

TritonTh!nk

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COGS 102C: *Cognitive Design Studio*

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University of California, San Diego

Spring 2013

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I. Introduction

Background

When choosing a focus for our team, we sought an interface that we would be able to find actual users for, and that we could reasonably design in our eight week timeframe. Some of our early options included a GPS interface or an interactive calendar, but those were dismissed as too difficult and too boring, respectively. We wound up deciding to redesign the TritonLink portion of the UCSD mobile app. Not only was this something that we were all personally vested in as actual users who stand to benefit from a redesign, but there were literally thousands of users around us that we could learn from and design for. We also felt that this would be a unique enough topic to tackle, as the prevalence of smartphones is relatively recent and we were confident that we would be the only group trying to redesign TritonLink.

Since the University of California, San Diego is one of the largest universities in California, the developers originally wanted to create a way to unify the student population by providing access to various campus resources easily through a mobile phone application, or mobile app. With this app currently available on both the iOS and Android platforms, every UCSD student with a smartphone has free access to it. However, although the app is easily accessible, many UCSD students do not actively use it. According to our research, the average UCSD student spent approximately 30 seconds on the TritonLink portion of the app. We also discovered that many students found the app to be too frustrating to navigate and lacking in functionality, so they ended up quickly deleting the app from their mobile devices. These were issues that our group wanted to address in our redesign project.

Our group, TritonTh!nk, consists of seven UCSD undergraduates with various specializations, all interested in designing a TritonLink app that meets our users' needs. After every group member navigated through the current UCSD mobile app, we all agreed that it is not user-friendly. The layout is unintuitive, and navigation involves too much pinching, zooming, and scrolling. Although the app includes access to a variety of campus resources like Athletics, Campus Shuttles, and Libraries, the TritonLink section of the UCSD app stood out to our group as having the most room for improvement.

All UCSD students use TritonLink to gain access to a number of campus resources, including academic, financial, and personal tools. After logging in to the TritonLink section of the UCSD

mobile app, the user is taken to a single, scrolling page that displays only the user's name, major/minor(s), account balance, hold status, TRIP enrollment status, and their class schedule, which is displayed as a list of classes. No other functions that students would likely perform on a daily basis are provided, like being able to actually pay their balance, signing up for classes, checking their Degree Audit, or asking questions in the Virtual Advising Center.

Since the current app does not support the TritonLink functions that UCSD students use, we found that many users needed to switch to using full-site TritonLink in their mobile web browsers to actually complete their tasks. This problem was the driving force and inspiration behind what our group wanted to address. At first, our group wanted to redesign the entire UCSD mobile app, but since different campus departments maintain each subsection of information, we knew it was not feasible to redesign the whole app in our eight week timeframe. We then switched gears and decided to re-focus on redesigning just the TritonLink portion of the app. In eight weeks, we created prototypes for a stand-alone TritonLink app for Android mobile phone users that is tailored to actual student needs, includes fully-functional access to TritonLink's most-used features, and features an intuitive layout that is easy to use.

Contextual Design

Our group used the Rapid Contextual Design method to achieve our goal of a user-centered design. This design method, which includes field interviews, interpretation sessions, affinity diagram building, personas, visioning, storyboarding, along with its concepts and techniques were thoroughly laid out in the book, *Rapid Contextual Design*, by authors Karen Holtzblatt, Jessamyn Burns Wendell, and Shelley Wood. Our group was able to take our project through the entire Contextual Design process, focusing solely on the user, and with the guidance of Professor Hollan and our Instructional Assistant, Joanna Huang, we were able to maximize our eight weeks together to develop prototypes of our new mobile app. Though the end result was worthwhile and satisfying, the process was just as rewarding, providing insight on mobile app development and design.

II. Methods

Summary

The methodology of our project focused primarily around the principles of *Rapid Contextual Design*. Throughout this process, we captured and interpreted our data by conducting contextual interviews, holding interpretation sessions, creating an affinity diagram, visioning, and storyboarding.

Communication

In order for our group to be productive and efficient, it was imperative that we had strong communication. Out of the immense number of free apps available on the market, our team chose a convenient and simple tool called GroupMe, an app that allows every member of a group to receive shared text messages, providing quick and constant communication amongst the group. Gmail was another tool we used, but its main function was to communicate information that did not require immediate attention. Google Docs was our most important and most useful tool as it allowed us to share data, documents, and relevant media to all members of the group. Although Piazza was available for us to use, we mostly used it to share progress updates.

The Interviewing Process

Over the course of eight weeks, we conducted a total of 41 interviews within 5 rounds. Each round was designed and structured based on data collected from previous rounds. In order to protect our users' privacy, observational consent forms were signed. Interviews were conducted in the users' natural environment using the Master/Apprentice model. In this model, the user is the expert and the interviewer is the learner/listener. By using this approach, we were able to observe their interactions with the mobile app and learn their behaviors. During our interviews, we also asked our users questions about the process to gather more data and insights.

Interview Rounds 1 & 2: Who We Interviewed & Why

Initially, we only focused on the general UCSD undergraduate population; however, after conducting our first round of interviews, we chose to refocus our user base. In our first round of interviews, we gathered demographic information from current UCSD undergraduates by asking survey-like questions. We had designed this initial interview without taking into account the behaviors of our users. The aim of this interview was to collect information regarding TritonLink tools/services that current undergraduates used frequently. We each conducted 2-3 interviews and collected a total of

16 interviews by the end of the round. Because the initial interview was survey-like, we couldn't get a good grasp of our user-base, so in our second round of interviews, we conducted contextual interviews. From the data collected in these two rounds, we formed two core user groups: continuing undergraduates and graduating seniors. These two groups had specific needs from TritonLink; for instance, continuing students need to use Class Planner and WebReg to register for classes for the next quarter, while graduating seniors want to check their Degree Audit and use the Virtual Advising Center to make sure they have satisfied their graduation requirements.

Interview Rounds 3, 4, and 5

After narrowing down our user base to current undergraduates and graduating seniors, we were able to design our interviews to acquire data relevant these groups. During our third round of interviews, we created a contextual interview that focused on the comparative analysis of other apps. We asked users to perform tasks with apps they frequently used and observed as they interacted with them. This allowed us to view their behavior as they interacted with apps like iCal and Facebook. We later incorporated data from these comparisons into the design of our prototypes.

After completing our first three rounds of interviews, we were eager to start designing and developed a movable paper "token"-based interview system to gather information from our users about basic app layout. We were particularly interested in what they would like to see on the redesigned app's home screen. Our group planned to provide users with half-sheets of paper to simulate a mobile device's screen, and we crafted a set of "tokens" that could be arranged on the simulated screens to represent information displays or links to TritonLink services. While we ultimately chose to not bring this interview system to our users, the tokens were helpful in one of our group meetings; we repurposed them to help our group decide what features and information to put on the redesigned app's home screen. Our group's design decisions from this activity influenced the app's first paper prototypes.

In our final round, we created paper prototypes based on our user data and conducted paper prototype interviews. We asked users to interact with our prototype as if it were an actual app and observed as they performed specific tasks. See the "Prototypes" section for more information on this process.

In addition to interviewing our users, we also had the opportunity to start a dialogue with the director of the campus web office. Through our interview with the developer, we were able to find

out why the app was created the way it was, how it was created, and issues he had while creating the app. He also provided us with access to TritonLink's Google Analytics, which provides valuable information during the prototype stage.

Interpretation Sessions

After each round of interviews, the group held a meeting within 48 hours at which all members participated in a process called an interpretation session. In contextual design, conducting an interpretation session is a way to interpret and analyze user data. We conducted a total of 4 interpretations in the span of 8 weeks. During these sessions, each member took turns discussing the data they collected, while one person in the group transcribed the data into individual notes in a Google Doc. At these sessions, we were able to discover the main issues users had with the system and begin to formulate design ideas based on the data.

Affinity Diagram

We started constructing our affinity diagram after our third round of interviews. Using the individual notes we compiled during the interpretation sessions, we transferred each note onto a yellow Post-it® note. These notes detailed the opinions, design ideas, and problems our users had when interacting with the mobile app and full-site TritonLink. After putting up all of our yellow notes, we started seeing the main issues and insights users encountered and began categorizing them in a hierarchical structure with blue Post-it® notes, pink Post-it® notes, and green Post-it® notes, which represented the broadest category. By doing this, we were able to see the big picture, which helped immensely when we needed to look back at our data for design ideas.

III. Results

Google Analytics

We were able to speak to the director of the Campus Web Office, Brett Pollack. He provided one of our group members with access to the Google Analytics data for the UCSD mobile app, which allowed us to see user usage patterns. From this analytics data we found that Apple devices had a large (~56%) share of the market, but Android usage was increasing (16% to 22% from 2010 to 2011). We also found that the majority of uses of the mobile app were shorter than 1 minute in duration. In addition, he explained why certain design choices were made when the current app was designed. For example, the current app cannot save student login information because this would contradict a campus web security standard, and all TritonLink services must cease from 12am to 7am because the campus mainframe processes data and then shuts down. Hopefully future instances of the app will be able to address these user complaints.

Interview Data

We also conducted three rounds of interviews. In the first round of interviews we released a survey-style questionnaire, while the final two rounds of interviews were focused on streamlining or supporting frequent user activities. The final interview round also investigated what features users liked in other mobile and non-mobile sites.

In our first round of interviews, we found that many users were *aware* of the app's existence, but few were impressed by its design and few used it to conduct their business. From this survey, we found that users generally used the mobile app to perform tasks like checking the locations and times of their courses, but thought the design and flow of the app could be improved. Users also wanted better synergy with related services like ucsd bus.com and map visualization.

In rounds 2 and 3 of our interviews, we focused on observing user tasks and understanding their reasoning as they interacted with the app. We also closely noted what troubles users would encounter when they attempted to use the current app. One common theme was that users had to switch to the non-mobile site while trying to do almost any task. When users attempted to view these non-mobile pages, the information could be distorted or could require too much scrolling, as TritonLink's full-site pages aren't optimized for mobile viewing. In these interviews users also reported that the current app required too much gesturing (scrolling, pinching, and zooming) to navigate quickly. They also made complaints about the app's layout and aesthetics, saying it was

drab and ugly.

We encountered problems of ecological validity when conducting these contextual interviews; it was not possible to observe students accessing services like WebReg and UCSD Billing in a natural setting. Given that we were interviewing in the middle of the quarter and we had no control over our users' enrollment times, so we had to prompt users to access these services.

In round 3 of our interviews, we also investigated what design choices our users approved of in their other apps. We collected a table of many mobile services that users approved of; two of the most common services were Google Maps and the Facebook mobile app. Users appreciated the simplicity of the Google Maps app, as well as its ability to automatically extract information about their location and make inferences, like providing predictive text when searching for a nearby restaurant. Users also explained that they liked the Facebook app's navigation style, which makes use of a navigation drawer; this is addressed in more detail in the "Prototypes" section.

Modeling of Users

We gathered these user complaints in our affinity diagram, and our blue (mid-level) headings identified specific problems with mobile TritonLink's design: there was too much scrolling, the app was not simple, the app's appearance was boring, the app didn't provide a good display of the student's schedule, the app didn't allow for direct access to WebReg, it was difficult to pay one's balance while using the app, and the app didn't allow users to access various other UCSD services.

We consolidated our users into three personas: a new student, a continuing student, and a graduating student. This allowed us to enact design changes that specifically addressed issues that these user groups had. Our new student, for example, wanted to check his schedule and his course locations frequently, while our continuing student wanted to use the app to register for classes while on the go, as she has a job and does not always have time to set up a laptop connection to handle time-sensitive arrangements like course registration and bill payment. Our graduating senior wanted to use the Virtual Advising Center (VAC) to request information about his graduation status from his advisors, and also wanted to check that he had no holds against his account.

We generated storyboards and visions to embody the sorts of tasks that these three personas would engage in: checking graduation information and VAC updates, checking one's schedule, and paying

for bills online. We also considered constructing a storyboard for a user accessing WebReg, but at the time we were unsure how we were going to tackle this onerous problem. Eventually, we did develop a prototype for this interface: for more information, please see the “Prototypes” section.

IV. Analysis

As previously mentioned, grouping the yellow Post-it® notes together on our affinity wall led to the emergence of some larger themes, which we eventually codified by writing them down as blue Post-it® notes. These notes, as well as the higher-level pink Post-it® notes that we later created, ultimately formed the outline of user needs that we kept in mind when designing our app.

From some of our yellow notes, we came up with two blue Post-it® notes which read, *“I don’t like having to scroll/pinch + zoom”* and *“The app requires too much gesturing to navigate.”* Specifically, having to scroll through an app and zoom by pinching is frustrating for users and is a sure sign that the current app is not optimized for use on a mobile device. The conclusion we drew from these two blue notes was that one of our priorities when designing our prototype should be making the app as easy and efficient to use as possible – specifically, the user should never have to pinch and zoom, and excess scrolling and clicking should be minimized.

Related to the above, two other blue affinity notes we derived from the data were *“I want a simpler app”* and *“The non-mobile TritonLink is easier to use presently.”* Because the existing mobile TritonLink lacks features and functionality, a user would have to use the link to the full TritonLink site (provided at the very bottom of the app’s page) in order to accomplish almost all common TritonLink tasks. However, because the full TritonLink site – as it’s currently formatted – is difficult and frustrating to use on the small screen of a mobile device, interviewees stated that they often preferred to use the TritonLink site on their computer because it’s simply much easier. From this information, our group concluded that ideally, our final app should be as easy and simple to use as the TritonLink website is on a computer.

Another blue note we wrote said, *“I don’t like mobile TritonLink’s appearance.”* Simply put, users thought that the current mobile TritonLink either looks boring, is not aesthetically pleasing, or both. Naturally, this meant that once we got to the point of designing our app’s appearance, we wanted it to be visually appealing.

Three more blue notes dealt with the class schedule feature in particular. The first one read, “*I frequently use TritonLink to view my schedule.*” Because of how often this was brought up in the large number of yellow affinity notes grouped below it, this was a big indicator that the class schedule was a very important feature for students – and should therefore be one of the more prominent tools in our app. The next two blue notes said, “*The schedule display is unintuitive*” and “*I want to customize or modify my view of the schedule*”. Together, these two blue notes told us that users had mixed opinions about the “list” view of the class schedule (the one existing mobile TritonLink app has) compared to the more calendar-like “grid” view found on the full TritonLink site. Generally, students preferred the grid view because it shows a full week of classes in a horizontal chart, which makes it easy to quickly visualize the times and days of each course. In the current TritonLink app, the schedule is listed vertically and is very spread out, so it requires scrolling to look through. We brought our users’ preference for the horizontal, “grid” schedule layout to our prototyping stages.

The next few blue Post-it® notes mentioned important tools our interviewees said they use on TritonLink (which cannot be used on the current mobile site; the user has to access the full site to use them). For example, one note read, “*Being able to register for classes easily when I’m on the go would be very convenient.*” This is because each student is given a specific time to enroll, and they may not have access to a computer at that time. We decided that the inclusion of the previously-absent WebReg tool would be very valuable for our users.

Another note we wrote was “*I want to be able to pay for my balance.*” The current TritonLink app displays what the user’s account balance is, but doesn’t directly allow them to pay it – they have to access the full site in order to do so. The obvious take-away from this is that our app needs to let users be able to pay their account balance from their phone easily, within the app.

Two other notes we had were “*The Virtual Advising Center display needs changing*” and “*I want to see more information about my degree/degree audit*”. These two notes indicate that students care about checking their academic history and status, and thus we should implement the Virtual Advising Center and the Degree Audit tool.

Finally, two more blue notes we had said, “*I want to stay connected to campus orgs and get campus information*” and “*I want features integrated from other UCSD services*”. The conclusions from these two notes are obvious: the app we design should include important links to campus organizations and services, as well as possibly integrating some of the services not found even found on the full TritonLink site into our app, because this is what the students want and need.

To recap the themes generated by our data, users want an app that: 1) is easy and efficient to use and navigate; 2) is visually appealing; 3) displays the class schedule in the best way possible; 4) facilitates class registration; 5) allows them to pay their account balance in addition to just seeing it; 5) incorporates the Virtual Advising Center and the Degree Audit; and finally 6) has links to other important campus services.

V. Design Changes

Our team narrowed our focus for design changes based on significant points in the affinity diagram and by going through our storyboards. By analyzing the user data, our team conceived of possible design changes that would enhance the users' experience when interacting with TritonLink on a mobile platform. Looking at our users' issues and insights, we began constructing potential modifications that would make the app better to use. As mentioned in the analysis, some students surprisingly preferred to use the TritonLink website on their phone's browser instead of the app version, because they thought it was easier to use and had more available operations. This indicates a huge flaw in the app since an app should make software more convenient to use on mobile devices. Because of this flaw, we wanted to make sure our TritonLink app could serve as a fully-independent replacement for using the TritonLink website. When beginning to develop design changes, we separated our users' desires into two broad categories: the users want the app to be simple and easy to use, but at the same time want it to incorporate many functions to support their needs.

Addressing Simplicity

Our TritonLink users expressed that a simple app layout would best optimize the user's experience, so we had to think of our app's overall aesthetics and organization, two features that are important to users as they get accustomed to using an app. An important outcome of these organizational decisions is how easily users can locate and maneuver through tasks. For instance, at the top of the current mobile version of TritonLink, the user's name, major, undergraduate status, and college are displayed. Students rarely need to access this static information and find themselves having to scroll through unnecessary content before beginning the search for their intended task.

To make the app simple, we first eliminated any scrolling on the homepage and displayed our main tools, navigation, and information more prominently, eliminating the need to zoom in or scroll to find content. We organized the page to better fit the frequent uses of TritonLink, and also selected a layout and color scheme similar to full site TritonLink's, so users can better predict where certain functions will be located. In the contextual interviews, users expressed that the app should be similar to the TritonLink website because they have grown accustomed to it and know how to use it. So, we incorporated TritonLink's "grid"-based class schedule display and put it on the homepage, since it is such a commonly used tool. Additionally, we developed similar graphics and icons to those found on TritonLink to keep navigational and tools recognizable and straightforward.

Addressing Functionality

Apart from ease of use, users also reported significant problems with limited functionality. From the current mobile TritonLink, in order to complete most tasks, the user must access the full site in their browser. This issue arises if a student tries to enroll in classes from the mobile site. The mobile site's omission of WebReg was a big concern for students, since course registration is one of TritonLink's most important functions. Additionally, full-site WebReg contains a lot of information and navigating and is difficult to use in a phone's browser. To modify it for phone use, we removed unnecessary text and incorporated popups with drop-down windows to simplify each page. If the app is to be independently used, it must be self-sufficient to carry-out at least the most used functions on TritonLink. As mentioned in our analysis, we determined that these other frequently used features are the Virtual Advising Center (VAC), degree audit, bill payment, and the class planner.

For a graduating student, the degree audit and VAC are important to make sure you are on track to graduate. While storyboarding a graduating student checking his/her degree audit, we observed a complication in accessing graduation requirements, which could be simplified. To fix this negative, we decided to build swipeable panes to change the Degree Audit display from department requirements to university requirements to college requirements. This allows the user to stay on the same page while accessing different sets of data. To make the VAC simple on the phone, on its main page, we have important buttons listed in three rows and then a big space at the bottom for the advising schedule and location of the advising office.

All undergraduate students use TritonLink in order to pay their bills. During the process of storyboarding a student needing to pay their bills, we agreed that accessing one's billing account shouldn't be a many-click process. To prevent this, we decided to make Billing & Payments accessible by simply clicking on the account balance notification on the home screen. Because of this, access to Billing & Payments is now a one-click process. We also realized that full-site TritonLink's Billing section contains unnecessary information for a person who simply wants to pay their bill, so we were able to simplify this process by only displaying the relevant information on one concise page.

The users also wanted functions in the app that are not currently available within TritonLink. One

of the main functions requested to include was access to the UCSD shuttle system, as explained in the Analysis section. On the homepage, we decided to include icons in a row towards the bottom of the screen that would allow a user to access different functions such as the shuttle system, Ted, maps, etc. The user can customize which icons are shown.

When planning our design changes, we had to find a balance between our users' desires for functionality and simplicity; an ideal app would support all TritonLink features while providing a simple layout and navigation structure.

VI. Prototypes

Android Design Guidelines

Before beginning prototype construction, our group had to choose which mobile platform to design for. In the world of app design, this is a realistic decision that developers make early in the process, as they tend to initially develop their app for only one platform. After reading iOS and Android design guidelines, we chose to design for Android phones because their design guidelines are more helpful, logical, and concise. Additionally, our group has more personal experience with Android phones; four of TritonTh!nk's seven group members own Android phones.

Following the decision to design a TritonLink app for the Android platform, our group read up on the Android design guidelines, learning about the basics of Android app design, Android design principles, layout suggestions, app navigation options, style guidelines, and app structure. Picking a navigation system was one of our group's first design decisions. Android design guidelines allow for app designers to choose between navigation bars, navigation drawers, action bars, and two types of tabs: fixed and swipeable. During interviews, many of our users revealed that they wanted the app to have navigation similar to full-site TritonLink, so we knew we wanted to preserve the full site's navigational categories in a quickly-accessible system that wouldn't take valuable screen real estate away from actual content. Taking into account these requirements and a user-reported fondness for navigation drawers in commonly used mobile apps like Facebook, we elected to use a collapsible navigation drawer for our redesigned app.

Paper Prototypes

Our next step in the prototyping process was the creation of paper prototypes. Following a group meeting to discuss design and layout choices, different members created the individual pages that made up the set of prototypes we used during the paper prototype contextual interviews with our users. One team member mocked-up the home screen and navigation drawer (shown below), providing similar organization and navigation to full-site TritonLink so our users would feel "at home" when using the app. The paper prototype of our redesigned app's home screen had the following similarities to full-site TritonLink (which are labeled in the diagrams below):

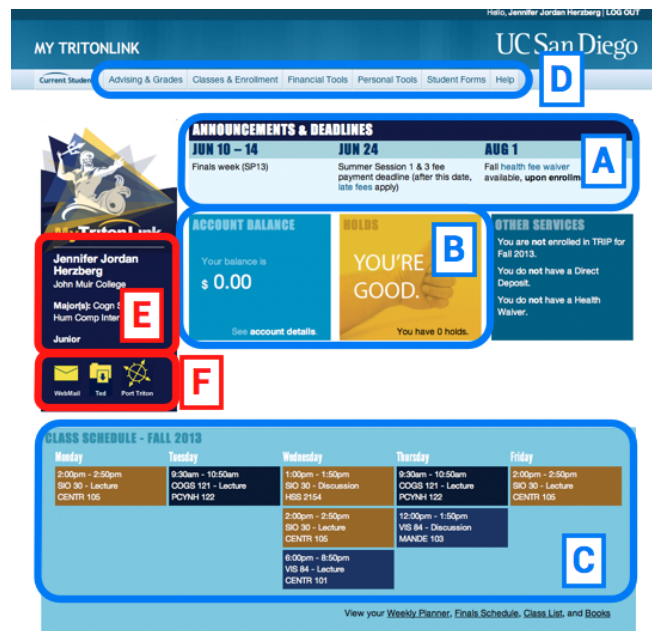
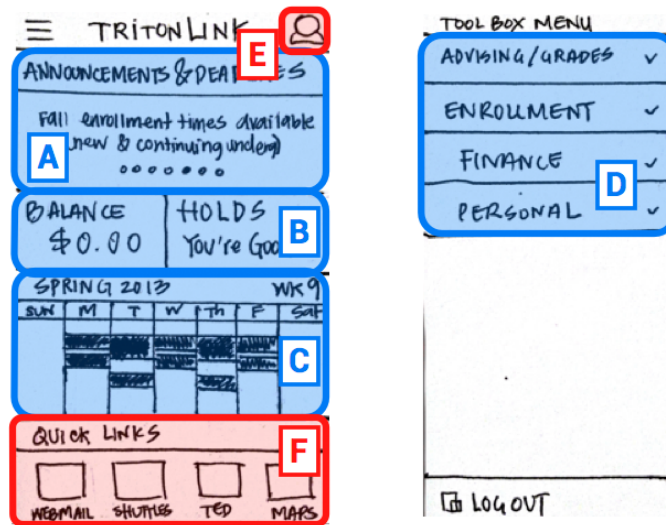
- A. Announcements and Deadlines are displayed prominently at the top of the page in an informative location. Additional announcements can be viewed by scrolling to the right.
- B. Balance and Holds status reports are informative, concise and also prominently displayed,

alerting users to any account status issues that might require attention. Like full-site TritonLink, but unlike the old mobile TritonLink, clicking on these information displays in our prototype takes the user to Bill Paying and Hold Information, respectively.

- C. Current Class Schedule is displayed in the familiar grid-like weekly view. In our prototype, clicking on this grid brings up a more detailed schedule with information about course names, times, professors, and locations. The student's upcoming finals schedule and next quarter's schedule can be viewed by swiping to the right.
- D. Navigational Categories include "Advising & Grades", "Enrollment" (later renamed to match full-site TritonLink's "Classes & Enrollment"), "Finance", and "Personal" (similarly later renamed "Financial Tools" and "Personal Tools"). By matching these navigational menus and their sub-links to the full site's, our users knew where to find the tools they were looking for.

However, our paper prototypes also included some differences from full-site TritonLink (also labeled in the diagrams below):

- E. Personal information, including the user's name, major, college, and grade level, is displayed very prominently on both full-site TritonLink and the old mobile TritonLink. However, in our prototypes, this relatively static personal information is less visible, conserving home screen real estate for more dynamic and commonly sought-out information and tools. However, to access it, the user can tap the bust icon in the upper-right-hand corner, which lowers a drop-down menu containing this information.
- F. While full-site TritonLink includes a few links to campus resources (WebMail, Ted, and Port Triton), we chose to include four user-customizable "Quicklinks" on our app's home screen, which are set "out of the box" as links to Webmail, Shuttles, Ted, and Campus Maps, four campus tools which our users reported an interest in having on-the-go access to.



Other team members created paper prototypes for the Billing & Payments, Class Planner, Degree Audit, Virtual Advising Center, and WebReg interfaces. These interfaces were essentially mobile reorganizations of their full-site counterparts with an emphasis on preserving functionality. One addition we developed for our app's Class Planner was the inclusion of an option to, at a user's WebReg enrollment time, register in their pre-selected classes directly from Class Planner instead of having to find them again in WebReg.

Paper Prototype Interviews and Results

After developing the app's paper prototypes, our team took them to six users for our final round of contextual interviews. In these paper prototype interviews, we asked our users to perform a series of tasks with the prototypes and took notes on their successes, failures, likes, and dislikes. During our interpretation session after these interviews, we found that users consistently liked the navigation drawer, commenting on its similarity to the navigation of commonly used apps (one user mentioned Facebook's navigation drawer specifically.)

On the home screen, many users liked the similarities to full-site TritonLink. One user found the Announcements and Deadlines section unnecessary, but others liked its location and similarity to full-site TritonLink. Users were generally pleased with the Billing & Payments and Virtual Advising Center prototypes, praising their similarities to these sections' full-site counterparts, particularly in terms of layout and functionality. When interacting with the Degree Audit prototype, users requested the inclusion of a "Minor" field, because they use Degree Audit to confirm that their minor was approved. One user wanted the option to hide or display the top information section, which contains personal information. After using our paper prototype for the WebReg tool, users requested links to evaluations, book lists, and descriptions of classes, and we included these in our high-fidelity prototypes. One user commented that our WebReg prototype looked like a significant improvement to signing up for classes via the Full-Site link in their mobile browser. After our final interpretation session, our group prepared for construction of high-fidelity prototypes, including improvements and changes developed from users' interactions with our paper prototypes.

High-Fidelity Prototypes

For our high-fidelity prototypes, our group chose to work in Axure, which two of our team members acquired licenses for through Axure's Good Student Licensing program. Taking into account our user data from the paper prototype interview interpretation session, we made the following changes to our low-fidelity prototypes when creating their high-fidelity successors:

- Eliminated Saturday and Sunday from the course schedule on the home screen
- Added links to course descriptions, book lists, and evaluations
- Included Minor information in the Degree Audit tool
- Improved visual and navigational consistency between tools
- Chose colors and fonts from full-site TritonLink, plus the addition of Roboto, an Android design guidelines-recommended font
- Added "Campus Tools" to our navigation drawer, a category that includes links to non-TritonLink campus resources like Housing & Dining, Libraries, Room Reservations, and Shuttles

-Eliminated the Class Planner tutorial.

Because we had two group members creating high-fidelity prototypes for the different sections separately, there were some inconsistencies in stylings that we later resolved when merging them into our finished prototypes. At the time of writing, we have a 25-page high-fidelity Axure prototype, including a Login screen, Home screen, and expandable navigation drawer, as well as interactive prototypes of the course schedule, Virtual Advising Center, Degree Audit, Class Planner, WebReg, and Bill Paying tools. These tools are linked with prototyped mobile device interactions, including tapping and swiping gestures.

VII. Discussion & Conclusion

Summary of Significant Findings

At the beginning of this quarter, our team set out with a vague notion to improve the experience of using TritonLink on a phone. Within the time period of roughly eight weeks in which we conducted interviews and collected user data, we were able to come up with several significant and meaningful conclusions regarding the design of TritonLink which helped us repeatedly refine our focus and target a solvable problem. Our mission became designing an intuitive interface for using TritonLink on a smartphone by maintaining the best design elements that were already in place while integrating new ones. We decided not to tackle the hurdle of trying to design mobile TritonLink to fit within the existing UCSD app and instead chose to create a stand-alone application. In creating our application, we had several key goals which we kept in mind through the development process:

1. Preserve consistency from the original desktop version of TritonLink as much as possible in our application to help ease of use and allow students to feel that they are using a familiar tool. This included design choices like the layout and structure of items relative to each other, the navigation menu sub-headings, and our color scheme.
2. While recognizing our first goal, we also realized we would have to rearrange or get rid of some things altogether in order to improve usability. We didn't understand at first what a challenge it is to scale an interface typically used on a desktop screen down to something phone-sized. To that end, we pursued heavy comparative analysis and prototyping, directing

our attention to how exactly people interacted with their phones.

3. Keep our redesign as realistic as possible. Although we realize that realism isn't a requirement of this course, we thought it best to keep ourselves grounded in order to think like real designers. Without the concern for realism, it is easy to stray away from actual implementation and ignore the consequences of real-world implications. This is why we interviewed Brett, who is the director of the Campus Web Office at UCSD and oversaw the development of both desktop TritonLink and mobile TritonLink. This is also why we extensively consulted the Android design guidelines in order to allow ourselves the same tools and limitations as real developers.

Our design process was more complicated than we had anticipated, but it turned out to be very rewarding and educational. To begin with, many students did not use the UCSD app in the first place, or were aware of it but chose not to. This raised issues of accessibility and barriers to entry. This necessarily ties into the actual flaws of the application: the data contained and visualized within the app is limited and poorly displayed, while the data on the full mobile site is only slightly optimized for a mobile platform. Looking at the specific results of our data on the affinity diagram, we found that most problems with Tritonlink generally fell within one of three primary issues: poor usability, a lack of features, and aesthetic concerns. We addressed these issues by exploiting the strengths of a mobile platform experience while simultaneously minimizing the weaknesses. Using Android design guidelines and the interpreted results of our data, we developed a specific strategy to address our user concerns. We targeted the design of the home page since that was the screen that users would first encounter, immediately shaping their perception of the design and usability of our application. We also heavily debated how to navigate through the app, since a mobile app requires many different pages simply because of the limited real estate on a phone. As covered in the prototype section, we chose a navigation drawer that mostly preserved the original navigation elements of TritonLink.

Looking to the Future

In the future, we want to advance the process of making our work into reality. We want to prototype more tools from TritonLink, since the number of pages on TritonLink is in the 20s and we currently only have 6 tools prototyped. Furthermore, we'd also like to integrate non-TritonLink services from UCSD, such as displaying news, student life information, and housing and dining information. We want to iterate through several more rounds of high-fidelity prototyping with hands-on interactive interviews between each round. Ideally, within another round or two we will have the design of our

homepage and navigational structure fully worked out, and only have to worry about the remaining sub pages. When we are satisfied with our work, we intend to send it to Brett and his development team and see if we can collaborate on making a real redesign of TritonLink. Even if our work doesn't make it onto the real site, it would be good enough to simply have it taken into consideration for future design.

It was both fulfilling and exciting to us to be able to work on something like this. Although we initially thought we would just be redesigning existing elements, what we found was that the TritonLink portion of the UCSD app was so incredibly lacking that we were essentially starting from scratch. However, since we had the desktop TritonLink to reference, we weren't completely on our own. In this way we were both creating something new while improving on the original design. None of us had any experience in anything remotely close to designing a mobile application, but we were eager to learn. This resulted in a very unique and engaging design process, as we were able to transform an outdated interface into a sleek, modern design through our research and expertise. We were also satisfied knowing that our work, if put into reality, can have very real benefits for the student population here at UCSD. Keeping that in mind during our design process helped us stay on track and fulfill our goals.