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Tools for Creating Mobile Applications for Extension

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Abstract: *Considerations and tools for developing mobile applications for Extension include evaluating the topic, purpose, and audience. Different computing platforms may be used, and apps designed as modified Web pages or implicitly programmed for a particular platform. User privacy is another important consideration, especially for data collection apps. Several useful tools already exist for using mobile devices for data collection, as well as for mundane tasks like volunteer management and effort tracking.*

This article is part 2 in a series on the use of mobile computing applications for Extension work. The first article discussed mobile applications for Extension, and an upcoming article will discuss mobile applications for participatory science.

Considerations for Developing Mobile Applications

The first step when building a mobile computing application (app) is identifying the topic, goal, and audience (LaBelle, 2011). The goal may be information delivery, data collection by professionals or volunteers, self-assessment and decision support, etc. (Drill, 2012). Identifying the audience will guide the sophistication of the interface. Another good exercise is to conduct market research by looking around the Apple App Store, the Google Play App Store, eXtension, state Extension services, and the *Journal of Extension* to see if similar apps already exist. Contact potential collaborators to see if existing apps could be built upon. For example, perhaps an

app for a local project could be expanded to become a multi-state collaboration by adding additional species. Several apps are listed at these websites:

http://ucanr.org/sites/ANR_Apps/

<http://www.wec.ufl.edu/faculty/brunae/AppList.php>

<http://baegrisk.ddns.uark.edu/geospatial/smartPhoneSearch.aspx>

Mobile Web vs. Native Apps

Another consideration when thinking about developing an app is the choice of whether to modify an existing Web page or develop a "native" app. This choice follows from an overall shift in the way users access the Internet, from Web pages to targeted applications used for a specific purpose (Anderson & Wolff, 2010; Anderson, 2012). Apps can be essentially mobile versions of websites accessed through a device's browser but modified for the smaller screen size and to enhance touch-screen navigation. These can be fairly easily programmed. There are more opportunities for enhancing the user experience with a native app, meaning one programmed for a particular mobile platform from the outset. The PhoneGap framework (distributed by Adobe©) bridges the gap to some degree, allowing developers to work with common Web programming languages then easily adapt the code for multiple mobile platforms. As this framework improves, nativity may become less important.

Platforms

Google's Android platform runs on 50% of U.S. smartphones, Apple's iOS on 30%, with most of the rest running the Blackberry or Windows platforms (Albanesius, 2012). While Apple may have less devices in the market, a recent assessment showed three times more apps in Apple's App store than in the Google Play Android Marketplace (Rothman, 2012). Designing apps for Android presents some challenges because the platform runs on a wide variety of devices with varying screen sizes and user interface devices (buttons and switches), but it's easier to gain access to the Google Play store. Over half of Android apps are available for free, while only a quarter of iApps are, and many apps developed for both platforms are free for Android and come with a small charge for the Apple version. This is in part because developers need to pay a small fee for an app to be sold through the App store and go through a review process.

Useful Tools

For data collection, there are some existing programs that are essentially survey data collection structures that researchers can modify to create their own mobile instrument. Epicollect and Episurvey, developed at the Imperial College of London, allow users to design a data collection instrument and project website, upload it to mobile phones, collect data onto their servers or the author's own, and view the data and perform simple analysis on the website or phone (Aanensen, Huntley, Feil, al-Own, & Spratt, 2009). User interfaces are fairly basic, and the projects are designed to be used by a team of trained participants. Open Data Kit is a similar tool developed at the University of Washington (Anokwa, Hartung, Brunette, Borriello, & Lerer, 2009). Both are designed to be used by researchers who have familiarity with survey design and programming but are not professional computer programmers or app developers. These and similar tools have been utilized for several years for social science research in the developing world, where local data collectors can bring a mobile phone to use with survey respondents who themselves may have very limited experience with technology. In addition to survey questions, on-line mapping tools such as the free app Geopaparazzi can be used to upload locations and photos of specific observations.

For more complex user interfaces, Extension professionals may prefer to work with professional Web developers or at least with technology-savvy students. In these cases, tools like Mock App can help those interested in having apps developed communicate their preferences for information and look and feel with the developers. iPhone Mockup is a free online tool that can guide the development of user interfaces. AppSketchbook sells actual paper notebooks designed to guide the development of iPhone/iPad apps.

Privacy

Privacy concerns are a potential drawback to the use of mobile devices for data collection. Privacy is an important issue for apps that track location or automatically capture sounds or images (Shilton et al., 2009). Tools for privacy protection can include notification and choice about data sharing, encryption, statistical anonymization, and protocols for data retention (Shilton et al., 2009). Exact locations can be generalized to a larger area and faces automatically blurred in photos that are uploaded (Goldman et al., 2009). Data collection mechanisms should be designed with privacy concerns in mind and data access managed to protect information where desired. Decisions about data resolution need to balance the needs of individual observers and the research goals. Privacy issues should be clearly considered at the early stages of research and design.

Unfortunately, developers are limited by the intrinsic structure of each platform. For example, the *What's Invasive* Android app requires users to allow the app to "read sensitive log data." The Android-sensitive data log includes geographic location information that the app needs along with other information it does not require, creating additional programming complexity to "dump" the non-necessary information. Data mining has raised concerns, and app developers should be aware of these inherent issues.

Apps to Help Extension Personnel

While the above discusses how to create apps to use with clientele, there are also apps that can help with other aspects of Extension work. Several states have developed Web-based or mobile systems for volunteer management. Another use is to help personnel collect data for the preparation of reports for USDA and other funders.

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