exposure to the faculty on campus. Interviews would last around 20 minutes and not all students would

be given the chance for an interview due to time constraints on a individual professor's schedule.

5. Speed Networking Event - Immediately prior to the actual poster session, a speed networking event would take place allowing students to quickly speak with each faculty member in 2-3 minute time slots.
6. Lab Internship Program - This program would give lab experience to graduate students during their first quarter as graduate candidates. Students would either participate in a single 10-week program in one lab, or their time would be split up into two five week sections with a different lab each section.
7. Additional interview slots - during the poster session, applicants would have the opportunity to schedule optional interviews with faculty on short notice.
8. Proposed faculty changes - these are changes that could be made with the faculty to serve as part of the deliverables. The changes are as follows:
    a. More faculty members must be involved in the reviewing of the applications
    b. Faculty must attend all social events
    c. All faculty interviews should be held in a single, centralized place on campus
    d. Students submit six preferences for interviews with the faculty
    e. Graduate students could be used as proxies during poster session and/or interviews

Methodology

Our user testing spanned the course of two weeks, starting the week of May 13. In most of our earlier user tests, prior to the discussion of our mockups and ideas, an extensive flow chart was shown to the testers (Figure 20). This flow chart represents the entire process of recruitment and was shown so that our testers had an idea of the overall flow of the recruitment process, not just their roles in it. It was also shown so that we could ensure our depiction of the process was accurate; for that reason, in many of the earlier testing sessions, our flow chart was edited to more accurately show the process of BME recruitment. The flow chart was not shown in later testing sessions as it became accurate.

Our first meeting took place with the two administration members Ms. Madeline Brown and Mr. Ian Magenta. User testing was done twice with the administration, due to the amount that changed over time, so they were also our last testing group. The first testing session took place on May 14, 2018 and was attended by Kevin Bai and Dave Washington. The user testing took place in Tech room A211 from 11am to 12pm. In this testing session, the app and survey were shown to the administration (see Mockups).

Our second meeting took place with our client, Professor Malcolm MacIver on May 15, 2018 and was attended by Elise Lee. The meeting took place in Tech room B292 from 11am to 12pm. Items discussed were the proposed changes to faculty engagement (see Proposed Ideas).

No actual sit down meeting took place with any graduate students, however data was gathered by way of a survey and a follow up email. The initial link to the survey was sent out on May 18, 2018. This survey contained questions about both what swayed their decision in deciding to come to Northwestern and what they thought about implementing an app, video chat interviews, fall internships (as a way of improving the internship system, the way that students learn about labs during fall quarter), and the speed networking event (see Mockups and Proposed Ideas). A total of 20 responses have been reported from the survey as well as an answer to follow up questions being received from one graduate candidate. The survey sent out was created by Shana Capur. Responses were gathered by Elise Lee over the course of a week.

Our fourth testing session took place with Professor Neha Kamat as our faculty representative on May 23, 2018 and was attended by team member Kevin Bai. This user testing session took place in Tech room E354 from 3:30pm to 4pm. Deliverables discussed were the app, video chat interviews, speed networking, having additional faculty members to sort through applications, the fall internship program, and additional interview time (see Proposed Ideas).

Our final meeting, again, was done with the administration (Mr. Brown and Ms. Magenta). This meeting took place on May 25, 2018 and was attended by team members Shana Capur and Dave Washington. The testing took place in Tech B252 from 10:30am-11am. In this meeting, no mockups were discussed. All of our ideas were discussed instead, simply asking what they thought about each of them (see Proposed Ideas).

Results

The following tables show the data we gathered from all of our users about both the mockups and proposed ideas. Tables 5 and 6 display quantitative data based on the administrative users' assessments of the two mockups (the survey and the app). Factors evaluated included implementation feasibility, how easy it would be to get responses, how efficiently each mockup can be updated, the ease of use, and thoughts on the overall design. The users rated each mockup feature on a scale of 1 to 10 where 1 would be considered the worse while 10 is the best.

Table 5: Survey - Administration User Testing Results

	Implementation feasibility	Getting responses	Keep updated	Ease-of-use	Overall design
Madeline Brown	4	10	9	10	10
Ian Magenta	4	10	10	10	9
AVERAGE	4.0	10.0	9.5	10.0	9.5

Table 6: App - Administration User Testing Results

	Implementation feasibility	Getting responses	Keep updated	Ease-of-use	Overall design
Madeline Brown	6	10	8	10	10
Ian Magenta	6	10	8	10	10
AVERAGE	6	10	8	10	10

Figures 24, 25, and 26 are pie charts depicting ratings graduate students gave on various aspects of the design when they completed the survey sent out to them. These ratings were given on the app, video chat interview, and fall internship.

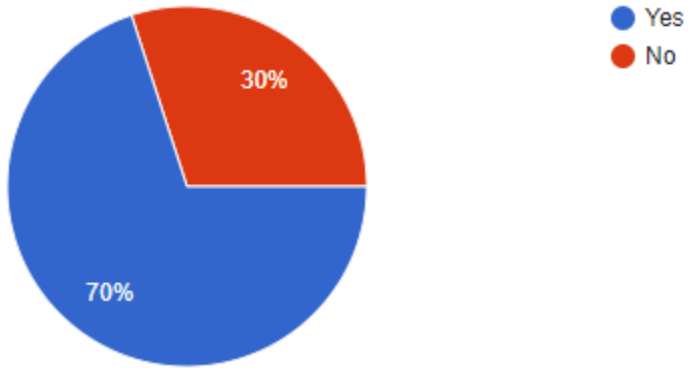


Figure 24: Students that would download the app

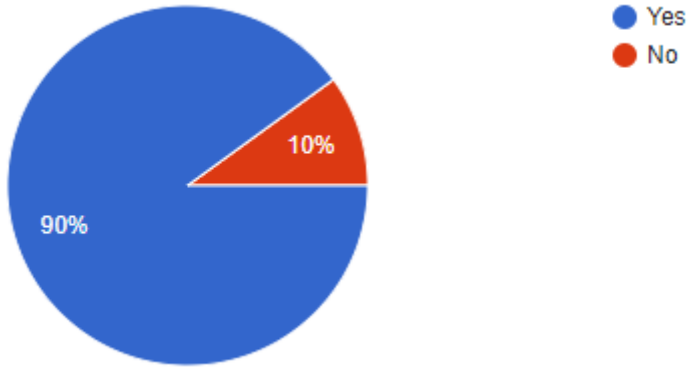


Figure 25: Students willing to participate in a video chat interview

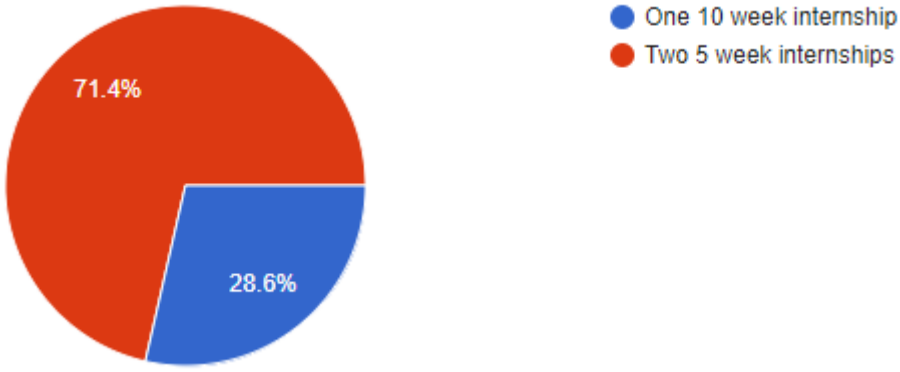


Figure 26: Type of fall internship preferred

Tables 7 through 13 are qualitative and about every single mockup and idea discussed (see Tested Designs). Not every user group saw every design as throughout testing, our final design was always in flux as new data came in.

Table 7: App User Testing Results

Administration	Faculty	Graduate Students
Like that professors can rank students Very dynamic Who has priority? Students or faculty? Not app, website. Not everyone has a smartphone Updating the app shouldn't be a hassle Profs can update their info in faculty meetings	Liked the idea Should be web based, faculty will be much more likely to help out Faculty would update the app at least once a year	This could be done without having to download an app

Table 8: Video Chat Interviews User Testing Results

Administration	Faculty	Graduate Students
Already used for international students/people that can't come As long as the faculty can do it, it's fine Administration is fine with setting it up They have time after recruitment days	A lot of work Graduate students can handle it, especially if they like it Faculty might think this is an over commitment	If faculty can't come to their interviews, they should be required to video chat all of the candidates that wanted to meet with them A lot of students have expressed interest in this ● There isn't a formal process ● Students too frightened to set it up themselves Good way to talk to faculty they may not have known existed before

Table 9: More faculty assigned to sort applications User Testing Results

Administration	Faculty
Would be easier if cover sheets were removed	Adding another faculty member wouldn't help since everything is already reviewed by each faculty member

Table 10: Speed Networking Event User Testing Results

Client	Administration	Faculty	Graduate Students
Would be a great attachment to the poster session In poster session, sometimes have to go through several posters to find something they are interested in	Additional time is good Not a big deal to tack on Can be added on to the back end of the poster session	Could also just have more faculty working the poster session	Great but difficult to get all of the professors in the same place at the same time Good way to meet many faculty members and hear a bit about their research

Table 11: More interview Time Slots User Testing Results

Administration	Faculty	Graduate Students
Has been seen a little last year Could be more formalized though Maybe a large space and have all the professors set up to meet with students	No more time needed Just have everyone sitting in one place to interview with	More time would be good Some interviews were not individual ones Only met with a few of the faculty they were interested in

Table 12: Internship System to find a Lab (Fall Internship) User Testing Results

Client	Administration	Graduate Students
Try having an internship (1 round of 10 weeks or 2 rounds of 5 weeks per lab) That way professor knows that the student actually wants to be there	Not sure how it would work Finding time could be easy or hard Admins haven't been here long to know how difficult it could be to implement	Internships sound weird, but there should be a more formal internship process If allowed, don't make it mandatory Internship would help decide which lab was good for them

Table 13: Remaining Qualitative data gathered from Administration

- Survey
    - have to manually change everyone's schedule
    - Will they actually do it? Maybe since they're already here
    - Some people don't check their emails
    - Have to be sure of your answer to the first time

- Graduate student assistance
    - can coordinate as time goes on, maybe in the future
    - depends a lot on the individual professor
        - high degree of variability, hard to implement sound solution
    - Can take the load off of some of the professors

- Chicago Faculty brought to Evanston
    - finding space may be tough
    - takes convincing to get them to Evanston
    - labs in Chicago, students might definitely want to see
    - if prof really wants meeting to happen in lab
    - Around 10 faculty members are involved in recruitment days from Chicago each year

Table 14 shows all of the ideas that resulted from user testing with our client and what their purpose would be in improving the recruitment process. Many of these ideas are included in our later user testing sessions and therefore, have quantitative and/or qualitative data given on them from our users.

Table 14: Proposed Ideas Heard During User Testing

Fall Internship	Happens during the fall quarter of their first year Either one 10 week session (all fall quarter) or two 5 week sessions. Students can test out labs to see which ones they like better
Speed Networking Event	Happens just before the poster session Students have an opportunity to speak with all of the faculty
Brochure	Can be handed out during the poster session Saves time in finding which research opportunities they like better Students know a little about research before they get to the poster
Chicago faculty brought to Evanston	Saves the trip between campuses
Graduate Student Proxies	Using graduate candidates as proxies would allow more applicant to "meet" with professor/hear about their research They can also take on other responsibilities
Students submit six preferences for interviews with the faculty	Allows more variety of scheduling options for students Would happen before recruitment days
Removing application cover sheets	Would cut down hours of time spent sorting through applications
Faculty participation required	This way students don't feel like the professor just doesn't care about them If they don't participate (barring and actual excuse), they don't get students
Rolling application data processing	This allows a faster turnover rate for getting all of the information looked at

Analysis

App vs. Survey

The administrators preferred the app over the survey due to the app's being more dynamic and aesthetically pleasing. Prior to testing, we thought it would be hard to have the faculty keep things updated, however the administrators assured us that it would be no hassle. The same could be said for the survey as not much would change from year to year in terms of professors needing students. The survey isn't dynamic, though. It is something that you fill out once, and can't change your answers to.

The feasibility of implementing either the app or the survey (Tables 5 and 6) is the hardest part of the process. Beyond actually creating either of them, the survey would be harder to implement because once the survey is completed by graduate applicants, the administration would have to go in and change everyone's schedules to try and fit more people's needs. The app gives the advantage of being real time so that schedules can be changed at certain times without as much hassle.

All three groups that discussed the app said that they thought it would be more suitable to use a web based app (Table 7). During the making of our mockup, we hadn't considered the possibility that a one of the people at recruitment days might not have access to a smartphone. We believe there is a higher possibility of getting access to a computer or laptop, making a website or survey easier to work with.

Based on comments made by administration (Tables 7 and 13), ratings given on implementation feasibility for both mockups, and the survey results from current graduate candidates (Figure 24), it would probably be easier to just implement the web based app, eliminating the use of a survey all together, as they'd both give the same result, but the web based app does so more efficiently. A dynamic app also allows the design to be even more dynamic.

Video Chat Interview

The idea of the Skype interviews is to give students a chance to either deepen the connection they started with faculty members during recruitment days, or give students a chance to talk to professors that they hadn't gotten a chance to during recruitment days. Based on the comments made by the administration, faculty member, and graduate students (Table 8), Video chat interviews might not be the way to go however it is in the right direction if we take into consideration Figure 25 (showing that most students would have preferred a skype interview following recruitment days).

A graduate student mentioned that students might be afraid to set up the skype interview themselves (Table 8). From this, we gather that even if someone else sets up the interview for them, they may still be nervous. It might be seeing each other's faces that is nerve wracking. Eye contact is sometimes difficult during interviews or just in general with people you don't know. Possible solutions to this could be doing phone calls instead or have video be optional during the chat.

Professor Kamat, our faculty representative says that might be too much of a commitment for professors. A professor doing research may not have the time to get on a video call with a prospective student. Therefore, a possible solution might be to use asynchronous communication, such as sending personalized emails back and forth the way letters are sent between pen pals.

Sorting Applications

We considered sorting the applications between more than three faculty members as that would relieve some of the load on the faculty members that do look at the applications. However, from user testing, we discovered that the number of faculty members wasn't the issue at all, but it was the amount of time added to the process due to the cover sheets of the application (Table 14). The administration gave the solution of just getting rid of the cover sheets altogether. Although we have not seen a cover sheet, assuming there are 400 applications, it is well within reason to assume that the amount of time that has to be added between sifting through the cover sheets and searching for the necessary data is quite a bit. Further looking into this might open up a chance to better analyze the situation.

Speed Networking Event

The purpose of the Speed networking event was to give students a chance to learn a little about each professor's research before the actual poster session. Based on the data in Table 10, most user groups believe this to be a good idea. A graduate candidate believed it would be difficult to get all of the professors together, however given that this happens during recruitment days, it shouldn't be too much of a hassle for any one party. The best way to maximize the number of professors that are present is to tack it on right before the poster session. That way, students will have an idea of what professors they may want to talk to during the poster session.

More Interview Times

Students currently say that the interview process isn't the best thing out there (Figure 25). They need more time to speak with more professors to better help them find a fit if they decided to

come to Northwestern for graduate school. However, our faculty representative disagrees, stating that students already get enough time to talk to professors in the allotted time. Both faculty and administration suggest a solution of having all of the professors set up in a single space to meet with students. This can almost be seen as a post-Poster Session networking event. If immediately following the poster session, students have a chance to quickly meet with professors, they can still meet with other professors the following day without messing up their schedule or missing out on time spent with other professors.

Internship System Improvement (Fall Internship)

At the moment, there is no real system for getting students to choose a lab that best suits them. The client, Professor MacIver, proposed a Fall Internship Program to be held during the first quarter of their graduate years and we brought it to the attention of the other user groups (Table 12). This program would give students one or two labs to explore and better help decide which lab they should stick with for the rest of their graduate years. As this is both of the administrators first year doing this job, they aren't very sure how easy or difficult it would be to implement such a program. As the client has been doing this for several years and proposed this idea, it is most likely something that isn't going to be impossible to put into play. Taking into consideration how busy a professor's schedule is, one difficulty may be that every time a new student comes in, the professor may have to drop everything and teach them the basics of what needs to be done. This, however, can easily be done by using a current graduate candidate as a proxy (Table 14).

Graduate students don't seem to be as committed to the idea of having an internship available for incoming students (Table 12). It might be that this gives the current graduate candidate less work to do or they don't think the internship would be a good value of time. One student does concede that an actual internship system should be implemented and given all the data we have been supplied, we consider the Fall Internship program to be the best option to pursue at this time. Figure 26 shows that people would prefer having two 5-week internships over a single 10-week internship. This is likely because it gives a little leeway to explore more than one lab. If a student only goes to one lab for 10 weeks, they wouldn't have anything to compare it to. We want to find a way to get as many students into labs that best suit them as possible.

Faculty Changes

During our client user testing, it was brought to our attention that many of the changes we were considering making to the recruitment process were already being put into play and that we should consider more drastic measures. That is where we received most of our proposed changes (Table 11). With the exception of a couple (such as centralizing faculty interviews and requiring faculty participation), implementing these ideas doesn't seem to require too much work on any

one given party. The least likely to occur is most likely bringing the Chicago faculty to Evanston (Table 11). In order to best maximize a student's time, it is likely best if students have the chance to see both of the campuses and as many labs as possible.

Limitations and Conclusions

Every project has its limitations, no matter how well user testing goes. One major user testing error when gathering quantitative data was doing testing with more than one person at a time. When testing in a group and asking to rate an aspect of a mockup, group members first tended to give separate ratings but after a brief discussion, converge on a single rating. This made it difficult to accurately assess mockups. The fact that we didn't have that much quantitative data overall didn't help matters much either. Not only was the data on the app and survey scarce, but we also only got quantitative data from the graduate students on a couple ideas and no quantitative data from either the client or the faculty. Because we had so much to test and what we were testing varied dramatically along the way, we had to sacrifice getting a vast number of critiques for getting critiques on as many ideas and mockups as we could.

Another thing to consider is that all of the ideas and mockups are theoretical. There is no way to know if any of these will actually work until beta testing is performed during an actual recruitment process. Because there are just so many designs, we have to pick and choose which ones will best satisfy the requirements of the project.

Throughout user testing, data was gathered in a few different ways. One was via in person interviews. This was the most common of them. A second way information was gathered was through post interview emails. These were sent to give us more information based on what was talked about. The third was by way of surveys. Because of the variety of techniques used in gathering data, it's not as simple to compare data taken from different user groups.

One last limitation is that we've never seen a cover sheet of an application. Therefore, we don't know where to start in having them automatically removed for the administration and is something that would need to be look into more.

We got a lot of information from our user testing sessions. We've heard various ideas that we will further consider such as the speed networking event, a brochure of the poster session for the students, and implementing the app as a web based app. User testing has enlightened us to many ideas that we had not yet considered that are just as good at solving our problem. We will use our testing data as well as future discussions to solidify our final design. As of now, our final design consists of the app, the brochure, video chatting of some sort, and the lab internship program, as well as some additional changes to the overall process. These changes include having graduate

assistance help professors with interviews and other events, removing the cover sheets from applications, having rolling application data processing, having a more centralized location for interviews, adding optional space for extra interviews, and making the poster session mandatory.

After gathering these results, we were then able to breakdown and deduce our decision matrix.

APPENDIX D: EXPERT INTERVIEW SUMMARY

This appendix contains the expert interview completed with the Assistant Dean for Graduate Studies.

Assistant Dean for Graduate Studies

Our team also interviewed Bruce Lindvall, the Assistant Dean for Graduate Studies at Northwestern University. All members of the team—Shana Capur, Kevin Bai, Elise Lee, and Dave Washington—attended the interview, which took place on May 4th at 3 PM and lasted for approximately fifty minutes. The purpose of this interview was to learn more about the broader context of the BME Ph.D. program.

Methodology

The interview took place in Dean Lindvall's office. All members of the team and Dean Lindvall were seated around a table, and the interview also took place in an open-discussion format.

About the User

Dean Lindvall has been the Assistant Dean for Graduate Studies for the McCormick School of Engineering and Applied Sciences for over 12 years. His role is overseeing graduate student recruitment and admissions, as well as meeting with numerous graduate students, helping recruit them and explain graduate opportunities. As Dean Lindvall has worked in higher education for 47 years and communicates daily with prospective graduate students, our team felt as if he would represent the opinions of graduate students well. As a result, the interview was a way of gaining supplement insight into the perspective of prospective graduate students.

Information about Northwestern's BME Graduate Program

Dean Lindvall gave a more broad overview of the BME Graduate Program within the context of Northwestern Engineering:

- BME is the only department that brings in prospective students to Northwestern to have an "interview-type" process before sending out acceptances
    - Northwestern's BME department has only does this for the past three to four years
    - Nationally, schools usually bring students to campus after admitting them; however, many other life science and BME departments also follow the trend of bringing students to campus before accepting them

- Prior to CollegeNet, BME used a software called the "Graduate Admission Tracking System"
    - It had a meeting tracking system specifically for setting up BME interviews and visits when students come to campus
    - However, a staff member would still need to manually arrange each student-faculty meeting
    - The Graduate Admission Tracking System was created by the McCormick School of Engineering
        - Two years ago, the Graduate School at Northwestern bought CollegeNet software from an outside vendor

Information about Other Graduate Programs

Dean Lindvall also gave details about recruitment in other Northwestern Engineering graduate programs:

- Chemical and Biological Engineering
    - Pay graduate students to be in charge of recruitment for a quarter, analogous to a TA program since they hold office hours and help prospective applicants
    - Usually successful, but for this current cycle, the yield was very low and the department was forced to make a lot of last-minute offers to applicants to reach their target
- Electrical Engineering and Computer Science
    - Didn't have a recruitment weekend for a long time, since such a large portion are international and thus find it cost-prohibitive to come to the United States even with the travel stipend that Northwestern provides
- Industrial Engineering
    - Had a recruitment weekend for the first time during this last recruitment cycle, and it was successful in increasing yield significantly
- Material Science
    - Are ranked #2 and have the largest Material Science Ph. D. program in the United States
    - Have two recruitment weekends (because it is such a large program)
    - Have the first weekend relatively early in the recruitment cycle
    - Have the second weekend a week and a half before the end of the recruitment cycle, which is April 15th

Dean Lindvall Interview Table

As a proxy for graduate student voices, Dean Lindvall identified the following problems from the point of view of prospective students (Table 15).

Table 15: Assistant Dean of Graduate Studies: Information, Problem, and Suggestions

Information Given	**Problem**	**Suggestion**	**Follow Up**
Many BME faculty members do not spend a lot of time emailing graduate students in general; Dean Lindvall spends a large amount of time communicating with prospective students in part because of this lack of communication.	It gives prospective applicants a bad perception of the university if faculty members do not respond to their emails.	Ensure that students don't get in touch with the faculty members that don't respond to emails, and allow them to get in touch with the faculty members that do. Alternatively, increase faculty engagement.	Continue to brainstorm ideas for increasing faculty engagement.
Northwestern's recruitment weekend is an opportunity for students to interact with enrolled students and meet with faculty.	Invited students may be unable to attend the recruitment weekend (for example, due to schedule conflicts with other schools), and are thus more likely to be denied admission.	Place less emphasis on whether a student attends the recruitment weekend when making acceptance or rejection decisions.	Research whether this makes a significant impact on students decisions, and consider making a process recommendation regarding this problem.

Limitations

During user and expert interviews, we did not have the opportunity to talk to any prospective graduate students. As a result, there is a lack of first-hand feedback from the point of view of graduate students or perspective applicants. This is important because it could result in the

design being disproportionately skewed towards resolving the problems of the BME administrative staff and BME faculty members and not the problems of prospective students.

Conclusion

After speaking with Dean Lindvall, our team gained understanding of the broader process of recruitment across more McCormick graduate programs. This will help us conceptualize where the BME department fits into this picture. In addition, despite our limitations, we gained understanding about the point of view of graduate students from the experiences of Dean Lindvall.

APPENDIX E : DECISION MATRIX

Below is our design matrix based on discussions with Professor MacIver and the administration. Instructions and the key to our table are also listed below:

Table 16: Design Matrix

	Dynamic/ Interactive	*Ready for beta-testing in next cycle*	*Time-efficient*	*Ease of Use*	*Maintain-ability*	*TOTAL number of +s*
App	++	+	-	++	+	6
Survey	-	++	++	+	++	7
Multiple Fly ins	++	-	-	-	-	2
video chat interviews	+	++	-	++	++	7
Brochure	-	++	++	+	+	6
Speed networking	++	++	++	++	++	10
Fall Internship	++	+	-	+	+	5

Key:

++ = satisfies requirement extremely well
+ = satisfies requirement adequately
- = does not satisfies requirement adequately
-- = does not satisfies requirement

As a result of this design matrix, our team decided to not to implement the multiple fly-in program, and instead replace it with the video chat interview idea. However, as the app and the survey received very similar results, we had to look to additional user testing to determine which mockup we would like to continue exploring.

APPENDIX F: PERFORMANCE TESTING REPORT

This appendix summaries our finding from performance testing via current graduate student surveys.

Purpose

While interviews were very informative in identifying the issue in the process, our team wanted to gain insight from the students who completed the process in the past. Therefore, by conducting a survey analysis, we were able to evaluate the changes that we recommend quantitatively.

Methodology

Performance testing for our mockups were conducted via a survey given to current PhD graduate students via the BME listserv, graduate school listserv, and the SWE (Society of Women Engineers) listserv. Our survey asked about general demographic information as well as ratings (1 meaning Strongly Disagree - 5 meaning Strongly Agree) for current aspects of the recruitment weekend and ratings for potential additions. We used Google Forms to deploy the survey from 5/21/2018 - 5/26/2018. Questions from the survey are listed below:

1. What year did you go through recruitment weekend (when prospective students visit Northwestern's campus)?
2. What is your gender? (optional)
3. Which research lab or research topic are you involved with? (optional)
4. Rate your experience during recruitment weekend with 1 being poor and 5 being great
5. What aspects of the two days on campus did you like?
6. What aspects of the two days on campus did you dislike?
7. Did you meet all of the professors that you wanted to during the two days on campus?
8. How would you rate faculty engagement and interaction during your two days on campus?
9. Why did you give faculty engagement and interaction this ranking? (optional)
10. On a scale of 1 to 5, how important was the faculty at Northwestern in your decision to come here?
11. On a scale of 1 to 5, how important was recruitment weekend in your decision to come here?
12. On a scale of 1 to 5, how important was Northwestern's graduate ranking in your decision to come here?

13. Would you be willing to download an app before recruitment weekend? The app would contain information about faculty and allow you to choose faculty members you would like to meet with over recruitment weekend.
14. After recruitment weekend, would you be willing to participate in additional Skype interviews with faculty members you did not meet with during recruitment weekend?
15. Would you want the option to intern in a lab during the fall of the first year as a Ph.D. student?
16. Would you prefer: (One 10 week internship) (Two 5 week internships)
17. Would you want the addition of a speed networking event between faculty and students during recruitment weekend?
18. Would you want a map for the poster session, where faculty members present posters of their research, in the form of a brochure?
19. Do you have any additional comments? (optional)
20. Are you willing to be contacted for follow-ups? (optional)

Current PhD students were incentivized to complete our survey with an automatic entry upon completion for a $15 amazon gift card. After one week of deploying the survey, we received 20 total responses. 16 of the survey responses came directly from respondents via the BME listserv and the remainder came from other groups

Results

A summary of the survey responses are detailed below:

First, we asked surveyees questions to understand the demographic for each survey respondee.

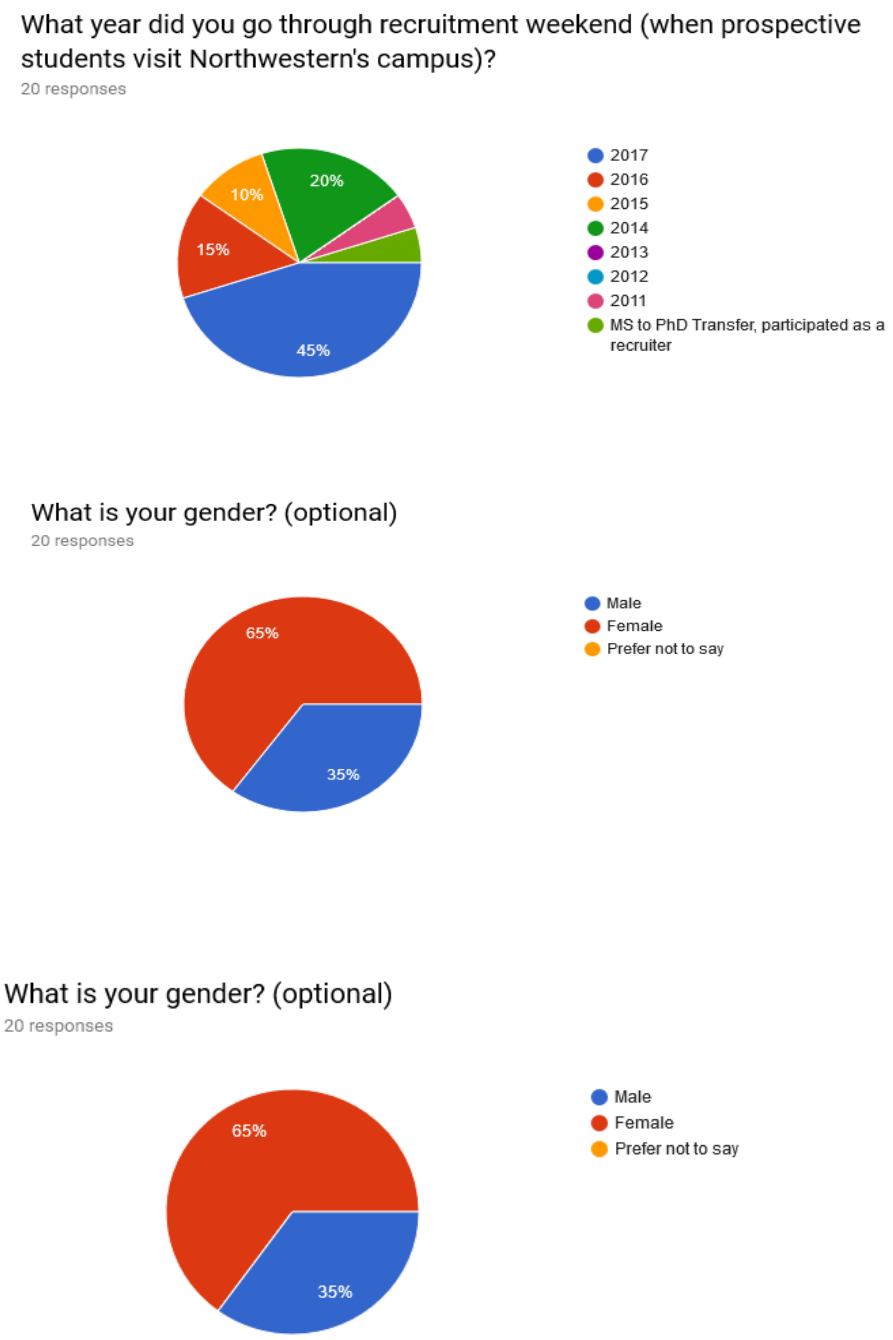


Figure 27: The above questions refer to demographic questions for each surveyee Which research lab or research topic are you involved with? See Table 1 for the responses. Note: These responses were manually entered and we sorted and classified them for ease.

Table 17: Survey Respondents by Research Lab

Research Lab or Topic	Survey Count
Tissue Engineering	1
Biomaterials	3
Regenerative Medicine	3
Rehabilitation/Neural Engineering	4
Total	11

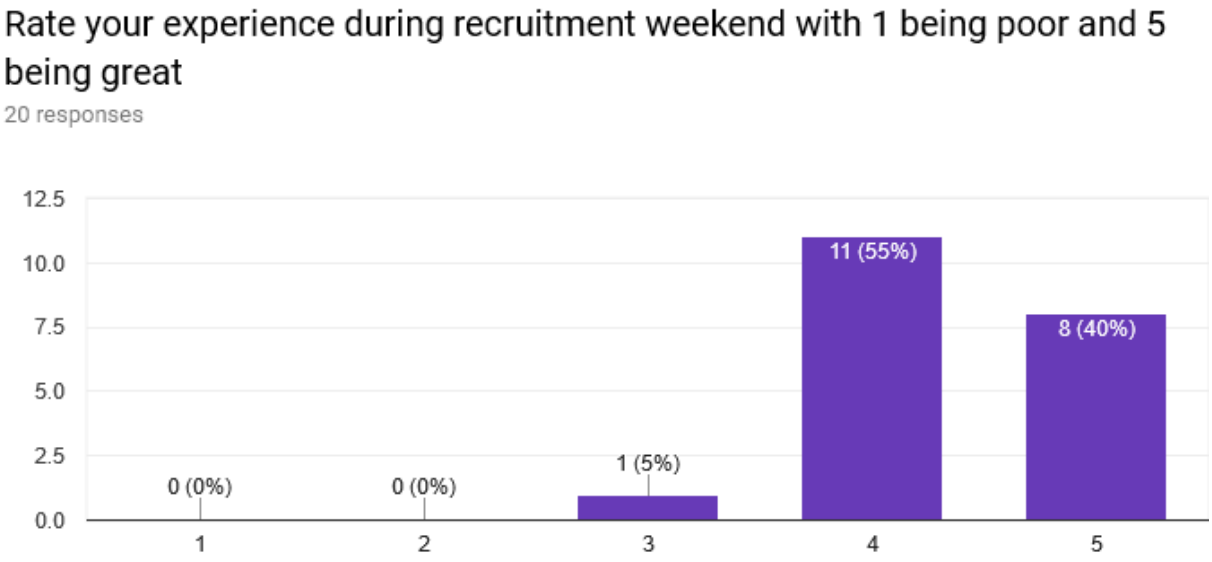
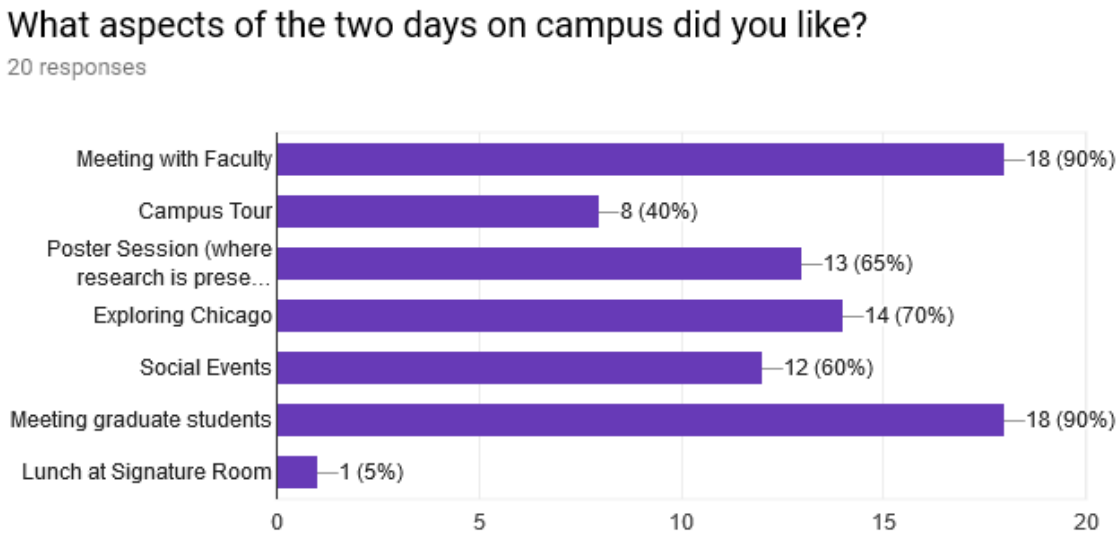


Figure 28: Survey question asking about holistic recruitment weekend

The next two questions ask about general likes and dislikes during the recruitment visit:



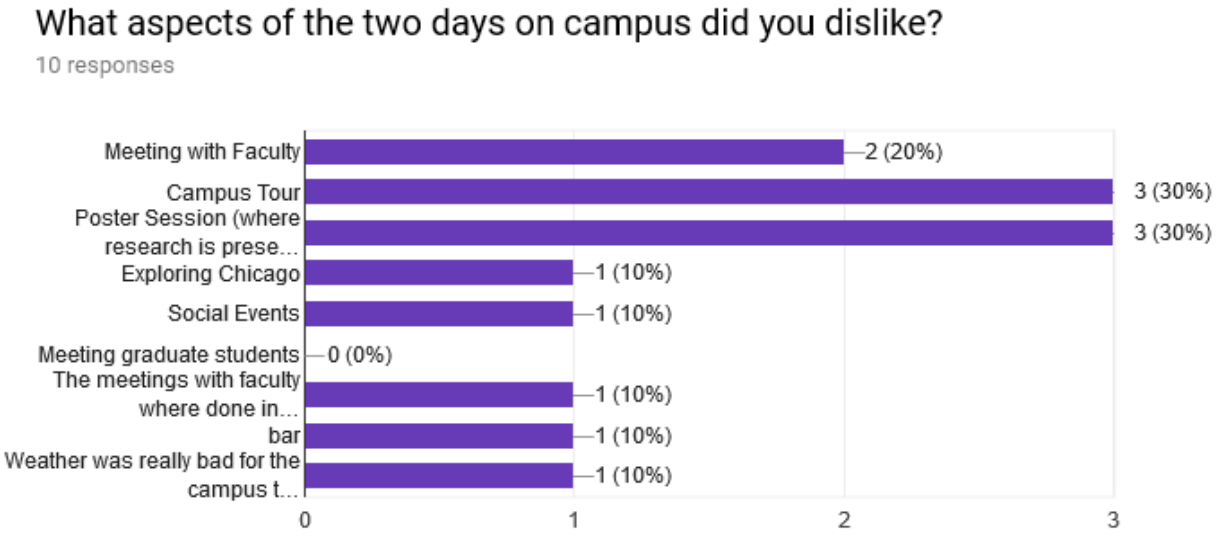


Figure 29: Above questions address general feelings on recruitment events

The next two questions address faculty engagement during the event:

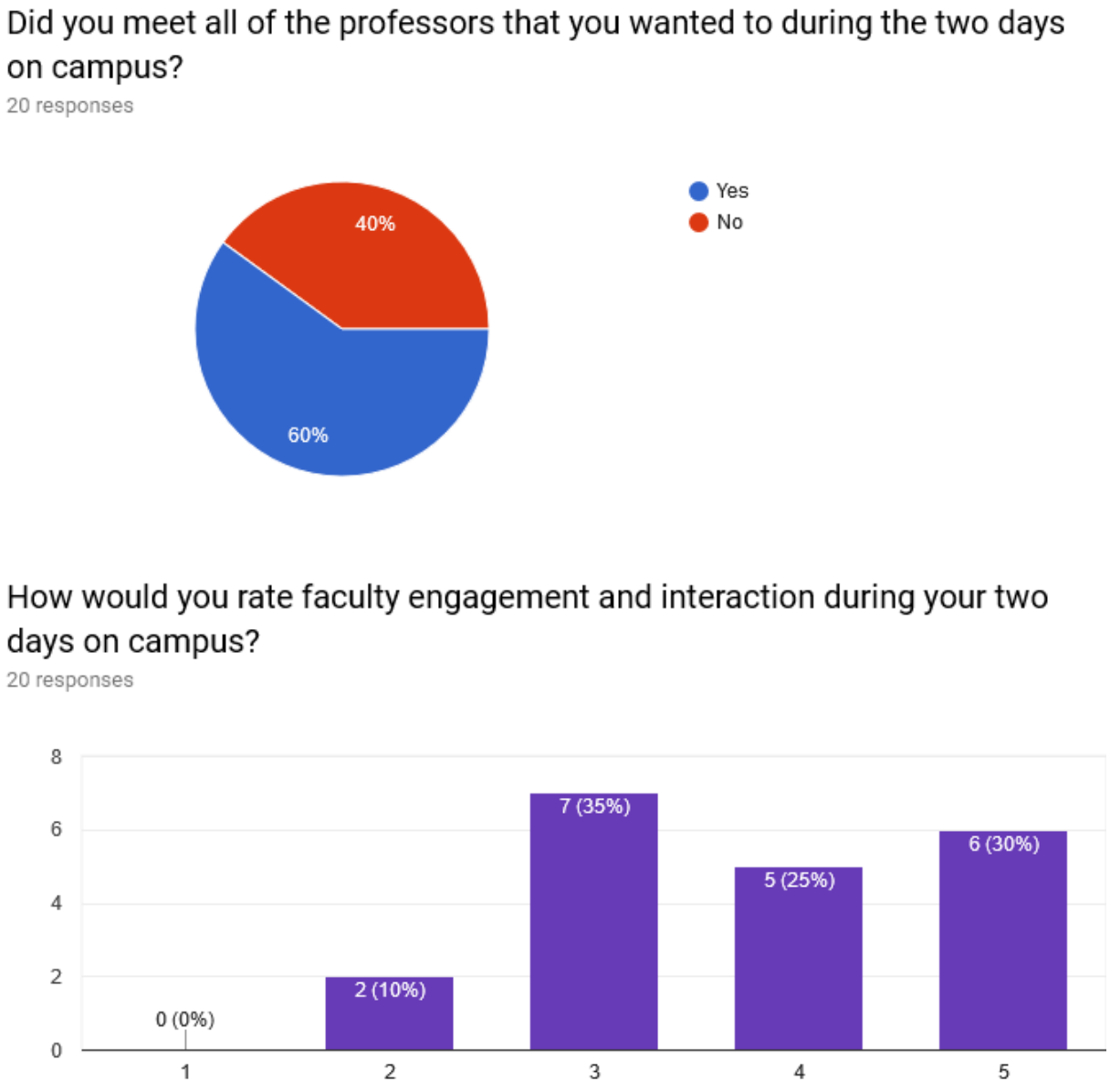


Figure 30: These questions above refer to the on-campus interviews and general faculty interaction during the event

Why did you give faculty engagement and interaction this ranking? (optional) See Table 18 for the responses. These responses were manually entered and we sorted/classified them for ease.

Table 18: Perception of Faculty Engagement

Faculty Engagement Comment	**Survey Count**
Lack of Faculty Engagement	2
Scheduling Conflict	1
Absent Faculty	1
Good Turnout at Social Events	1
Total	5

These next questions ask surveyees about the aspects of recruitment that made current students choose Northwestern:

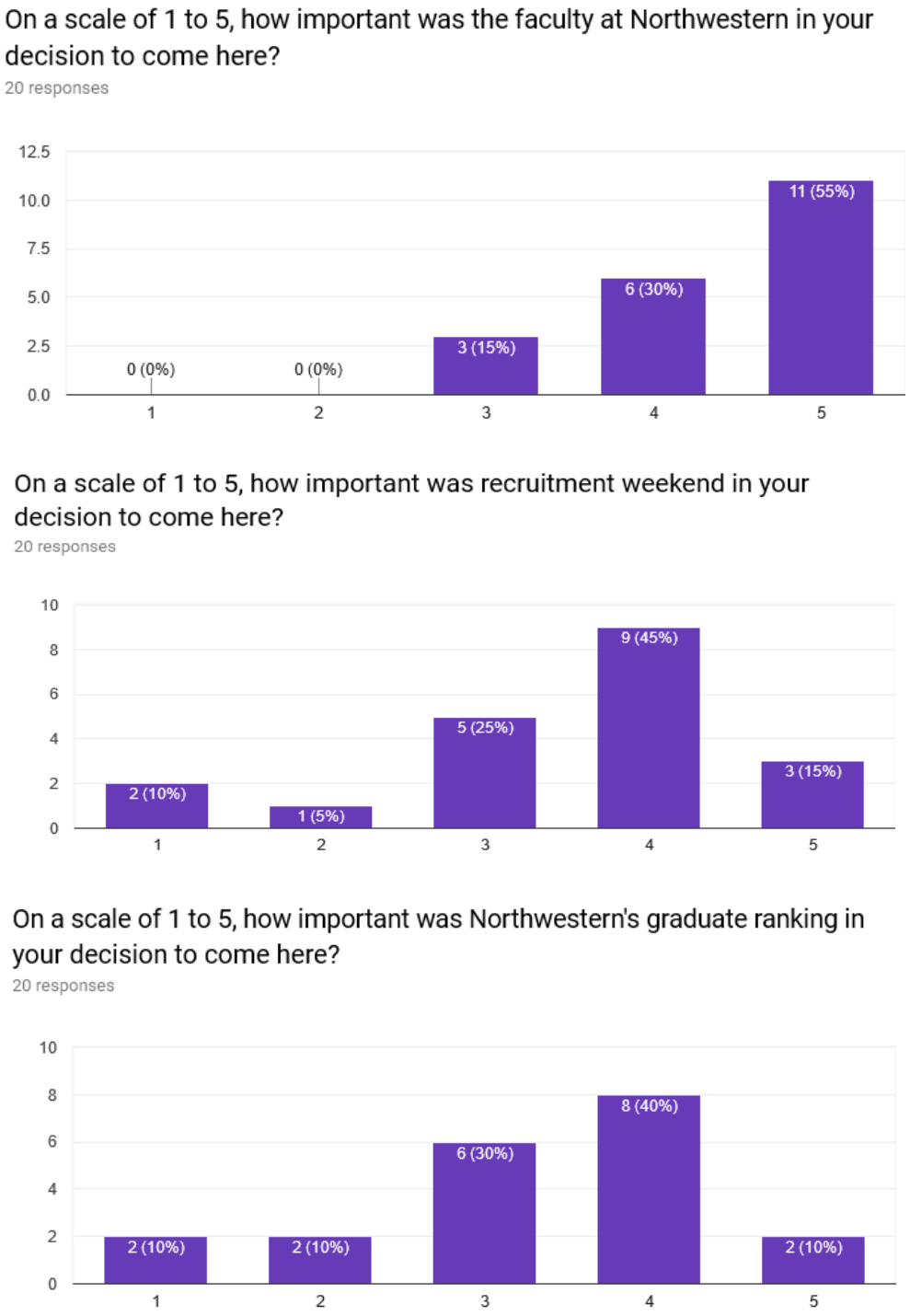


Figure 31: These questions ask surveyees to rate the aspects of general recruitment and their influence on why they chose Northwestern

Our final segment of questions ask surveyees to rate their thoughts on potential additions to recruitment weekend:

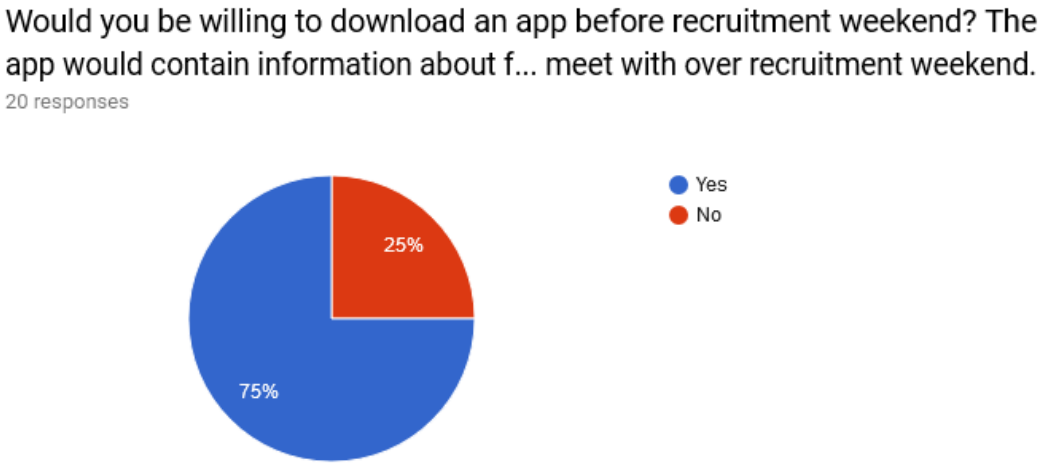


Figure 32: This question gives surveyees a brief description and purpose of the app and then asks if they would like such an addition

Figure 33: This question asks if surveyees would like an additional opportunity to video chat with faculty members

These next questions ask about general feelings towards an opportunity to intern at a lab during the fall of the first year as a PhD student:

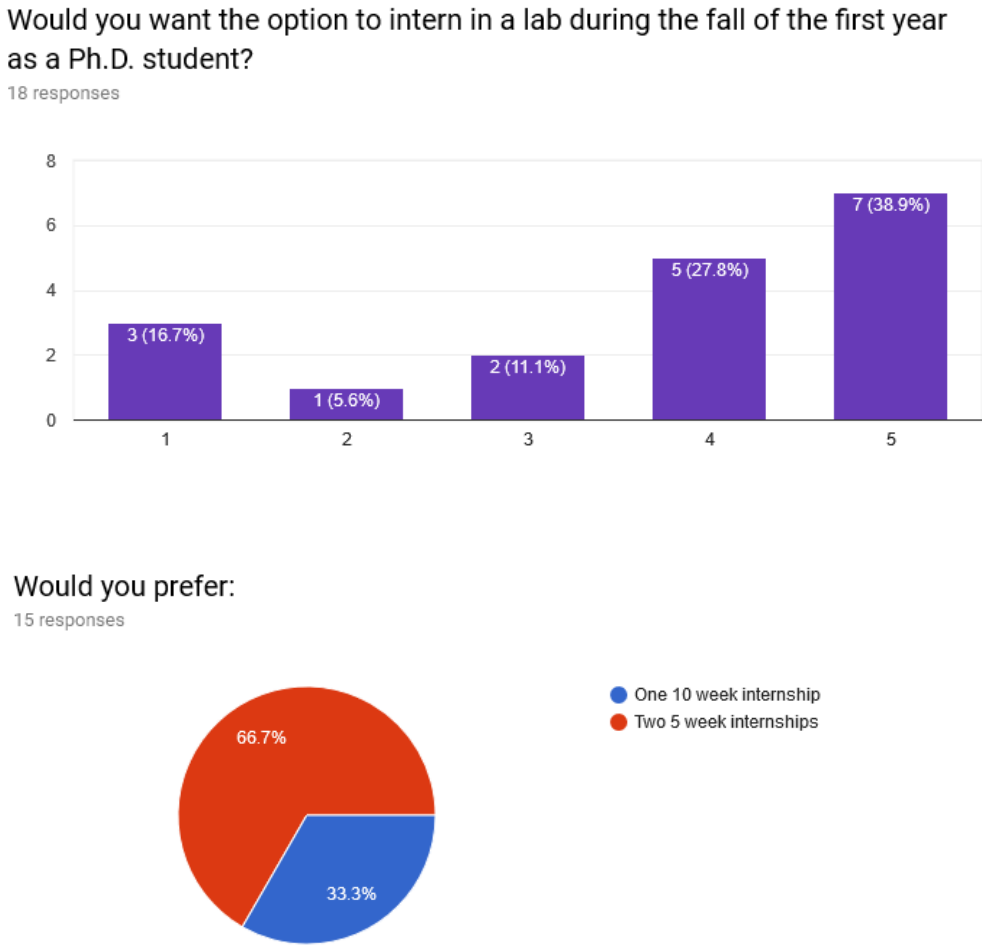


Figure 34: Above questions refer to the possibility of a fall lab internship

The final two questions ask surveyees to respond to the possibility of speed networking and a poster session brochure:

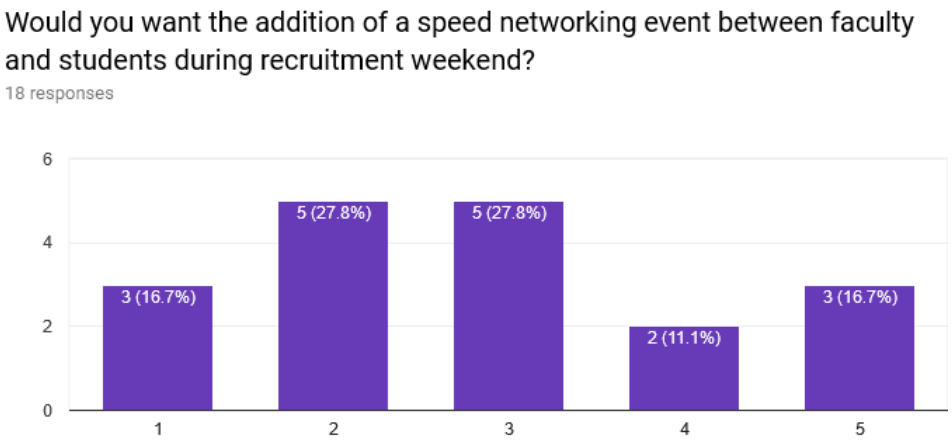


Figure 35: Surveyee respondent results to a speed networking event

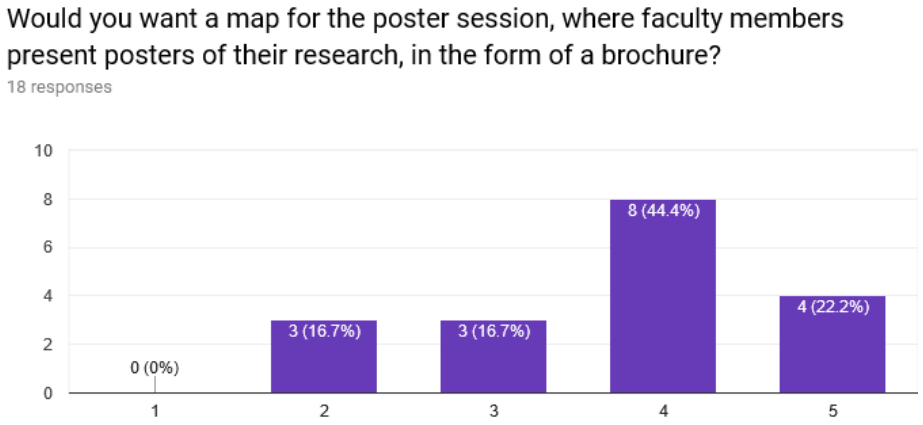


Figure 36: Surveyee respondent results to an informational brochure

Due to the small sample size, our team did not think it was best to perform statistical tests to determine significance. However, we were able to categorize our responses by certain demographics such as age and gender.

Figure 37 shows the average rating to each question addressing current and potential aspects of recruitment weekend

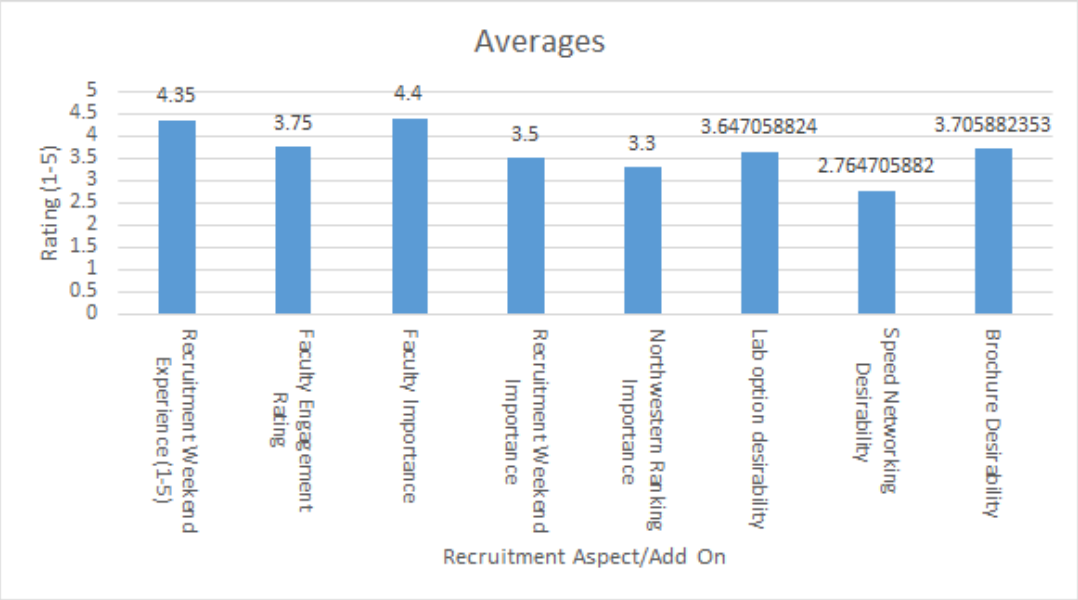


Figure 37: Average Total Rating for each aspect and add-on

Figure 38 breaks down those average ratings by gender.

Figure 38: Ratings by Gender

Figure 39 breaks down the average ratings by year of recruitment

Figure 39: Ratings by Year of Recruitment

Notable Findings/ Analysis

The results of our survey clearly indicated the best features of the current process as well as what proposed design elements would make for substantial additions to the process. A list of the most notable findings are below:

- Faculty Engagement was rated as the highest in terms of importance but was the lowest rated aspect of the current process in terms of satisfaction (see Figure 31)
- The Speed Networking desirability received a very low rating compared to the other potential recruitment add-ons (see Figure 37)
- Video-chat follow-up Interviews were overwhelmingly favored by all students (see Figure 33)
- Graduate students are mostly willing to download an app prior to recruitment weekend (see Figure 32)
- 40% of applicants did not manage to meet with professors that they had wanted to meet with (see Figure 30)
- There was no significant general difference between males and/or females on their preference ratings on all aspects addressed (see Figure 38)
- General differences between recruitment year were apparent but this is most likely due to the fact that 60% of the respondents were invited during 2016-2017 and any polarizing responses from respondents for 2014-2015 years skewed results shown in the graph significantly (see Figure 39 and 27)

Conclusion

This survey was immensely helpful in informing our decisions and providing additional feedback to minor tweaks and changes. Going forward, we now have quantifiable metrics to demonstrate the importance of different aspects concerning recruitment weekend and the process as a whole. We also know that we should not pursue the Speed Networking Session as it was rated unfavorably. We can also pursue the other deliverables (the app, the brochure, and the follow-up video interviews), knowing that we have valuable feedback supporting the implementation of them.

Limitations

- We gave only brief and vague descriptions of deliverables which left a lot to the respondents' imaginations
- Candidates responded from different recruitment years which may have varied significantly in experience between years
- These responses only came from students who are only one segment of the users (does not include faculty)

APPENDIX G: MOCKUP TESTING REPORT

Our mockup testing report serves as a potential indicator for how our performance testing would look like and was useful to clear up any glaring weaknesses and issues with the deliverables.

Purpose

The purpose of this testing was to evaluate the potential partial solutions for our problem as well as compare our mockups to figure out why one was better than the other to improve the design before testing them with our user groups. As noted in previous appendices, our mockup designs were focused on helping improve a specific part of the Biomedical Engineering Ph.D. recruitment process: recruitment weekend. Based on the feedback that we received, the app was the most liked design.

Methodology

Testing took place on May 3, 2018, in the Ford Engineering Design Center in room G.211. The testers were other engineering students in our class (see Table 19). We asked our testers to rate various design requirements for both our app and survey mockup. They then proceeded to fill out the survey and use the app.

Table 19: Tester demographics and order of testing

Tester	Age	Tried First
1	18	Survey
2	19	Survey
3	19	App
4	19	App

Mockup Information

We tested 2 mockups: An app that let users rank professors and students that they would like to meet with and a survey that lets candidates respond to the first day of recruitment and request changes in meetings with professors. These mockups were the only ones tested simply because these were the only mockups that allowed interaction between the tester and the mockup. The

other two mockups featured a process flow diagram that outlined the current process in Northwestern PhD BME Recruitment and a process map of having multiple fly-ins of PhD applicants on seperate weeks. At most, we could only discuss these other mockups and predict flaws and outcomes but we could not perform any sort of substantial testing. The two mockups that we did test were designed as follows:

1. Matching App
   This design was created to allow for a dynamic matching system that let applicants choose six professors that they would like to meet with during the recruitment weekend. Each candidate creates their own profile and reviews each professor's profile (Figure 40). After reading through their profiles, candidates then rank the top six professors and can change their rankings up to a certain date (Figure 41).
2. First Day Retrospective Survey
   This design was created to allow applicants, after they arrive, to make impromptu decisions on whether or not they want to make changes to their first day of recruitment activities (Figure 42). In essence, these questions are geared to assess whether they would like to spend the time on social activities or on spending extra time meeting with professors (Figure 43).

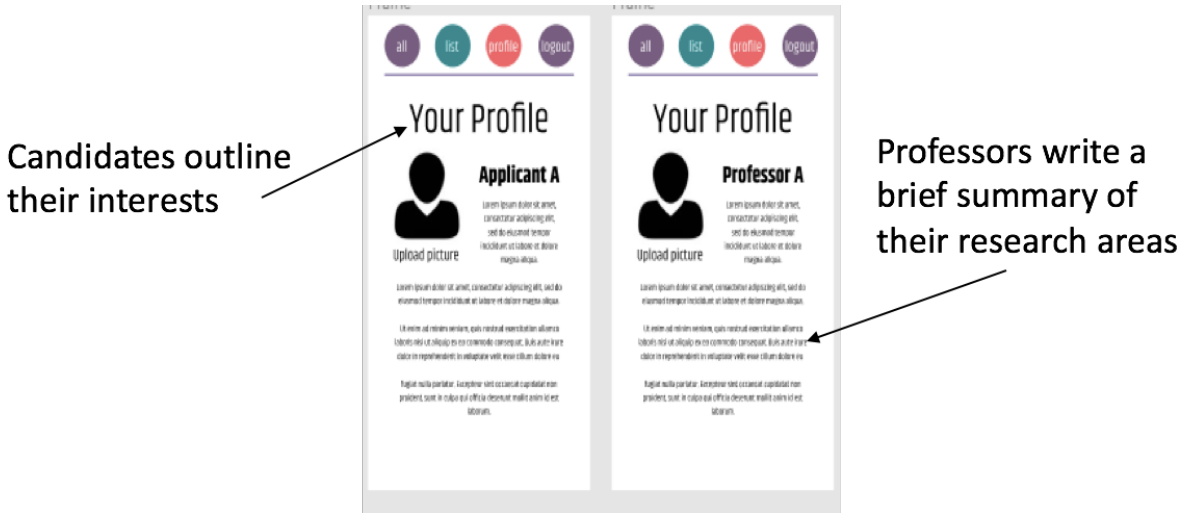


Figure 40: Current view of professors' profiles and applicants' profiles

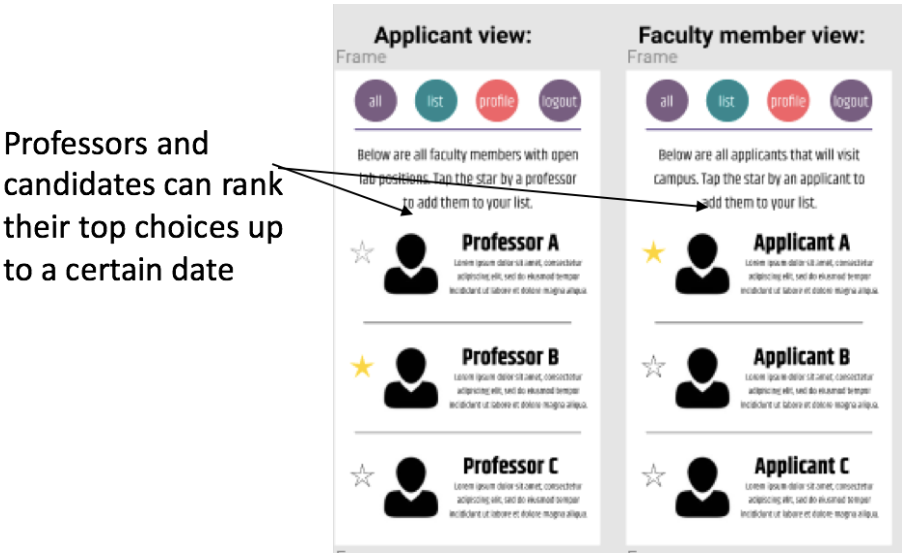


Figure 41: Current view of the applicant and faculty lists of ranks

After the poster session, which labs seem the most interesting to you? Select * 4 at most.

- [ ] Lab 1
- [ ] Lab 2
- [ ] Lab 3
- [ ] Lab 4
- [ ] Lab 5
- [ ] Lab 6

Figure 42: Survey response after candidates view the poster presentation

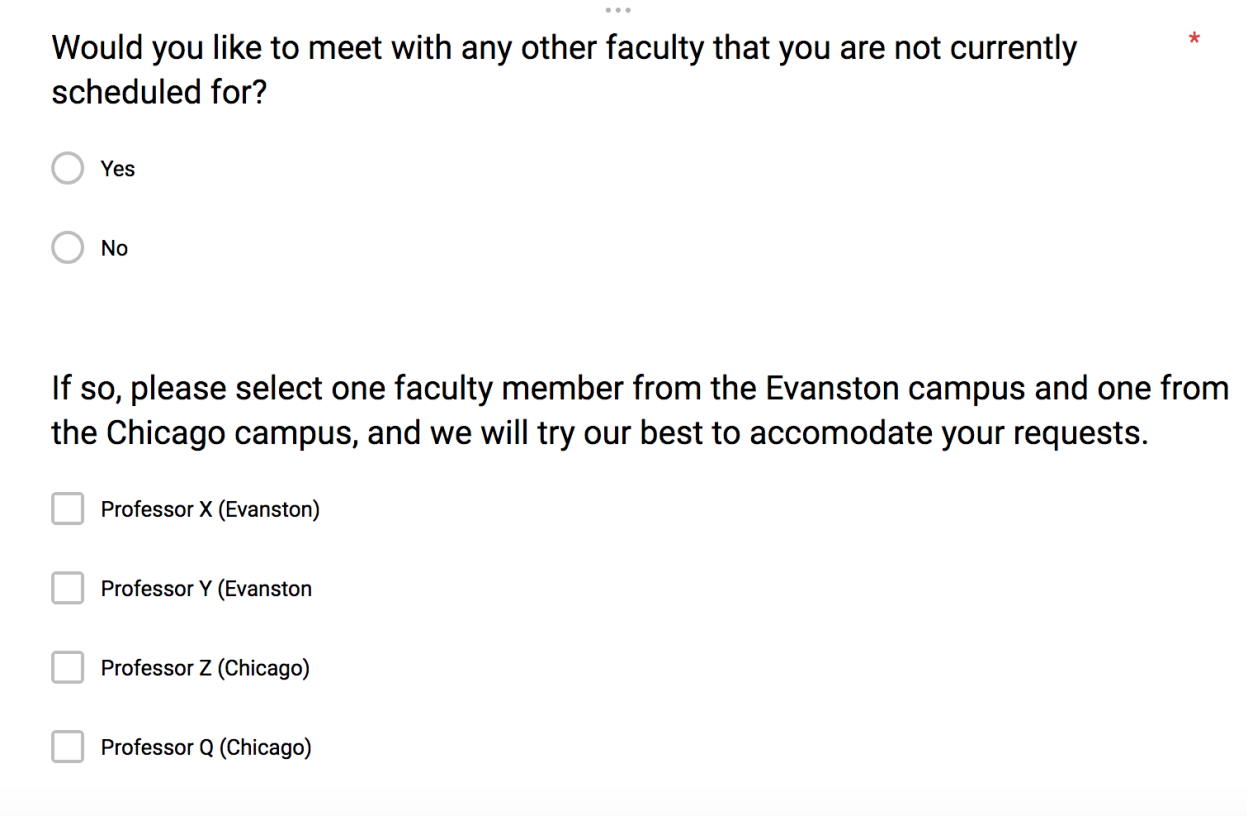


Figure 43: Survey response in case candidates would like to meet with professors currently not on their itinerary

Results

Aspects of our results were rated 1-10. 1 means "very bad" and 10 means "very good."

Mockup 1: Matching App

During mock-up testing, testers were timed from start to finish on their progression through the app and quantifiable metrics were gathered upon completion. The test results for the Matching App were generally positive but suffered from some confusion due to testers not understanding the full extent of the application being used and our group having to explain certain aspects that were not immediately evident. This resulted in extra time being taken by two the testers. Testers also liked this mockup mostly because of its technological application and neat interface. While they mainly enjoyed the feasibility and thought it was easy to use, they thought that our design could be slightly improved and certain features needed to be added to the app such as a drop-down search menu. Results are shown in Table 20 below:

Table 20: Results summary for Matching App Mockup					
Tester	Time (sec)	Ease-of-use	Feasibility	Maintainability	Design
1	120	7	9	10 (back-end development would be instrumental)	6
2	135	7	9.5	8.5 (if set up right and not coded poorly)	4
3	60	8.5	8	8	7
4	60	9	9	8	7
Average	93.75	7.875	8.875	8.625	6

Mockup 2: First Day Retrospective Survey

Similar to Mockup 1 testing, Retrospective Survey testers were timed from start to completion of the survey and quantifiable metrics were gathered upon completion. Like the app, several survey testers needed some extra time during the mock-up testing to clarify some aspects surrounding the survey. The test results for the Retrospective Survey are shown below in Table 21. The survey received generally positive ratings too but were not as high as the App's. Testers thought that the survey was very easy to use and after having its application within the recruitment weekend explained to them, thought that a survey could be useful and practical in gathering the results needed for impromptu scheduling changes. A lot of the user ratings were conditional based on future plans with the mock-up and are also noted in Table 21.

Table 21: Results summary for First Day Retrospective Survey					
Tester	Time (sec)	Ease-of-use	Feasibility	Maintainability	Design
1	70	6 (couple of confusing questions, especially adding more context)	10	1 (if hardcoded code), 10 (if easily updatable)	6 (are there better choices out there for forms?)
2	90	7 (couple of unintuitive things, like pick one questions allowing for multiple choices)	10	8 (if only in Google forms, higher if coded to export information easily)	6 (because Google form)
3	60	7	9	8	6
4	60	6	9	7	6
Average	70	6.5	9.5	7 (for the Tester 1, I used 5 as the maintainability because it is the median of the responses)	6

Analysis and Conclusions

Matching App

Overall, testers were in favor of adding a dynamic system like an app or app-like website that enabled faculty and students to rank each individual based on research preferences. The app and its application within the recruitment weekend needed to be explained and we believe that there are certainly features that we would need to add (ie. drop down search menu, instructions on what to do) but testers certainly enjoyed the prospect of using an app to handle meetings with professors as opposed to a traditional survey.

First Day Retrospective Survey

Testers were also mostly positive on our survey mockup. They believed that the survey could be enhanced with certain features that limit the choices that users can make. For example, if a user is meant to only select 1 professor, then there should only be an option for 1 professor to be selected. Additionally, certain questions could be elaborated upon. Testers disliked the survey being completed on a Google form the most and already had some previous biases against using the Google forms format. However, testers unanimously agreed on the maintainability and feasibility of using the survey.

Immediate Mock-up Testing Issue

All testers needed some sort of context explained prior to each start of and during mockup testing. Therefore, it is clear from the feedback that providing the testers with the flow chart would have been helpful. We realized our mock up testing faced multiple breakdowns where the tester had to stop what he/she was doing in order to ask a clarification question. This highlights the importance of the information presented on process flow diagram. Perhaps if we had spent a brief amount of time explaining the whole process and where the mock-up design fit into the process, testers would've had a smoother experience while testing. However, this omission on our apart has taught us the value of providing valuable contextual information.

Limitations

Although performance testing, in general, is very useful in understanding how things work, it is important to consider all the limiting factors of testing our mockups. First and foremost, our testers are first-year undergraduate engineering students and not the primary users of the design. They have not applied to Ph.D. programs and are not familiar with the Ph.D. application process or the strains that the process entails. Therefore, although we were able to explain where each design fits into the whole process, our testers did not have to face the same difficulties and stress that Ph.D. applicants go through which may have greatly impacted our testing results. The suggestions and ratings that many of the testers gave were conditional based on the addition or removal of certain features and many questions that might not have been that confusing to real applicants were confusing to some of our testers.

The information gathered was useful and provided a set of expectations to compare to for further user testing and performance testing.

APPENDIX H: DESIGN REVIEW SUMMARY

This appendix contains a summary of our design review, as well as our team's discussion and implementation of feedback from the design review.

Our design review took place on Thursday, May 17, 2018 in our DTC classroom, where we presented our proposed final deliverable to our classmates and professors. This deliverable was a combination of several mockup ideas and is to be implemented surrounding the Biomedical Engineering PhD recruitment weekend. The purpose of the design review was to get feedback on our design and overall process change recommendations. With the designs, we were given several things to consider for when we construct our final deliverables. The feedback has been organized into two tables. Table 22 includes what the reviewers liked and disliked as well as changes we will make based off of the reviewers' comments. Table 23 examines the suggestions and criticisms made by our reviewers and what implementations we will consider based off of these suggestions. Before actually incorporating any of these solutions, we will perform more user testing and continue interviewing with faculty and graduate students.

Table 22: Design Review Summary

Reviewers like	Reviewers dislike	Features to be added	Features to be removed/modified	Additional comments
<u>Deliverables</u> App Matching concept <u>Faculty Changes</u> Incentivizing the faculty with interns Adding more faculty members to look at applications so individual faculty members don't get swamped Makes professors more accessible Speed networking event	<u>Faculty Changes</u> Faculty seems to be asked to do a lot more <u>Admin Changes</u> Administration seems to be asked to do a lot more <u>Deliverables</u> The use of an app rather than a website Too many features to be implemented/spread too thin	<u>Deliverables</u> Maybe add a web based app <u>Faculty Changes</u> Some more incentives for faculty Faculty using graduate students as proxies to take some of the workload off of them (since graduate students are already being entrusted as proxies for some meetings)	<u>Faculty Changes</u> Possibly lower faculty involvement slightly from proposed level of involvement. Faculty meet with students for 4-5 hours instead of 6. <u>Admin Changes</u> Clarify process to emphasize that admin workload will be greatly reduced due to removal of rec letter cover sheet data pulling (intensive 1 week process). <u>Deliverables</u> Speed networking event altered so that students only meet with professors in their group, or potentially removed	<u>Faculty Changes</u> Faculty member Professor Kamat thinks faculty involvement is a good idea but she is very involved already and so might be implicitly biased Helped solve the faculty problem but put more work on them in the process <u>Deliverables</u> Ideally, student engagement will go up if faculty engagement does

Table 23: Implementation of Design Review Advice

Suggestion/criticism	Implementation
• **Can faculty really take out 6 hours in 2 days?**	• We will be speaking to professor Kamat on May 22nd to look at the feasibility of this commitment
• **Why would one category of students (imaging, biomechanics, etc.) chat with professors in other categories during speed networking?**	• Students and faculty can be split up into their subcategories during the speed networking event
• **What if students/faculty don't have a smartphone or lose their phone?**	• We should add a web app that has an app style interface and is mobile friendly
• **More automation of work faculty has to do**	• Faculty members can enlist their graduate students as proxies
• **If faculty are really busy with research and applicants are busy looking at other schools. How do you justify the whole process for them?**	• Successful engagement from professors could have a real impact on the students; substantial involvement on the part of NU faculty could differentiate Northwestern from other schools
• **Need more incentives for faculty (maybe food/extra lab time)**	• Have snacks/food at poster sessions and involved professors should have preference over who gets to work in lab
• **Put everything from brochure into app and eliminate brochure**	• Being given a physical brochure makes the experience feel more personal and not everyone has a smartphone

The most significant insight we found was touched upon frequently during the design review and was the significant added workload for faculty members. From giving 6 hours during recruitment weekend to making more faculty review applications, a lot of the burden of recruitment seemed to be thrown on the faculty. This is one of the things that we are going to look into. We will also be looking further into the suggestions made our reviewers, like removing some deliverables, and see if better solutions can be thought up. Over the next week or so, we have more user testing that we will be engaging in. One such user is a faculty member Professor Kamat. With her, we will explore our options in terms of what the faculty may or may not have time to do and how the division of labor can better be sectioned off. Following our faculty user testing, more concrete solutions can be determined.

APPENDIX I: MANDATORY POSTER SESSION DESIGN

This appendix outlines the process of the mandatory poster session. The recommended changes are outlined in the diagram below. The most important change is mandatory attendance by faculty members.

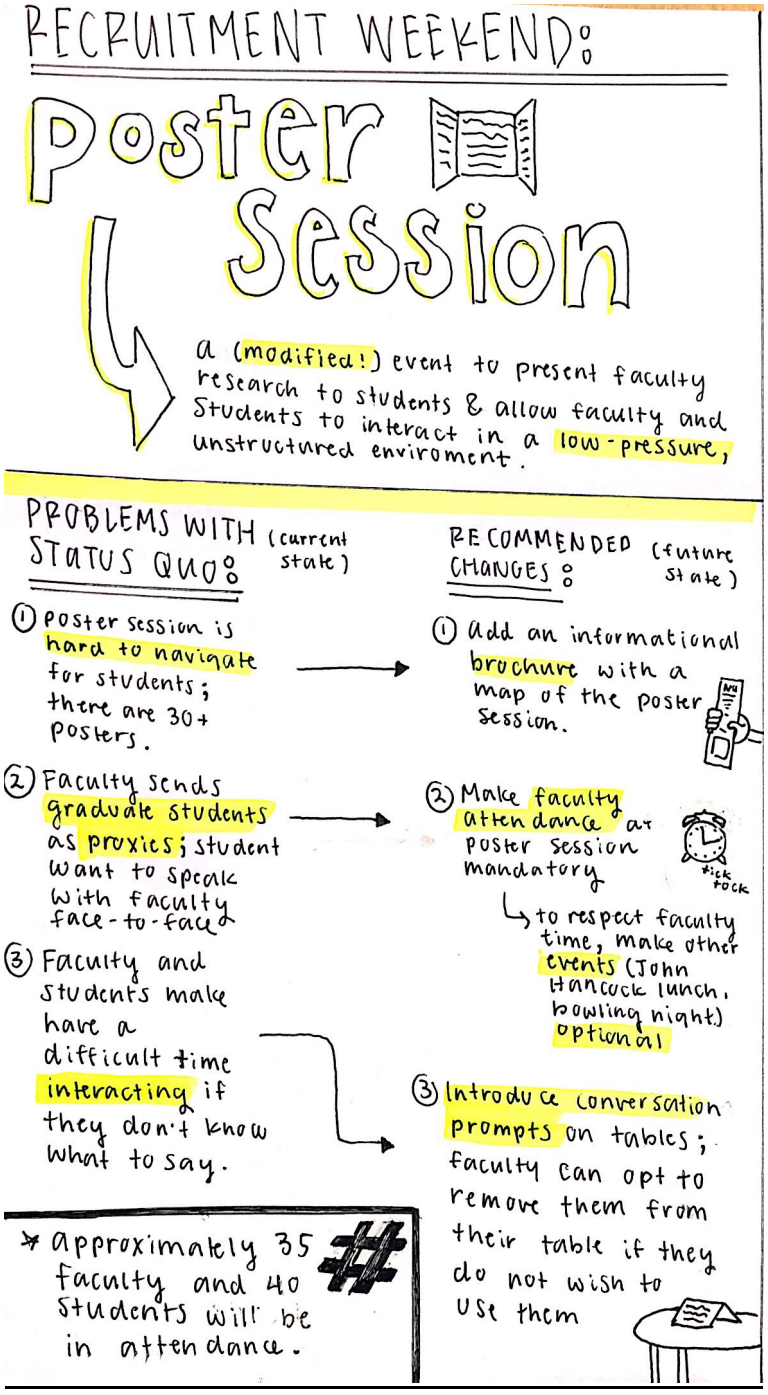
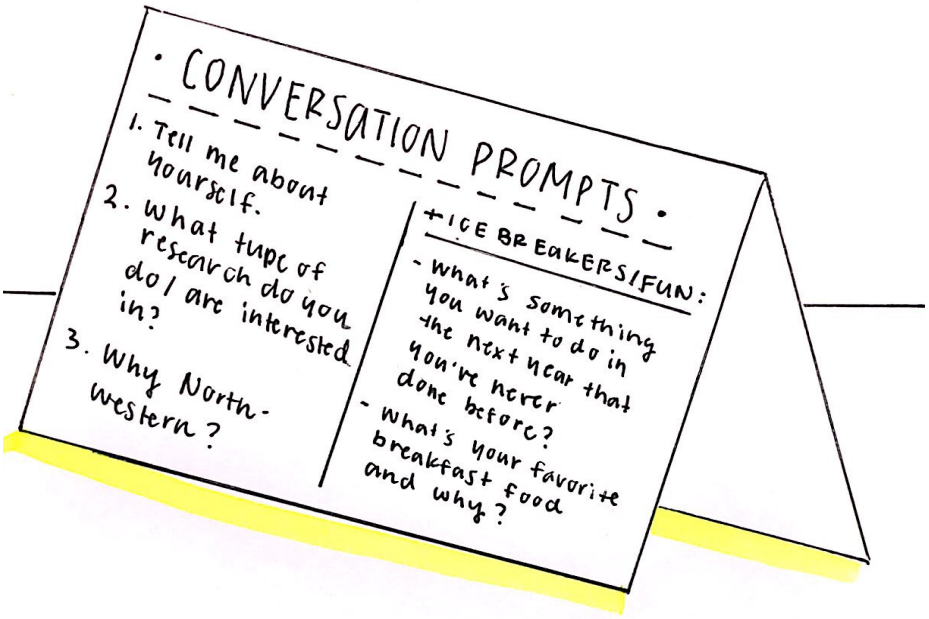


Figure 44: Recommended changes to the Poster Session

Conversation-Inspiring Placards



- Placards will have the same questions printed on both sides.
- Placards will be placed on each table by admin before event.
- Microsoft word layout:

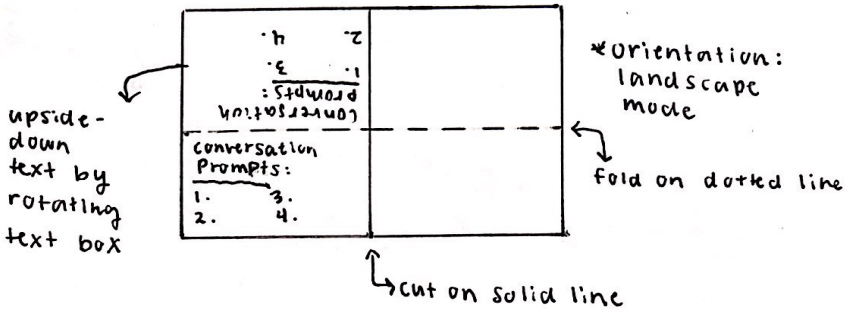


Figure 45: Sample Conversation Prompt

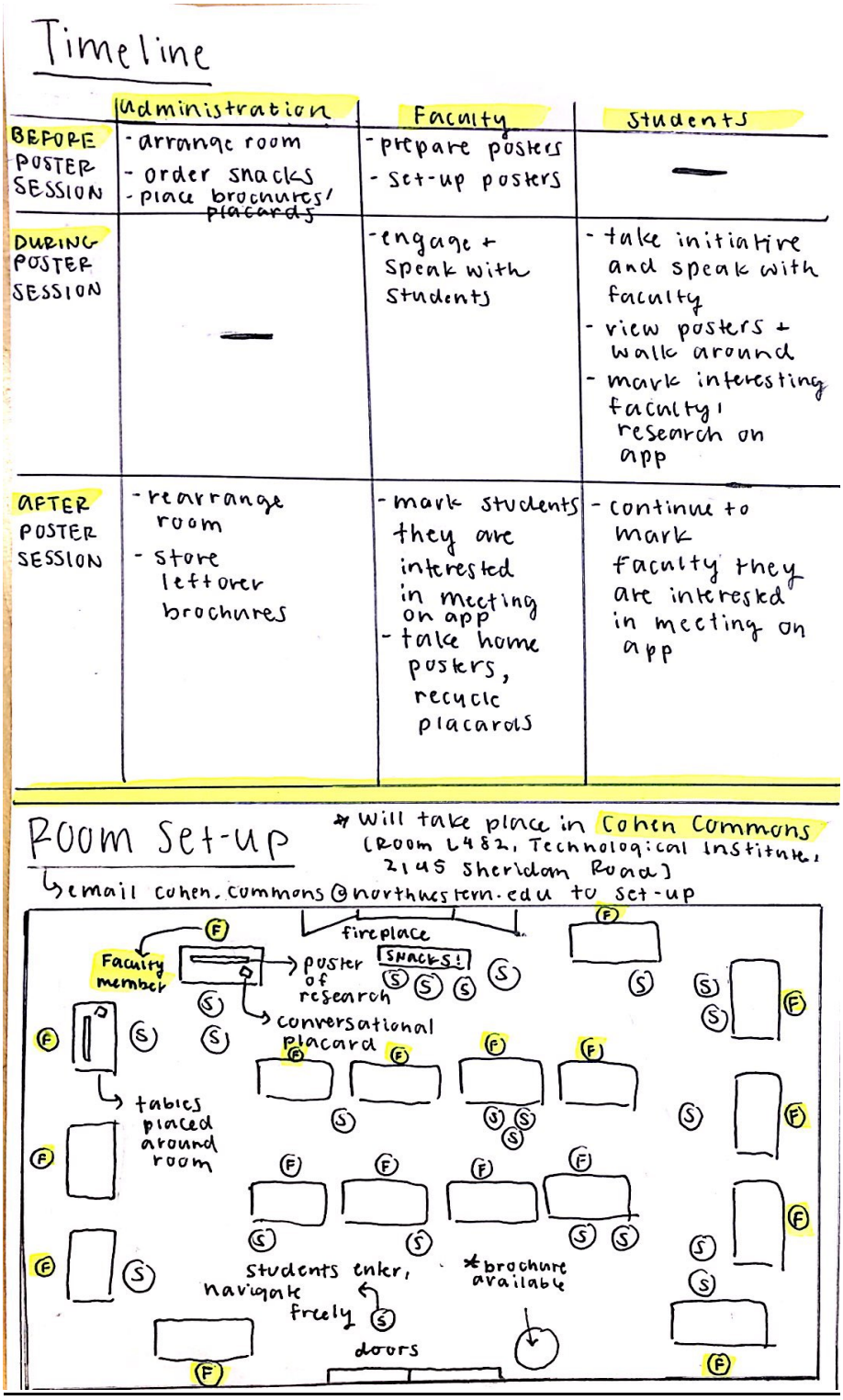


Figure 46: Sample schedule for each user group and session layout

By ensuring mandatory attendance, we drive direct interaction between students and faculty and expose these students to new research that they might find interesting.

APPENDIX J: SPEED NETWORKING PROPOSED DESIGN

We proposed this idea initially as a solution to enable students to speak with professors that they might not get the chance otherwise. However, after reviews from both students and faculty, we decided not to include the deliverable in our final design (see Appendix C: User Testing Report).

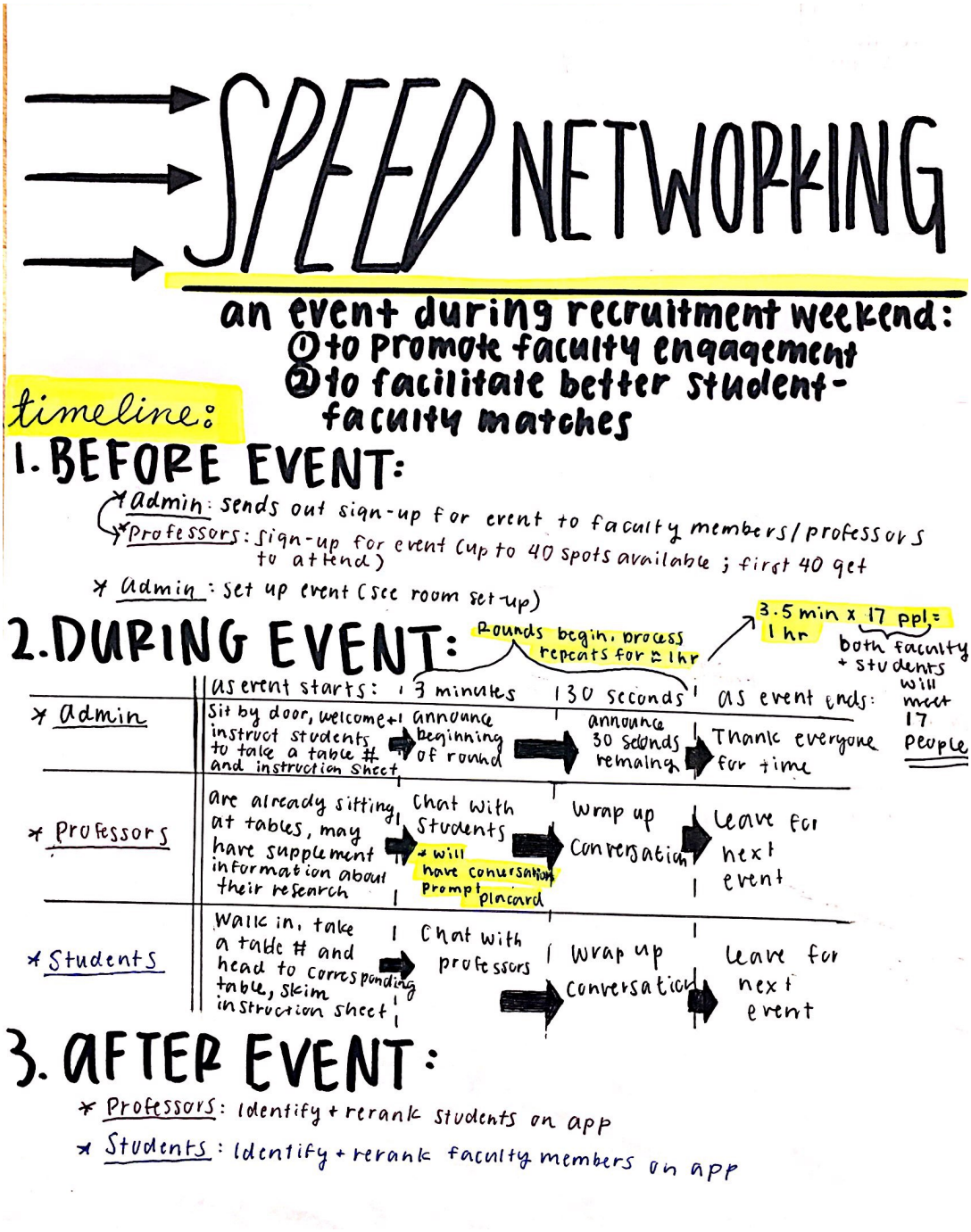


Figure 47: Overall Speed networking plan

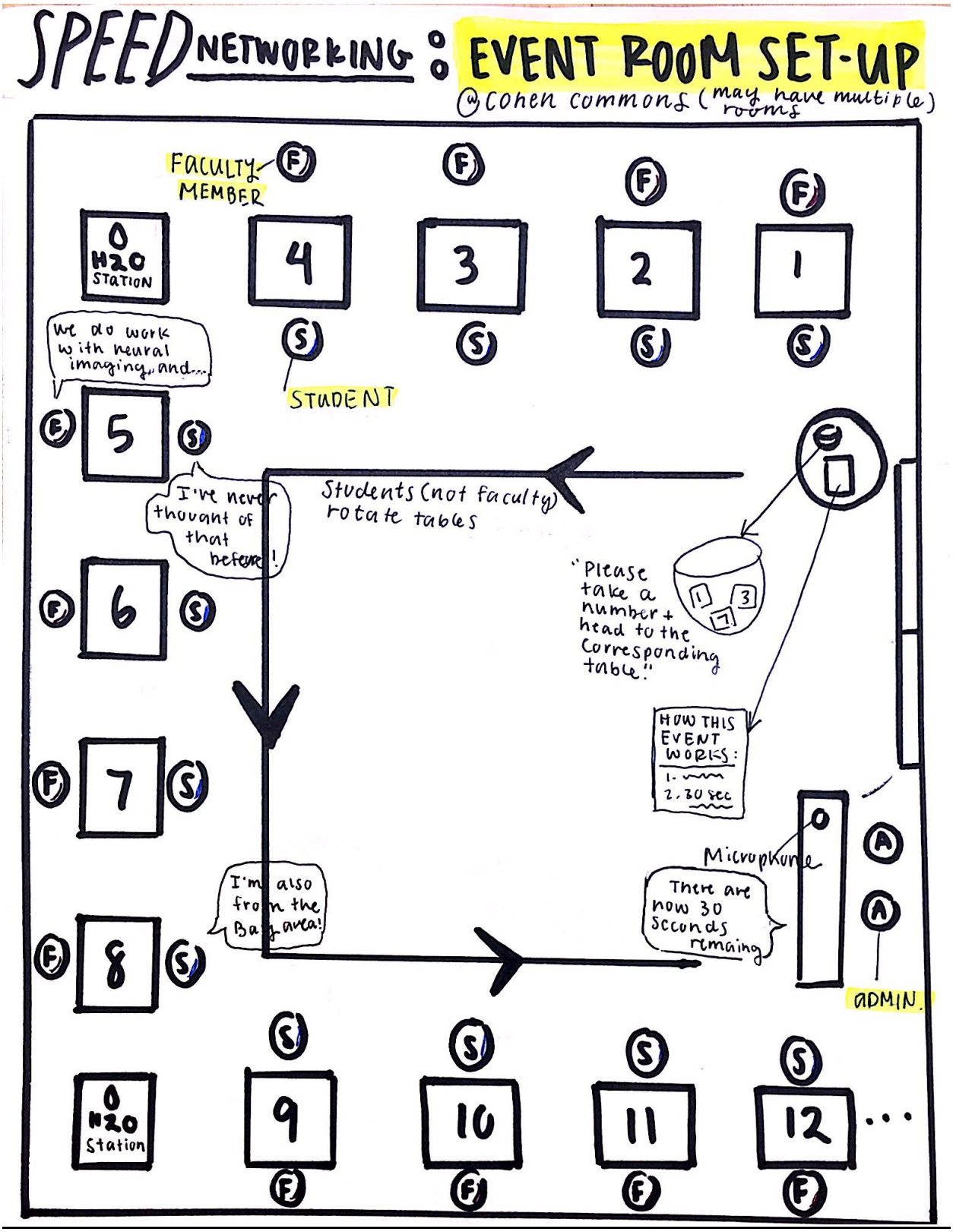


Figure 48: Sample Speed Networking Layout

We realized that mandatory poster attendance would replicate this enhanced engagement to greater effect without overburdening faculty members.

APPENDIX K: VIDEO CHAT PROCESS FLOW

This appendix shows the process for creating follow-up video chats for students with faculty member. This aspect also requires usage of the app.

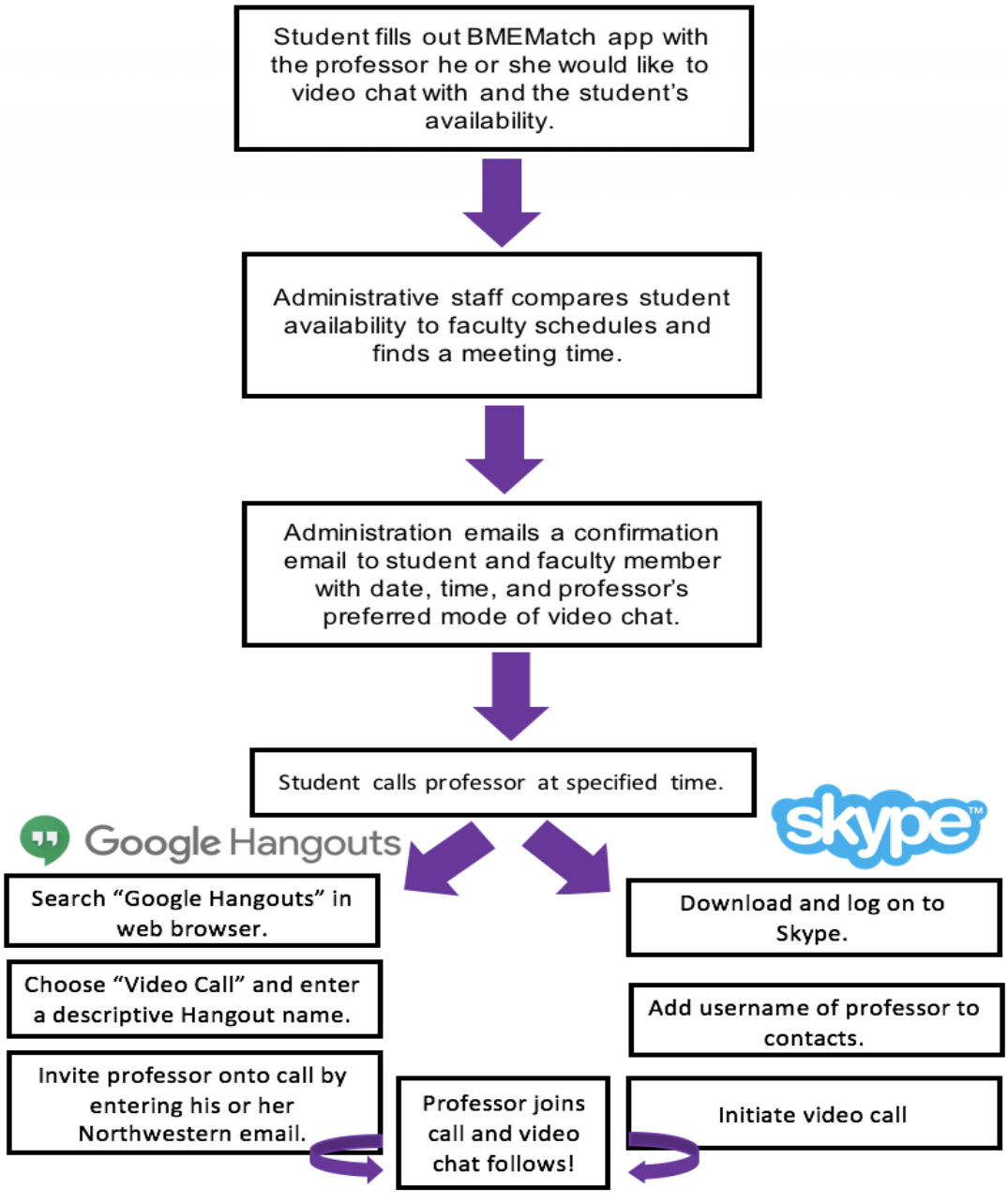


Figure 49: Instructions for the setting up video-chat interviews

Follow-up video chats allow potential students an additional opportunity to bond with faculty members in order to incentivize students to attend Northwestern.

APPENDIX L: LAB INTERNSHIP PROCESS FLOW

The lab internship was suggested as a means to enable students greater flexibility when choosing a lab such that accepted students are able find the best lab pairing possible without committing too much time.This appendix details how to set up the Lab Internship program.

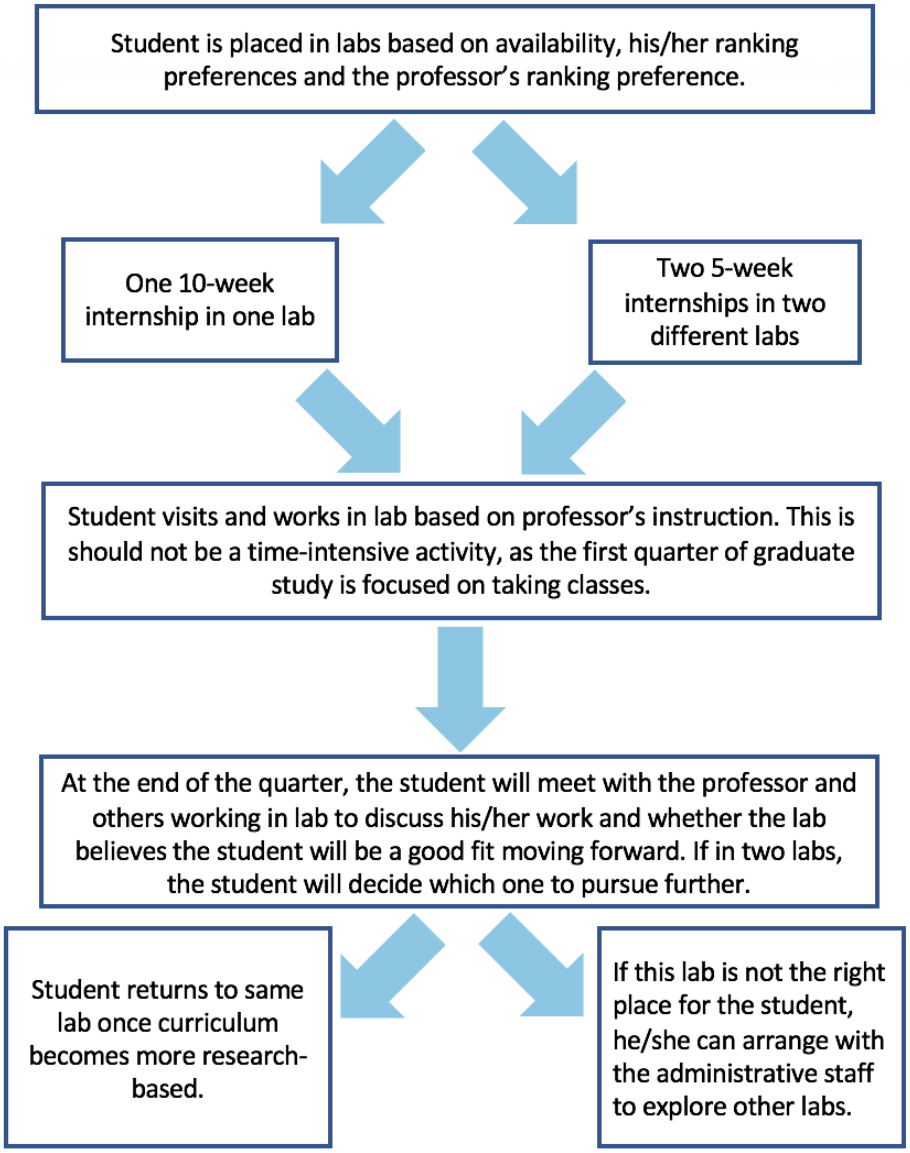


Figure 50: A process flow explaining the Lab Internship Program

Ultimately, granting students the ability to trial test labs allows for students to find labs with interesting work and maximizes both faculty and students' time.

APPENDIX M: RECRUITMENT DATA

This appendix contains data from the 2016-2017 and 2017-2018 recruitment cycles. More specifically, it describes, for each BME subarea, the number of applicants to Northwestern, number of invitees to recruitment weekend, number of attendants at recruitment weekend, number of acceptances offered to students, number of accepted acceptances, and the target number of accepted applicants.

Table 24: 2016-2017 Recruitment Data

	2016-2017					
Admission Pool	**Number of applicants**	**Number of invites**	**Number attended**	**Number of offers**	**Number accepted***	**Target numbers**
Total number	404	76 (19%)	63 (83%)	51 (81%)	24 (47%)	19-25
Imaging	52 (13%)	13 (25%)	10 (77%)	6 (60%)	4 (67%)	4
Bioregen	213 (57%)	38 (18%)	30 (79%)	23 (77%)	13 (57%)	7-15
Neurorehab	131 (32%)	25 (19%)	23 (92%)	22 (96%)	7 (32%)	8-10
Global	4 (1%)	0	0	0	0	0
No specialization	4 (1%)	0	0	0	0	0

Table 25: 2018 Recruitment Data

	2017-2018						
Admission Pool	**Number of applicants**	**Number of invites**	**Number Attended**	**Number of Offers**	**Declines**	**Pending**	**Target numbers**
Total number	420/387	54 (13%)	45 (83%)	44 (81%)	4 (7%)	6 (11%)	19-25
Imaging	41 (10%)	12 (29%)	9 (75%)	9 (75%)	2	1	2-5
Bioregen	170 (40%)	26 (15%)	22 (84%)	24 (93%)	2	0	6-15
Neurorehab	118 (28%)	16 (14%)	14 (88%)	11 (69%)	0	5	4-5
Global	3 (1%)	0	0	0	0	0	0
No specialization	55 (9%)	0	0	0	0	0	0

*The 2017 numbers do not include the 2 MS to Ph.D. transfer students. They did not attend recruitment visit.

**While there were 466 applications for the BME Ph.D. program in 2017, 404 of the applications were first choice applicants, and the remaining 62 applicants chose the BME PhD program as their second choice.

Conclusion

From the data, it is clear that imaging is by far the smallest subarea, but had a high acceptance rate in the 2017-2018 recruitment cycle. Also, it can be seen that approximately 40 (or more specifically, 45 students in the 2018-2019 recruitment cycle) students attend recruitment weekend. In addition, the data reinforces how high the percentage of students attending recruitment weekend accepted to Northwestern is, as well as reflecting the yield rate of about 50%. Finally, the data shows that the 2017-2018 recruitment cycle was successful in obtaining the desired yield numbers and projects that the 2018-2019 recruitment cycle is also on the correct track. The data found in this appendix will be helpful in providing concrete data that will be extremely useful when discussing the specifications of our proposed design process.

APPENDIX N: INSTRUCTIONS FOR ADMINISTRATION IMPLEMENTATION

This appendix focuses on the instructions administration should follow in preparation for and during the recruitment days. Only administration should worry about construction as other user groups will just use the implemented designs as they come. Discussed are the implementation of the app once it is already functional, year to year updating of the brochure, and how setting up video chats should work following recruitment days.

Instructions on App Implementation

At the beginning of each recruitment cycle, during the time when professors are finalizing their lab demands and requirements, administrators should send an email reminding professors to update their profiles by the end of the year to give more time for administrators to follow up with professors who may have not updated their profile. A draft is shown below:

"Dear (Dr./Professor Name),

Hello! We just wanted to remind you that recruitment for next round of PhD students is just around the corner. As such, we would like you to update your information on the "BMEMatch" app if it is not up-to-date by Jan 1st, 201_. If you aren't sure how to update your profile or if you are a new member to our faculty (by the way welcome!), here are instructions below:

1. Search "BMEMatch" in the App Store on your device of choice.
2. Download the free app.
3. Create a username and login.
4. Create your profile by typing a bio about your professional career and lab work. An optional profile picture can also be uploaded.
    a. View a live demo of the app here. This video is from the student's perspective, so your interface will look slightly different with the same functionality except without the video chat button.
5. *Browse through the list of prospective students and read their bios in order to find students whom you would like to meet
(this will be completed after invitations are sent out).
6. *Star the six students you would like to meet during the two-day recruitment visit (this will be completed after invitations are sent out).
7. *After first day of recruitment visit:
    a. Log in to app again and update student selections if it has changed after first-day interactions.

Steps with * by them indicate that the step will be completed at a later date. We will be sending out reminders as recruitment visit draws nearer.

Best,
Maddy & Ian"

As recruitment visit draws nearer and steps 5-7 need to be completed, administrators should send out reminder emails at least two weeks and one week before submissions need to be finished. Steps 5 and 6 will need to be completed one week before the scheduled recruitment visit. Step 7 will need to be completed two days after the recruitment visit is over.

The following is a draft of an email that administrators can send out to applicants invited to the recruitment visit two weeks prior to the actual visit. Additionally, this email should be sent after the official invitation is sent and will be noted in the official invitation email:

"Dear (Student Name),

Congratulations again on being invited to the official BME recruitment visit! As you may have saw in your invitation, we would like you to utilize our BME recruitment app to handle your interview preferences during the visit. Here are the steps for you to complete the app:

1. Search "BMEMatch" in the App Store on your device of choice.
2. Download the free app.
3. Create a username and login.
4. Create your profile by typing a bio about your academic and professional career, as well as interests in research and any other information you see fit. Faculty will read these bios as they make their preferences for meetings with students. An optional profile picture can also be uploaded.
    a. View a live demo of the app here.
5. Browse through the list of BME professors and read their bios and lab descriptions.
6. Star the six professors that you would like to meet during your recruitment visit to Northwestern.
7. After first day of recruitment visit:
    a. Log in to app again and update professor selections if it has changed since the poster session and first-day interactions with faculty.
8. After recruitment weekend:
    a. If there is a professor whom you were not able to meet with, fill out the video chat page on the BMEMatch app with the professor's name and your availability. Administration will coordinate the date and times based on the faculty member's schedule and send a confirmation email.

We will be sending a reminder after the first day to log back into the app and update professor selections if you found a new professor that you would like to speak with!

Sincerely,
Maddie & Ian”

Students should be given a week deadline to create a profile and rank professors. If invitations can be sent out two weeks before recruitment visit, then the deadline for the profile should be made one week after the invitation is sent out. Step 8 should be completed also within two days of the ending of the recruitment visit.

After rankings from both students and professors are given, administrators will use these to create official schedules for each applicant.

Instructions on Brochure Construction

Once the names of all of the professors participating in recruitment days is finalized, a meeting should be held so that professors can submit updated bios of their research if they need to. Bios should be inputted through the app. The bio should have their name, photo, area of research, a brief description of their research, and the names of their current graduate students. Follow-up emails should be sent out for professors that either don’t attend the meeting or don’t finish their bios every week until the poster session, in hopes that by a week before recruitment days, all professor bios are up to date. The bios will be the same as those on the app, so it is important that all bios are completed with ample time.

The itinerary should be updated to its most current version as well as the year on the front cover. Besides that, a map of Tech with all of the professor’s rooms label should be placed into the brochure. From year to year, the brochure will have relatively the same underlying structure. The order of the brochure in terms of content should be as follows:

- Cover Sheet
- Itinerary
- Map of the floors of the Technological Institute
- Layout of the poster session
- Description of each of the three research areas to pursue
- Professors’ research biographies

Overall aesthetic design can vary from year to year.

Instructions for Construction of Video Chat

The videochat is a necessary tool to help develop relationships between professors and potential students. Like the main interviews, the app will also be used in scheduling the follow-up interviews. Once the preferences for follow-up skype interviews are given, administrators will work as such:

Administrators will email the students and professors with official confirmations for both the time and interview video-chat software, and they can follow the template below.

"Dear [student or professor name],

You are scheduled to participate in a video chat with [professor or student name] on (insert date here) at (insert time here) for Northwestern University Graduate Program. Here are instructions for using each video chat software.

Sincerely,
Maddie & Ian"

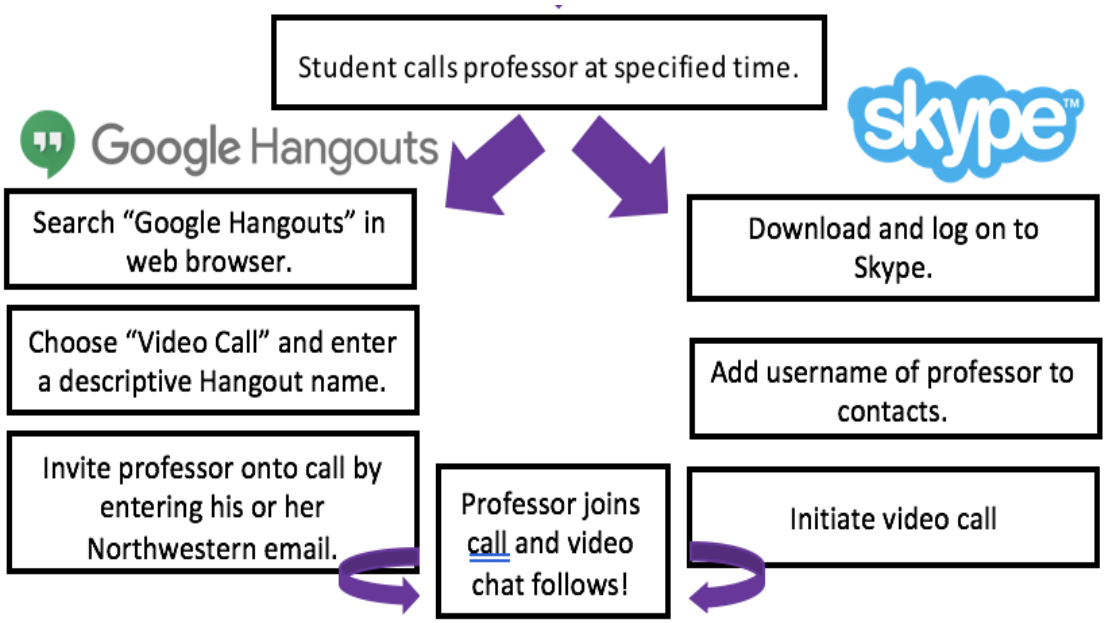


Figure 51: Administrators can also send this portion of the graphic to applicants as basic instructions using both video chat devices (not part of email).

APPENDIX O: INSTRUCTIONS FOR USE OF APP

Introduction

This appendix explains how students and faculty can access the BMEmatch app and how to use it throughout the recruitment process. The app ensures better matching between students and faculty labs, as well helps coordinate follow-up video chats.

Students

1. Search “BMEmatch” in the App Store on your device of choice.
2. Download the free app.
3. Create a username and login (see Figure 52).

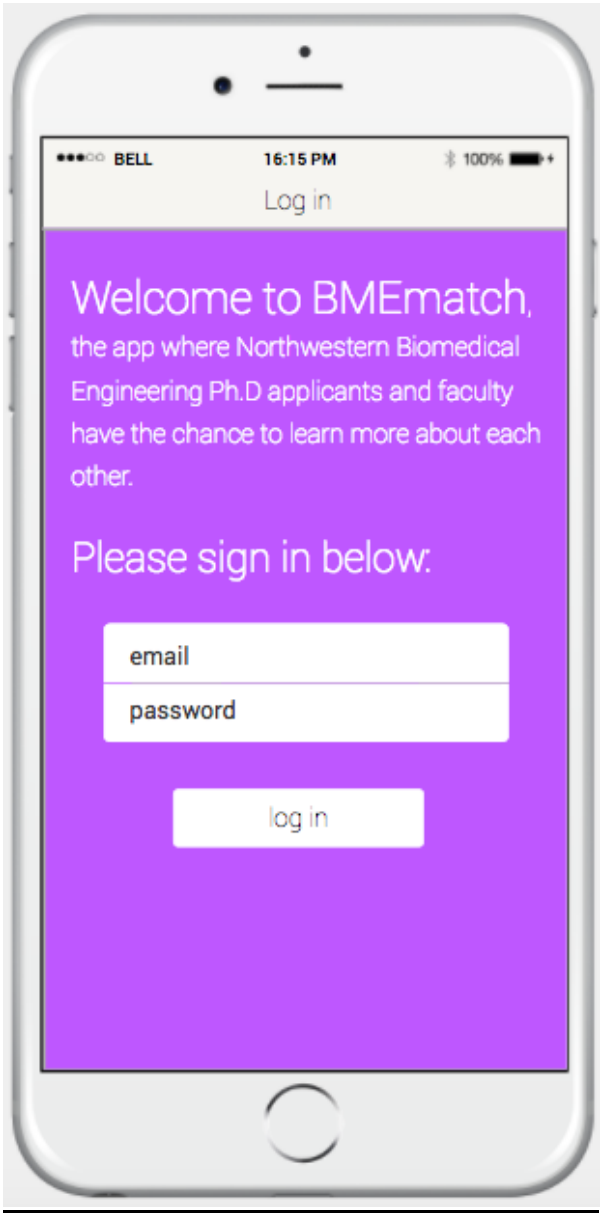


Figure 52: Login Page

4. Create your profile by typing a bio about your academic and professional career, as well as interests in research and any other information you see fit (see Figure 53). Faculty will read these bios as they make their preferences for meetings with students. An optional profile picture can also be uploaded.
    a. View a live demo of the app here.

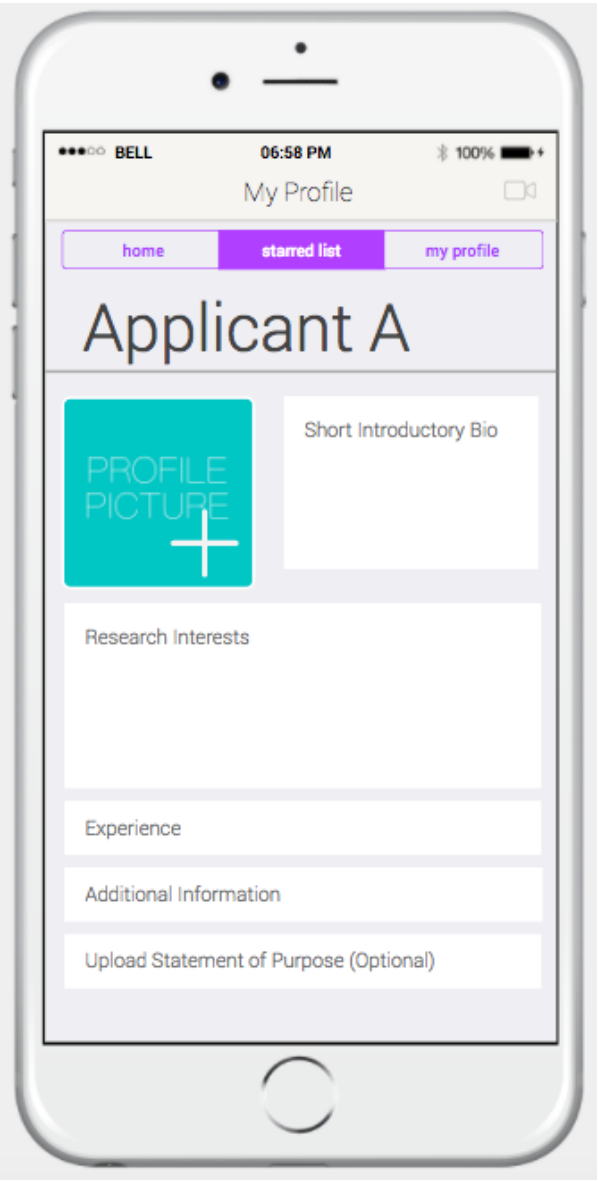


Figure 53: Applicant Profile Page

5. Browse through the list of BME professors and read their bios and lab descriptions (see Figure 54).

6. Star the six professors that you would like to meet during your recruitment visit to Northwestern (see Figure 54).

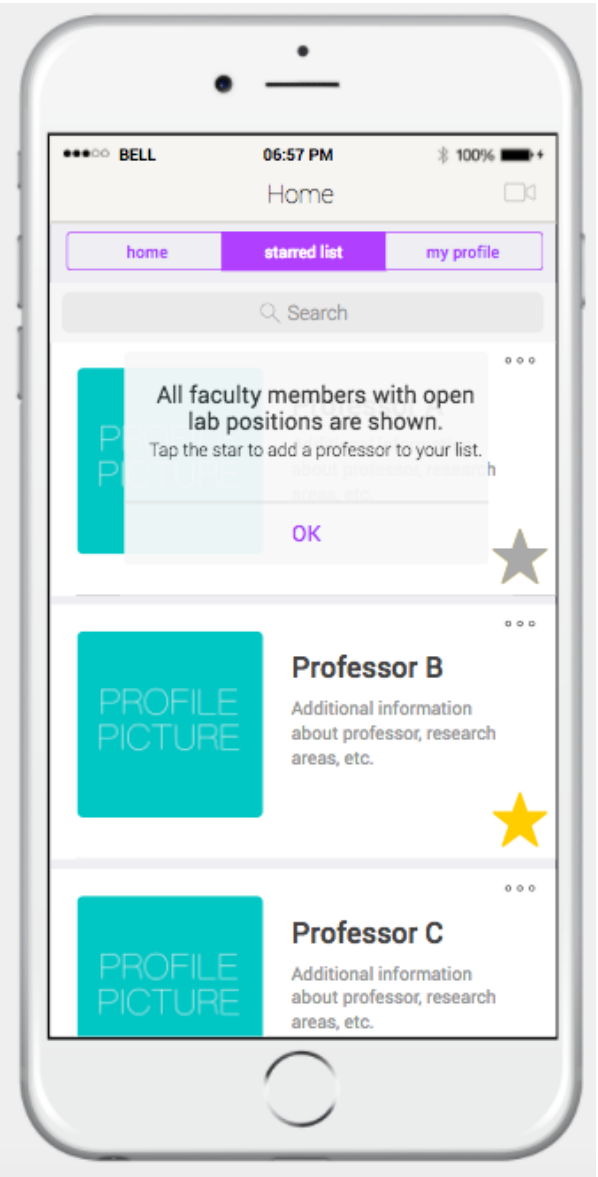


Figure 54: List of Faculty

7. Visit the “starred list” page, where you can drag and drop professors to reorder them based on your preference for meeting the professor (see Figure 55). This will be taken into consideration while arranging meetings during recruitment weekend.

8. After first day of recruitment visit:
    a. Log in to app again and update professor selections if it has changed since the poster session and first-day interactions with faculty.

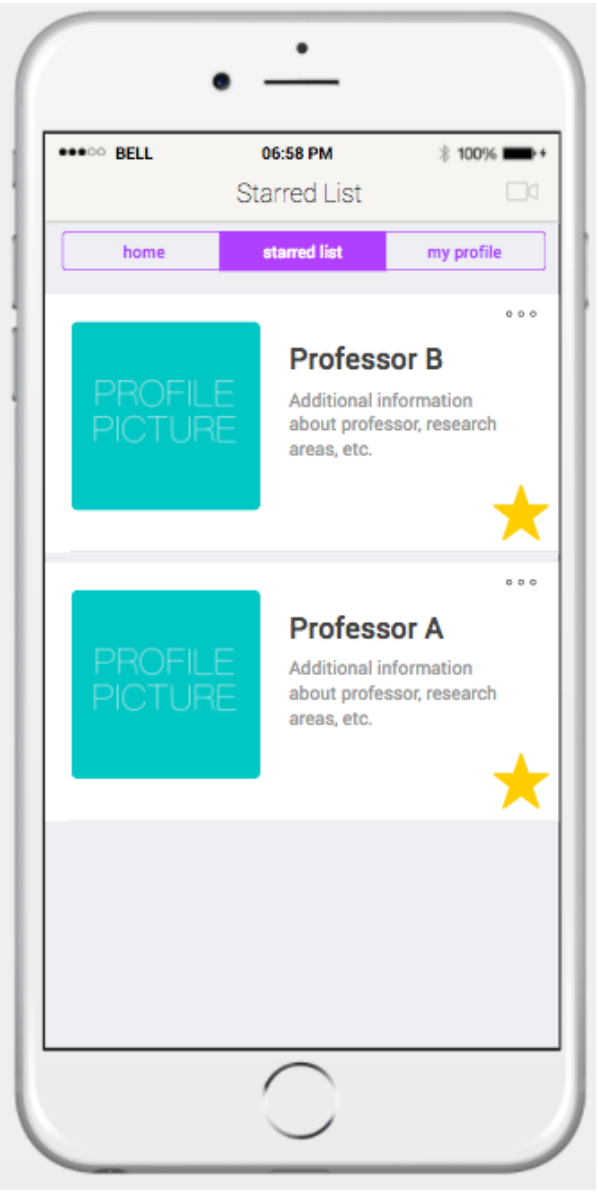


Figure 55: Starred List of Faculty

9. After recruitment weekend:
    a. If there is a professor whom you were not able to meet with, click on the video icon in the top right corner to fill out the video chat page on the BMEmatch app with the professor's name and your availability (see Figure 56). Administration will coordinate the date and times based on the faculty member's schedule and send a confirmation email.

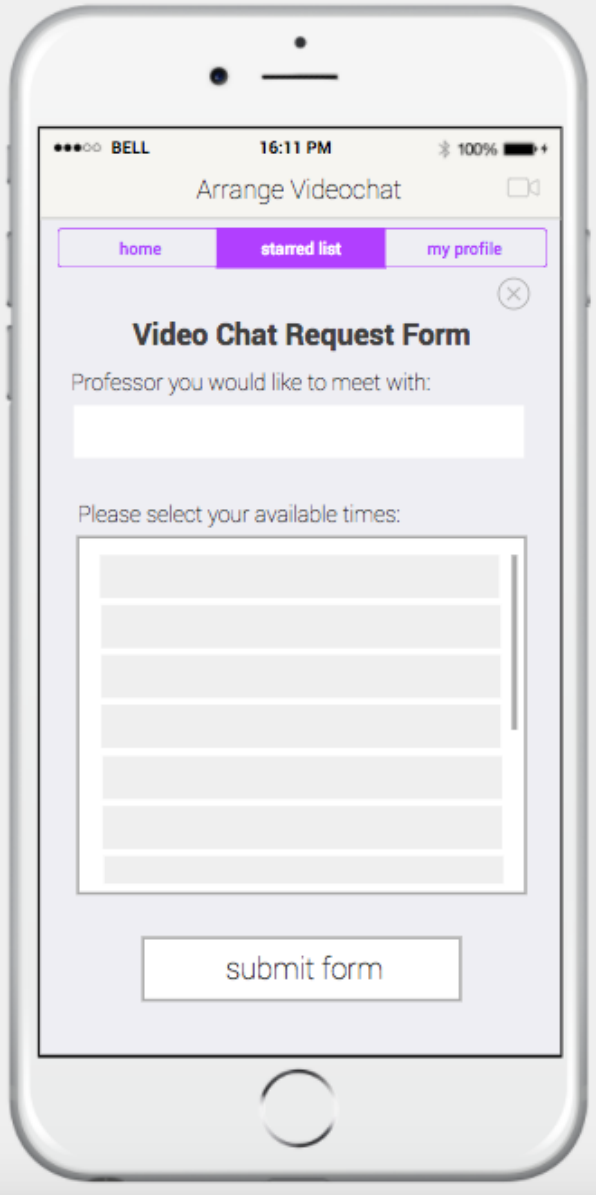


Figure 56: Video Chat Request Form

Faculty

1. Search “BMEmatch” in the App Store on your device of choice.

2. Download the free app.

3. Create a username and login (see Figure 57).

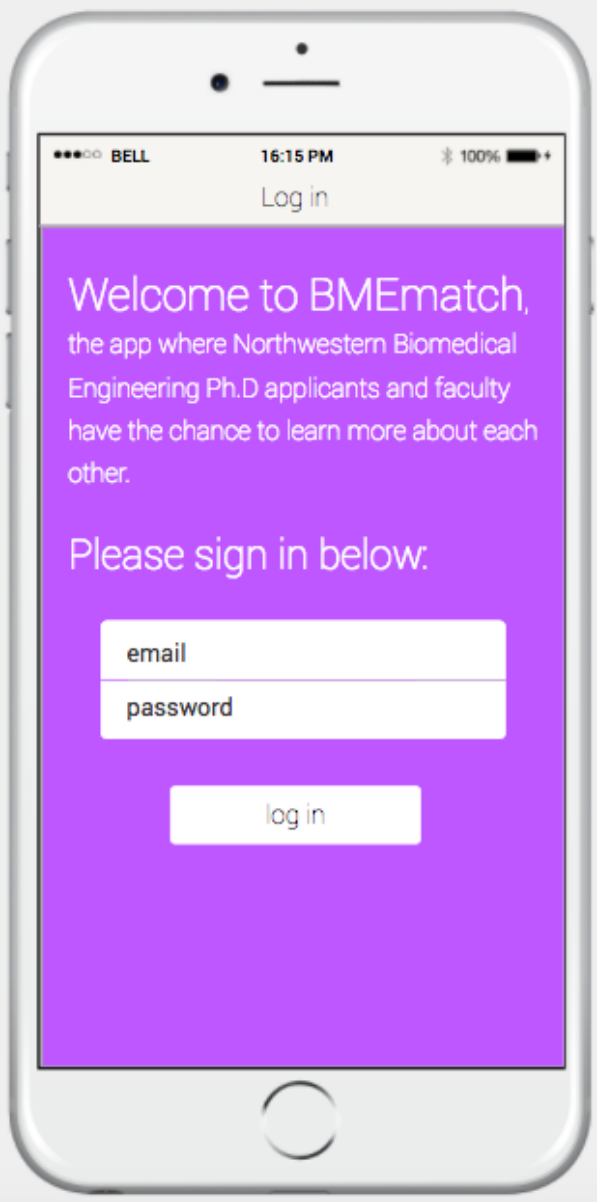


Figure 58: Faculty Profile Page

4. Create your profile by typing a bio about your professional career and lab work (see Figure 58). Students will read these bios as they make their preferences for meetings with faculty members. An optional profile picture can also be uploaded .
    a. View a live demo of the app here. This video is from the student's perspective, so your interface will look slightly different; it has the same functionality except without the video chat button.

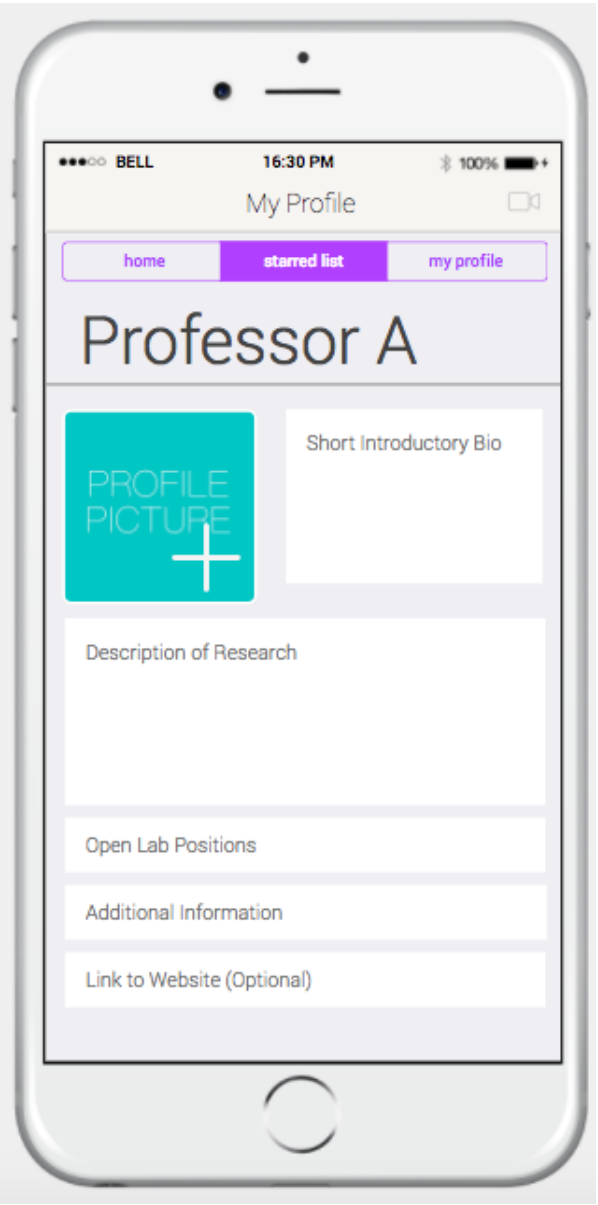


Figure 58: Faculty Profile Page

5. Browse through the list of prospective students and read their bios in order to find students whom you would like to meet (see Figure 59).

6. Star up to six students you would like to meet during the two-day recruitment visit (see Figure 59).

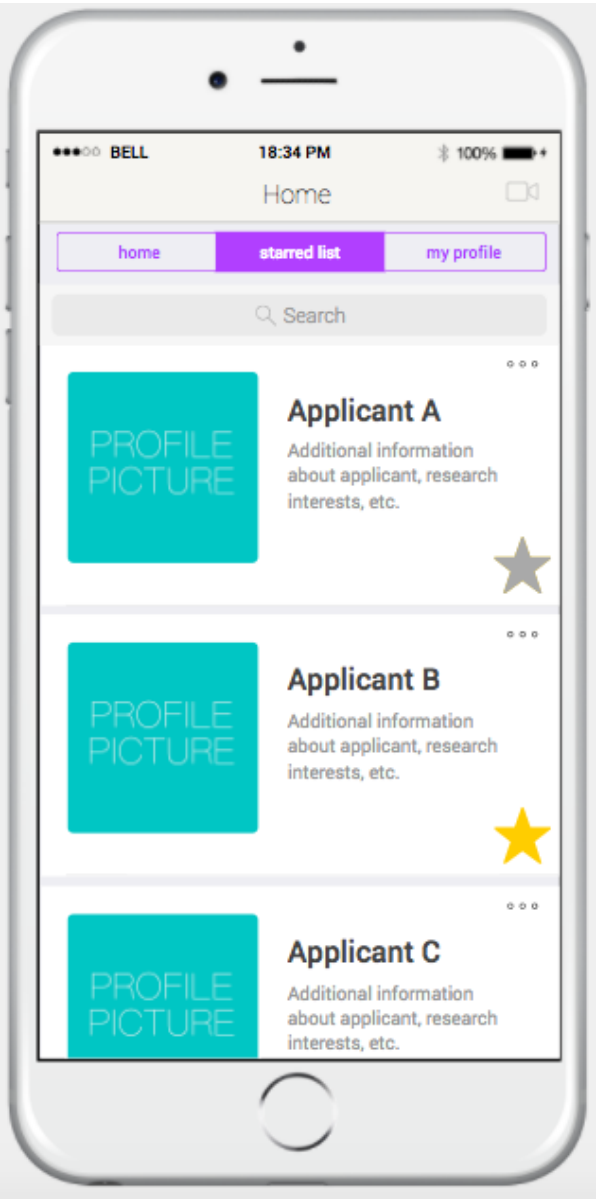


Figure 59: List of Applicants

7. Visit the “starred list” page, where you can drag and drop applicants to reorder them based on your preference for meeting the applicant (see Figure 60). This will be taken into consideration while arranging meetings during recruitment weekend.

8. After first day of recruitment visit:
    a. Log in to app again and update student selections if it has changed after first-day interactions.

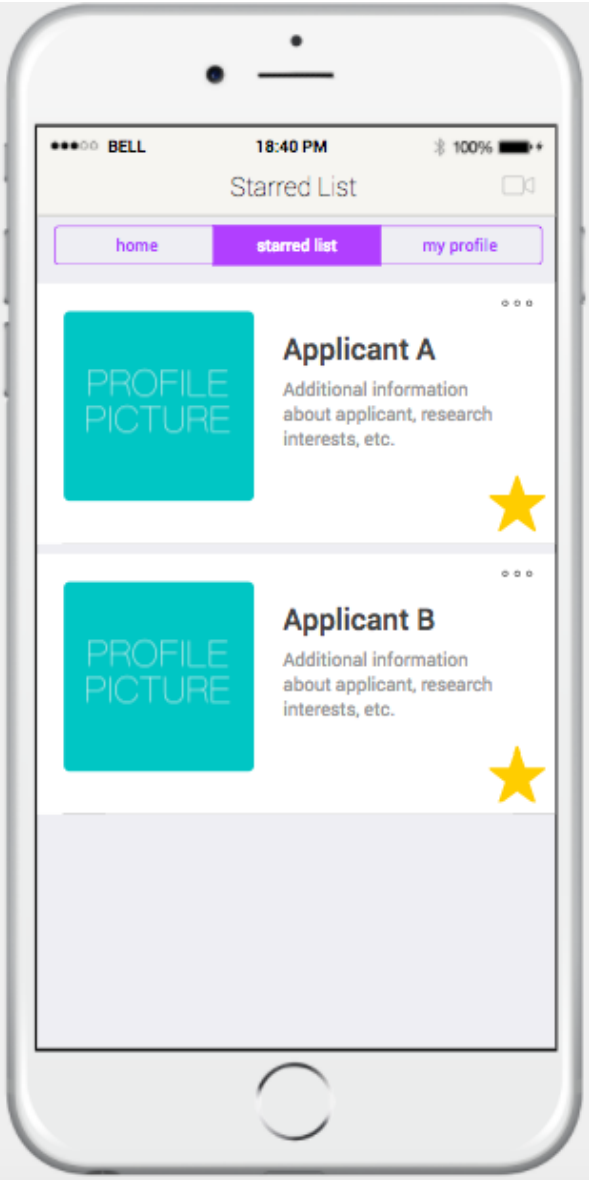


Figure 60: Starred List of Applicants