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49er Alerts: Utilizing Mobile Marketing Technology for Library Outreach

Marc Bess, Somaly Kim Wu & Bob Price

Background

Lack of awareness of resources and services is one of the major hurdles libraries face in effectively serving their users. If users aren't sufficiently aware of a library's offerings, it makes it difficult for them to take advantage of those resources and services. Building effective, sustainable outreach programs is one way libraries can help address this age-old issue. Outreach has traditionally taken on a range of forms, such as tours and orientations to introduce students to the library, flyers and handouts to publicize services, special events, and library presence on social media platforms. However outreach must be evaluated and modified as new technologies change how society communicates and acquires knowledge. Technology has fundamentally impacted librarianship in countless ways. As technology creates new channels of communication, libraries must be prepared to take advantage of new opportunities to reach their users and connect them with the library's offerings.

The rise of the smartphone is one of the most transformative technological developments of the new century. The Pew Research Center tracks smartphone ownership as part of their Internet and American Life Project. Their findings reflect a large increase in smartphone ownership among adults over the past few years. According to their 2015 report, 64% of American adults (defined in the survey as individuals over the age of 18) own a smartphone. By comparison, their initial 2011

survey reported 35% of adults as smartphone owners (Pew Research Center, 2015). Such statistics illustrate the rapid pace and extent to which smartphones are permeating American life. Countless organizations recognize the opportunities this growth represents for outreach, marketing, and publicity.

Retailers are taking advantage of the smartphone revolution by integrating mobile devices into their marketing strategies. This goes beyond creating mobile versions of Web sites. Location-based marketing, also referred to as proximity marketing, is one method retailers use to target potential consumers through their smartphones. Proximity marketing relies on wireless technologies to push promotional material directly to a mobile device when a consumer enters a specified area, such as a brick and mortar retail store. Location-based alerts are noted as a way to potentially enhance the shopping experience for consumers (Persuad and Azhar, 2012). Bluetooth technology is frequently used to send promotional messages to smartphones in proximity marketing initiatives (Ojala, Kruger, Kostakos, & Valkama, 2012). Retailers commonly use proximity marketing to send coupons and information about other promotions to a potential consumer's mobile device when they are in close proximity to the retail outlet (Dow, 2013).

Implementing successful proximity marketing campaigns is not without its challenges. One such challenge is determining what material to push to consumers and how frequently such material should be sent. As Bell (2014) writes in his article on mobile marketing strategy, "It is crucial to identify the moments and messages that will drive a real connection with the consumer." In analyzing survey data

collected from mobile phone users, Persuad and Azhar (2012) found that while respondents reported being open to the idea of receiving marketing materials through their mobile device, it was important that retailers seek to reach consumers on an emotional level with their alerts. This puts the burden on retailers to determine which promotional alerts have the most potential to engage target audiences.

The private sector is not the only place where mobile technologies are being leveraged to enhance outreach and publicity. As device ownership rises, mobile devices are increasingly becoming a focus of library outreach. A 2014 review of 100 academic library Web sites found widespread use of technologies such as social networking (found on 100% of the reviewed sites), instant messaging (91%), and mobile applications (76%) in library promotions. It is worth noting that the study's researchers counted mobile versions of library Web sites as mobile applications (Boateng and Liu, 2014). This review shows a clear interest in general on the part of library professionals in incorporating mobile technologies into the library's public-facing operations.

Individual libraries are experimenting with offering more than a mobile version of their Web site in the form of full-fledged mobile applications that seek to enhance navigation of the library as a physical space and facilitate access to resources. Applications that incorporate geolocation technology have been launched at institutions such as Boise State University and Oregon State University (Vecchione & Mellinger, 2012). Additionally, Hahn (2011) describes a model of an innovative

library mobile application at the University of Illinois at Urbana-Champaign. His application design focuses largely on developing an application to deliver resource recommendations to students based on their location in the library. Such research illustrates how mobile technologies in general and location-based marketing in particular can be harnessed to support library outreach.

Recognizing the opportunities presented by the rise in smartphone ownership, the authors began planning a proposal for a grant-funded project to design, develop, test, and implement a smartphone application that harnesses proximity marketing technologies to enhance outreach at an academic library. Creating a user-centered application that both increases awareness of library resources and makes it easier to use such offerings was the central goal of the project. The application, dubbed 49er Alerts, was intended to give the library a chance to reach users through an exciting new channel.

The project team submitted their grant proposal in early 2014.

Initial Development

The application was developed for both Android and iOS devices. A Google Nexus Tablet and an iPad were used respectively during the development process. The rise of smartphones and tablets on college and university campuses dictated the device selection. In addition, the Nexus and iPad are compatible with beacon technology and have built-in Bluetooth functionality to ensure seamless delivery of mobile alerts. The tablets served as the receiver for the alerts during initial development. The initial

application prototype utilized a Raspberry Pi (www.raspberrypi.org) as the beacon transmitter. After further development, an iPhone was used as the transmitter for the duration of the project.

Following the start date of grant funding for the project, application development commenced in summer 2014. The application development process was adapted to correspond with the grant schedule and consisted of the following phases – hiring a graduate student developer, iOS development, usability testing, Android development, and beacon deployment.

Application development was dependent on hiring a part-time computer science graduate student developer. The project team did not have the technical expertise required to fully develop the application. Programming for the application required a programmer with mobile application experience. As such, the position description used to recruit emphasized mobile application expertise. Due to the constraints of the grant schedule, the project team prioritized development experience with the iOS environment. It was essential for applicants to have experience with object oriented programming language (OOP) and application programming interface (API). During the interview process, applicants were asked to demonstrate knowledge by providing evidence of their mobile application programming experience. The project team was able to identify and hire a student with experience developing in both the Android and iOS environments.

Mobile device usage data shows the University of North Carolina at Charlotte is predominantly an Apple campus. Data compiled in 2012 by the Director of Clients Services indicated Apple devices represented approximately 64% of the total mobile

device usage on campus. The project team also personally observed iPads and iPhones as the devices predominantly used by students. Additionally, one of the primary objectives of the project was to widely distribute the application. This goal could be achieved by distribution through the Apple App Store. As a result, initial application development focused on the iOS environment.

Development for the iOS environment involved the use of iPad and iPhone devices. The project specifically utilized a fourth generation iPad and iPhone 5s (support.apple.com/en-gb/HT202880) in the development process. iBeacon technology (developer.apple.com/ibeacon) was used to transmit alerts to the mobile devices. This technology is compatible with 4s model and later iPhones and third generation and later iPads. Additionally, many Android devices including the Google Nexus tablet is compatible with iBeacon. Mobile application development for iOS devices requires the software development kit (SDK). Programming is written in Objective-C, Apple's primary programming language. Once development for the iPad was completed, the code was duplicated in the Android environment for the Nexus tablet.

The initial development phase of 49er Alerts focused on four library specific alerts or feeds. The alerts were designed for transmission to users with Bluetooth-enabled mobile devices when they enter in range of specific beacons. The content delivered to users varies depending upon where the beacon is located in the library. For example, a student near the circulation desk would receive a different alert than a user in close proximity to group study rooms.

The project team wanted the initial alerts to focus on offerings that are a primary part of the library's public services. This was in keeping with the project's goal to improve and enhance library outreach. The four alert types chosen for the initial development phase were news and events, computer availability, library brochures, and group study room availability. Except for library brochures, the other alerts were based upon current services offered via the library's Web site. The application utilizes JavaScript Object Notation (JSON) to automatically populate the mobile application with data from the library's Web site. Library brochures in the form of PDF files are manually uploaded onto a separate server and sent directly to the application.

When a user is within range of a beacon, they receive an alert on their device. Clicking the alert automatically opens the application to content relevant to the specific alert. In some cases, such as with the group study room availability alert, the content links to the library's Web site so the user can complete a task or view an external page.

Usability Testing

Usability testing of the application commenced once the mobile alerts were functional. Assessing the effectiveness of the application was integral to the overall success of the project and ensured a user-friendly interface. To achieve these aims, the project team conducted task-based usability tests with student participants to evaluate the application prior to its launch. The tests were conducted using an iPad interface. Participants were asked to perform tasks in reaction to specific alerts as they appeared on the iPad. Techsmith's Morae usability software (www.techsmith.com/morae.html) was

used to conduct the test sessions. A document camera and audio recording device captured participant interaction with the interface. This allowed the team to review individual sessions multiple times if needed. Participants were asked to complete a short demographic survey prior to the test and a post-test survey to assess their impressions of the application.

As the application is intended for students at all levels, it was important that both undergraduate and graduate students were recruited to participate. Both undergraduate and graduate students participated in the study. The team recruited participants from a range of backgrounds to ensure demographic diversity. A total of eighteen participants, including eleven undergraduate students and seven graduate students, tested the initial application interface. A number of academic majors were represented with participants ranging from freshman to doctoral level.

During usability testing, the iBeacon was transmitted using Radius Networks' Locate Beacon (store.radiusnetworks.com/products/locate-ibeacon-app), a standalone and freely available mobile application. A team member would install the Locate Beacon application to their smartphone in order to send specific alerts to the participant while the usability facilitator conducted the test.

The initial response to the prototype application was overwhelmingly positive. On the post-test survey, a majority of participants stated they would use the application once it became available. Along with capturing user interaction with the interface, the study also captured crucial user needs that informed further application development and

improvement, particularly in regards to the design of the user interface and the terminology used in the alerts.

Using a temporary beacon such as Locate Beacon during the usability test phase enabled the team to explore additional beacon technology as they continued the application development process. Following completion of usability testing and final development, the project team identified two third party beacons to deploy – RadBeacon (store.radiusnetworks.com/products/radbeacon-usb-2) and Estimote (estimote.com). The beacons were selected based on compatibility with the application, battery life, and cost. A total of five portable beacons were purchased and deployed in the library for the application's initial launch.

Conclusion

The 49er Alert project allowed the team to learn from its pilot and present the application and its uses with very diverse internal and external communities. These dialogues produced several potential streams of future development:

- Modify the application to push content when in proximity or as notification(s) have been requested by the user. This would allow the Library to inform its constituency irrespective of location. The thought would be to potentially draw patrons to the library based on new resources, services, and/or events that they have expressed interest in.

- Hosting a regional proximity-marketing group for co-development. An open-source community would allow for ideas and creativity to come from multiple libraries to enhance the application and its implementation.
- Creating an alert system that would connect regional libraries together into a network allowing users to roam between libraries seamlessly. The same application could deliver proximity alerts as an individual switched between one library and another (e.g. campus library to public library).
- Allow users to quickly and easily add library events and/or bookings to their calendar.
- Create an alert kit bill of materials that would allow libraries to quickly and inexpensively set up an alert system within their own libraries.

In addition to the ideas above, new locations for proximity beacons are being discussed that would include spaces students inhabit on campus, e.g. student union. By placing beacons outside the library, the library has the opportunity to extend beyond its physical location and reach students who aren't in proximity of the library's beacons. The thought would be to draw more students into the library and to positively impact their academic success.

As with all technology, the hardware and software components available continued to multiply and decrease in price. These developments will allow libraries to continue building upon proximity marketing functionality and to do it in a cost-effective manner. One new Google project named "Physical Web"

(http://google.github.io/physical-web/) has the potential to open avenues for smartphone communication without the use of installed applications. The J. Murrey Atkins Library plans to continue to develop the 49er Alert Service over the coming academic year and would love to share code and co-develop as opportunities arise.