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Book Raider: Connecting Patrons of Texas Tech University Libraries with Resources Anytime, Anywhere

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Abstract

Given the mandate of Texas Tech University to expand its research mission, Texas Tech University Libraries developed new library services through the Book Raider project that allows patrons to use mobile apps to check library holdings and to order materials through interlibrary loan. Library literature shows an increasing desire among patrons to use this type of technology and suggests an open door exists for librarians to create these new modes of access and delivery. Book Raider, a collaborative project of several departments of Texas Tech University Libraries, involved the development of various types of apps across several technology platforms, a project that grows in popularity among students and faculty of the University.

Keywords: Book raider; Texas Tech University; Library apps; Interlibrary loan

Introduction

The evolution of libraries from warehouses of quiet stacks of books to bustling information commons has never diminished or eclipsed in any way the goal of providing patrons with information they want when they need it. In fact, as libraries changed with the proliferation of mobile technology, students and patrons have come to expect improved, if not instantaneous, delivery of content. In many cases, however, library uses of mobile technology typically have been within areas of metadata access to library catalog information and less about actual delivery of materials. Since 2013, a group of faculty and staff at the Texas Tech University (TTU) Libraries has been developing mobile applications that go beyond the passivity of other library apps by offering a tool for requesting desired information independent of a patron's location within or beyond the library. This project, known as Book Raider,

has not only met the library's mission of "connect[ing] users with resources that advance intellectual inquiry and discovery,"¹ but also has demonstrated the positive potential of library employees working beyond their own professional area to achieve a new level of service.

The Texas Tech University Libraries serve the students, faculty, and staff of the university, as well as community patrons within the area of the University. In Fall 2014, the student population reached over 35,000 with a University goal of achieving 40,000 students by 2020. As the University strives toward the status of a higher research level, in the United States known as a "Tier One" institution, the University Library adopted a mission of meeting the needs not only of undergraduate students, but for renewing focus on the growing graduate student population and enhancing resources needed by top level research faculty. Our team wanted to focus on a



project that would support these initiatives by enhancing user connections to research material. Inspired by the barcode scanner apps available on mobile phones that allow users to search for item level pricing of products online, the idea of a similar product for retrieving research information began to form.

Since the initial idea of creating a mobile solution for accessing library materials incorporated varying aspects of librarianship (technology development, content delivery, instruction and outreach, among others), the group charged with developing this idea would have to be equally dynamic and possess diverse skillsets. The core team for the project consisted of a personal librarian (subject liaison), two programmers, the document delivery librarian, and a metadata librarian. This small, cross-functional roster allowed for individual strengths to operate in tandem, free from complexities that can mire a larger group in procedural wrangling. Next, since this team had almost no budget, a funding source was required. The Mobile Solutions (MS) program of the Texas State Library and Archives Commission (TSLAC) offered support made possible through funding by the Institute of Museum and Library Services (IMLS). The MS program lived up to its name-sake by providing an avenue for the Book Raider project to become reality. With talent, a compelling idea, and an avenue for funding, the team next conducted a scan of library literature for similar projects, ideas, and best practices.

Literature Review

Much of the current literature focuses on mobile applications in libraries that essentially reflect responses to particular needs of patrons. These apps provide general information, including catalog access, searching capabilities, and facility reservations. The literature reveals that the environment has been changing ever since the introduction of the iPhone in 2007 when apps were introduced as high quality media. These rapidly became quite sophisticated integrated programs that were increasingly seen as a necessity. When EDUCAUSE surveyed university students in 2008, it was reported that "only 14.8% selected 'library services' as one of the top three institutional services they would most likely use from a smart

phone."² Just two years later a 2010 survey revealed that, "44% of academic libraries and 34% of public libraries said they offered some type of mobile service to their customers, and two out of five libraries of all types reported their intent to 'go mobile' in the near future."³ Schnell also points out that, in 2011, the sales of smartphones surpassed the sale of personal computers.⁴ Liu and Briggs state that "mobile data traffic in 2011 was eight times that of the global internet in 2000 and, as of 2013, 56% of Americans owned a smart phone, with the age group of 18 to 27 being the highest demographic," and over 67% of this student demographic used their devices for academic purposes.⁵ Liu and Briggs also found that "in 2010, 44% of academic libraries offered some type of mobile service, 39% had a mobile website, and 36% had a mobile version of the library's catalog."⁶ This progression statistically shows that there was a significant upturn in libraries taking the mobile app revolution seriously. However, not all top tier research universities got onboard with this development within the same time period. According to a survey taken by Catharine Bomhold, "of the 73 academic libraries at Carnegie [Classified] rated very high research (RU/VH) universities, it was found that almost 30 percent still had no mobile access in 2013."⁷ These results further highlighted the disparity among academic libraries for not being able to provide for their patrons on an equal technological level. In an effort of TTU Libraries to improve service levels, the Book Raider project sought to be both reactive and proactive in the services that it offered.

According to literature, library-driven services are the most demanded feature of mobile applications by students, faculty, staff, and other patrons. Liu and Briggs found that the "most common mobile services in libraries were mobile-friendly access to the library's catalog and databases, interacting with librarians through texts/chat, and information literacy instruction."⁸ Interlibrary loan was the least common service requested by patrons.⁹ According to the "United States Association of Research Libraries (ARL) in 2010, 58 libraries (47% of its members) were offering mobile-optimized sites or apps," and the most commonly offered services were information on library opening hours, ask a librarian



ian/chat, search, news, locations, and databases.¹⁰ Bomhold also revealed that libraries are starting to offer access to course reserves and subject guides.¹¹ These surveys provided significant insight into what kinds of information patrons wanted to be able to access on their mobile devices. However, nearly all of these offerings were either only mobile accessible webpages or passive mobile apps that only provided information or basic search functionality.

In a 2014, *Horizon Report* (library edition) identified mobile apps “as an important development in technology for academic libraries,” and they would become a “key challenge for rethinking how academic librarians develop their roles and skills.”¹² Reviewing some of the surveys that identified service gaps in academic libraries offered patrons it can be assumed that technical expertise and required funding mechanisms are out of reach for those that lack a mobile presence.¹³ If academic libraries want to remain relevant to the students for whom they provide services, they need to think about how *immediate* access to scholarly material will help meet their information needs.¹⁴ Arzola and Havelka believe that by adapting to this diverse technology environment led by the mobile phenomenon, librarians can create new roles for meeting the research needs of students and faculty.¹⁵ Book Raider is one step forward in creating a new library service at TTU.

Funding the Project

As the literature revealed the possibility and need for new service modalities, the unique project, Book Raider, appeared to be one early expression of this development at TTU, a program whose success began as a Mobile Solutions Project of TSLAC. This grant-giving program offered up to \$15,000, and was the team’s first consideration for funding. Book Raider was a natural fit given the Mobile Solutions Project’s goal of helping libraries achieve “a mobile presence useful to, and used by, their customers.”¹⁶ Working with the programmers and analyzing literature on technology at the time, the final inventory of necessary materials included a Google Play registration fee, an annual license to the Apple Developer program, a MacBook Pro (for development on the iOS platform), eight iPad units for development,

testing, and outreach functions, an iPad Mini, and iPod Touch, a Samsung Galaxy S4 cellphone, and eight Android Nexus 7 tablets. A variety of equipment was necessary to ensure that the application would be functional and optimized for various screen sizes across the two platforms (Android and iOS). The selection of the number of units was decided according to the scope of outreach, and the instruction and publicity opportunities that could be managed by the various librarians at workshops and events promoting the service. In total, the Book Raider project received \$10,054 as a TSLAC grant. Once the money was received, evaluation of the app in terms of its integration with our Interlibrary Loan services began.

Resources Anytime Anywhere

Clearly, the literature showed that students want mobile-friendly webpages for the academic library. This presented TTU Libraries with an excellent opportunity to connect library users with resources in new ways. In the development of Book Raider, we did not want to connect library users with resources and library services in a simple format, i.e., a mobile webpage or app that searched. We wanted students to understand that TTU Libraries are there for them at any time they need library services. With that in mind, it was important to develop an app that did more than simply search. We needed to provide feedback on student searches and needed to have the process interactive. It also needed to function outside of the library. To begin to accomplish this, it was decided to link Book Raider to the TTU Libraries ILL/Document Delivery department. Before we can discuss how that process works it is important briefly to understand the structure of the department and why it was a good choice to help link the library to patrons in a more meaningful way.

Book Raider was a collaborative project of several departments. Chief among these was the Texas Tech University (TU) Libraries Document Delivery Department. The Document Delivery department has taken great strides in providing TTU library patrons with the resources they want and when they want them. This, in fact, reflects the branding tag of the department, “Resources anytime – anywhere.” It is with this vision in mind



that the Document Delivery department offers a book paging service for all patrons, as well as a book delivery service for faculty and staff. As such, some TTU library patrons can make a request of the Document Delivery department and staff will pull the book from the shelves if the item is in the collection. If the book is checked out, or is unavailable, the Document Delivery department will automatically request the book from another institution. This type of seamless access to resources was an excellent place to begin designing an app that could help students, faculty and staff gain access to resources at a moment's notice. However, a few new mechanisms were needed to aid this process.

Of course, the driving question in the development of Book Raider concerned the best way to connect students and the resources of the library. But from there, various ways were considered to create or adapt apps to streamline requests. This included barcode scanning similar to that used in a variety of commercial enterprises like Amazon and eBay. We knew we could develop a way to allow the patron to scan a barcode of a book and then connect the device to the TTU Libraries Document Delivery system. This would provide seamless integration of the needs of the patrons for books and the ability of the Document Delivery department to retrieve materials. It was discovered from the literature that the development of mobile library webpages and the use of apps increasingly was a new mode of library service. We imagined that not only could a user search library websites via an app, a common experience in today's academic institutions, but we could take it one step further and have the library interact with users through an app. So how does this process work?

We can all understand the simple matter of wanting a book. Suppose you are out with your friends, talking about the latest book. Or you are in a bookstore browsing for class or for general pleasure reading. Now imagine if you had a tool that would allow you to scan the commercial barcode of a book in a store, or input the title into your phone. Your device could then automatically search the Texas Tech Libraries catalog to determine if the library owned the book and, if the item was not part of the catalog, you would

then be given the option to request it through interlibrary loan. If this were possible, a patron could have immediate knowledge of what is available in the library collection and either hold that item for check-out or immediately enact the interlibrary loan process to obtain the item in short order.

Clearly, the critical component of this process involves the seamless integration of the library catalog and the Document Delivery request process. In order to accomplish the integration, we needed to create an Open URL generator. The Open URL can then be received by the Document Delivery management system called ILLiad. An Open URL has the advantage of enabling a patron's search to be populated with needed information. When one scans a barcode and requests the citation information for that item, web pages are automatically populated. Using the Open URL generator this way allows for maximum accuracy of requests and thus ensures a patron will get the needed item as fast as possible. At least this was the vision and hope.

Programming

Making the vision a reality involved extensive programming. Book Raider is created for both Android devices and Apple iOS devices, two separate applications available in two different marketplaces, the Apple iOS App Store and the Google Play Store. The development of Book Raider on these two platforms therefore requires totally separate programming languages, development environments, tools, programming idioms, and software support. One full-time programmer/analyst was dedicated to designing, testing, and deploying both apps over the course of one calendar year. Much of the developer's time was devoted to research and training in Android and iOS development—even the most experienced mobile developers must devote considerable time to understanding the myriad changes, updates, requirements, paradigm shifts, and best practices in the fast-evolving world of app development.

In addition to the programming work of our full-time developer, the Texas Tech University Libraries marketing department designed the visual assets used in both the Android and iOS apps.



These assets include buttons, logos, fonts, startup screens, backgrounds, suggested layouts, and the color palette. The look and feel of Book Raider benefits greatly from the professional design work that enhances each of these components. Importantly, the designer in the marketing department had to produce many different sizes of graphics to accommodate the different requirements of Android and iOS and to accommodate the range of devices available for each operating system. Since phones, tablets, and computer monitors each require different design considerations with changing graphical asset needs, having a professional designer available was a great help.

The two apps have similarities in spite of the many “under the hood” differences in operating systems. The overall functionality and user experience are the same. The end user cannot easily distinguish between the two user interfaces despite the vastly different roads to leading to the unique interfaces. In both operating system versions, the user can scan a book barcode, request a book, and search by ISBN, title, or author. The settings menus offer the same options for exact title searching and advanced author searching formats. However, the toggles are rendered idiomatically for each operating system with checkboxes for Android and left-right slider switches for iOS. The scanner interfaces are also nearly identical with only minor cosmetic differences due to the different scanning options available in each operating system.

The overall approach to the programming structure was also the same for iOS and Android. Our team had the early goal of releasing Book Raider publicly so that other libraries could create similar apps without encountering as steep a learning curve as did we. Thus, the design was kept as modular as possible with easy substitutions of information that would change for each institution, such as institution name, contact information, OCLC symbol, WorldCat API key, catalog links, open URLs, and so forth. The modular design of the Book Raider code also enables the easy addition of new resources and capabilities of the app without altering or interfering with other parts of the app. Functionality is kept in distinct groups. For example, changes to the scanning process will not affect document delivery requests, or

vice versa. Both Java for Android and Xcode for iOS are object-oriented languages that also make the division of tasks distinct. These clear internal lines of separation also make updates to the apps simpler and easier to comprehend for future developers.

The Android app development was done through the installed Eclipse Android Development Kit (ADK), a popular, Java-friendly integrated development environment (IDE). We avoided the Android Development Studio, an official Google product, because it was only released in an alpha version at the time we created Book Raider. If we were developing the app now, Android Development Studio would be the best choice because of its Google support. The configuration of the Eclipse IDE contains a few potential pitfalls. For example, the 32 or 64 bit version must be correctly selected for the development machine and this selection must remain consistent throughout all resources of the project, in our case the Android Development Kit (ADK) and Java Development Kit (JDK). Since the Android operating system version advances rapidly as well, care must be taken so that all components of the project support the target operating system version. The ZBar Scanner project for Android, used for the barcode scanner, also has to match the version of the project.

The Apple app development was done entirely in Apple’s Xcode integrated development environment that was installed on a MacBook Pro purchased especially for this project. The Apple development pipeline is strict and limited to only their products that forced not only the use of Xcode but also the built-in AVCapture library for the barcode scanner. Xcode is fairly unique in the programming world; most developers will not be familiar with it unless they have previously developed Apple iOS apps. The syntax is similar to the C family of programming languages, but the programming idioms are unique to Xcode. Additionally, developers will need experience working with the layout designer in Xcode to design the screens and workflows of their app.

The development goals of each app are the same in spite of a vast difference in syntax. Both versions of Book Raider listen for and handle user events such as swipes, taps, and pinches. Both



versions navigate the user through a series of screens, including a barcode scanner to retrieve a 10 or 13 digit ISBN. Both must send ISBN, author, or title data and receive citation information via the WorldCat API, Google Books, or the library catalog. The TTU Libraries website is a common destination for the activities of both apps, so both apps must communicate with those document delivery and circulation webpages and store HTTP cookies if necessary to maintain the state of the program.

Testing the iOS and Android Book Raider apps required a representative selection of mobile devices for each operating system. In addition to the MacBook Pro development environment running the emulators available in Apple Xcode, Book Raider for iOS was tested on Apple iPad and iPad 2, Apple iPod, and Apple iPhone 4 and 4s. Book Raider for Android was tested on emulator in the Eclipse IDE, Samsung Galaxy S3 and Galaxy S4 mobile phones, and Google Nexus 7 tablet. Testing on different devices was especially useful to identify and improve user-friendly design patterns, to adjust the scanning behavior for the focusing characteristics of each device, and to make spacing and alignment changes for a consistent appearance across all devices. We also confirmed that the app works well even with poor internet connectivity as only a small amount of data is sent back and forth. The test case of a library patron scanning a book barcode while browsing in a commercial bookstore was especially rewarding to see during the testing phase.

The deployment of Book Raider was drastically different for Android in the Google Play Store versus iOS in the Apple App Store. Apple is very strict about account creation and app validation before deployment. We had some difficulty working with Apple to create an account to publish the application. The Book Raider team began by funding the modest annual expense of \$100 required for an individual Apple Developer account to release the app to the public, but ultimately we migrated the app to our Texas Tech institutional Apple Developer account. This account transfer process required repeated calls to Apple support to work out the kinks. Additionally, the Book Raider iOS app would not show up in the Apple App Store until someone at Apple

had reviewed the app and approved it. This delay was necessary even for minor updates to the Book Raider app. However, the positive side of this delay is a reasonable confidence on the part of the consumer that the apps available in the Apple App Store are not maliciously designed or full of bugs.

In contrast, the Android app deployment to the Google Play Store was simple and quick. For this there is virtually no quality control or human intervention involved in publishing apps. A low, one-time fee of \$25 was all that was required to create a Google Play Store account to publish the Android Book Raider app. The popularity of the Java programming language, coupled with the relative ease of publishing to the Google Play store, means that consumers in that marketplace have a large selection of apps from all kinds of developers.

The Google Play Store and the Apple App Store each provide a full suite of app analytics once the apps are published in the appropriate marketplace. The interfaces are different, but the information collected is similar in nature. In both cases, we are most interested in the total number of downloads, but each marketplace offers additional insight. The Google Play Store presence is managed by Google's Developer Console interface, which is similar to their popular Google Analytics interface for analyzing website traffic. It configures how the app appears in the store, including title, description, screenshots, and pricing. It also displays reports about the number of downloads, ratings, reviews, installations by device, installations by android version, and crashes. Overall, the Developer Console interface is streamlined and easy to use.

For the Apple App Store, iTunes Connect manages the app presence in the App Store and displays the app analytics. The interface is similar to the iTunes interface for artists. The store presence configuration includes the app availability, pricing, rights, description, metadata, screenshots, in-app purchases, ad networks, and game center integration. Most of these features were superfluous for Book Raider, which is a free app with no in-app purchases, ads, or gamification. The Apple App Store analytics include downloads per day and by device, crash reports by device, active



sessions per day and by device, ratings, reviews, and views in the App Store. The app information provided by iTunes Connect is slightly more complex than Google Developer Console, but it is still straightforward to navigate.

Both app stores provide the Book Raider team with valuable user feedback while showing a clear path toward updating the apps in the future. Ratings and reviews are the essential methods that app users communicate with app authors. After over 100 installs each on Android and iOS devices, the apps are each rated between four and five stars, five being the highest. Feedback in both stores indicates that app users, particularly faculty, enjoy the convenience of checking whether the TTU Libraries own a book they encounter "in the wild" and the ability to make interlibrary loan requests from within a smartphone app. Future anticipated app updates include a new catalog link in conjunction with the TTU Libraries migration to a new catalog system as well as major new features planned for the second version of Book Raider. Both Google Developer Console and Apple iTunes Connect offer clear steps for app upgrades.

Summary

The core idea behind Book Raider is to provide users with an improved method for obtaining library materials. To begin, a user finds a book or DVD (really, any item with an ISBN) and scans the code using a cellphone camera. The information is then compared to WorldCat metadata, at which point the user has the option of requesting the item from local holdings or to obtain a copy through Document Delivery. The app also allows users to search within holdings manually by author, keyword or ISBN.

To test sufficiently the various iterations of Book Raider, the team enlisted various librarians to scan items using a number of the tablets. These sessions revealed issues such as scanning errors that would force-close the app and misreading items with multiple barcodes, later added to a list for further testing. Going forward with continued development, the most daunting challenges concern the "unknowns" that are largely out of the control of the Book Raider team. The decision of OCLC to move to its new WorldCat Discovery

interface and the TTU Library's decision to implement the Ex Libris Alma library management system have raised potential concerns of possible service interruptions. Such outlooks have allowed the team to anticipate possible obstacles, though the full ramifications cannot be understood until those products are fully implemented. However, the app's integration of open source and (so far) freely-available data may make these challenges not as significant. An important question is how our mobile document delivery service, a key feature of Book Raider, will be affected by these new implementations.

Since launch, data shows 110 Apple store downloads and 285 Google Android store downloads. There have been 33 ILL requests from our document delivery statistics, and we only expect these numbers to grow as the new fall 2015 semester begins and future testing/development take place.

Book Raider continues to grow as the team looks at raising additional funds to provide users with several new features. First, the team has rolled the upkeep and maintenance costs associated with Book Raider into other business budgets since these costs mainly include maintaining developer subscriptions to the app stores. Costs for testing on newer platforms and hardware will have to be done as those devices become available through other means. Second, in the near future, the Book Raider team will conduct a more formal usability test by polling a better representative body of users and collecting more specific feedback that may reveal previously unrealized user interaction within the app. Third, the Book Raider team is also looking at future funding opportunities to build upon this initial success to deliver additional mobile, integrated services for our patrons. Preliminary ideas range from using the WorldCat subject heading data to check against the personal librarians contact information, so that if a user scans a book with the subject heading "history," for example, the user would not only be able to request the book, but would also automatically obtain the history librarian's contact information to set up a research consultation.

All in all, the Book Raider project has been a clear success and the future looks bright for expanding



access to library resources and for improving document delivery.

Endnotes

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