DIGITAL SPECIAL COLLECTIONS MOBILE FINDINGS

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August 18, 2010

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EXECUTIVE SUMMARY

Calisphere and the Online Archive of California are potential areas for mobile development. The key audiences for Calisphere is K-12 and the general public; primary users of OAC are higher education archivists, librarians, and researchers.

Calisphere Use: In K-12 one classroom, a teacher uses mobile devices to look up information for students, particularly when they are working in small groups or she is not near a computer. A high school technologist reports that her district is buying fleets of iPod Touches and iPads for use in the classroom. They are less expensive than laptops and using them is more spontaneous than reserving time in computer labs.

OAC Use: In higher education, a special collections librarian describes the finding aid as the "bread and butter." Students come to her looking at their phones asking about collections. An archivist would like to use a mobile device to look things up while away from the desk, but he doesn't have enough signal in the stacks. A researcher uses archives extensively but often uses physical archives. She doesn't currently use own a mobile device with internet.

Designing and Building for Mobile Environments: There are many tradeoffs between designing native applications and mobile websites. Native applications can take advantage of device functionalities such as cameras and GPS and have faster load time. Native applications are generally built first for iOS and then expanded to other platforms. Mobile websites are accessible to more users, but there is less control over how the sites will render on various devices. Applications that use geolocation to determine a user's location and display content based on location. Privacy needs to be addressed when designing with geolocation.

Recommendations: Although mobile Calisphere and OAC tools are not necessities, there are opportunities to develop a mobile version of Calisphere, a "fun" application that showcases Calisphere collections, and a mobile version of OAC.

INTRODUCTION

The Digital Special Collections mobile findings were based on three main areas:

1. General user behavior and preferences uncovered from the mobile user research project conducted this summer 2010
2. Specific findings uncovered when talking with Digital Special Collections constituents (Special Collections Librarian, Archivist, Graduate Researcher, K-12 teacher, and K-12 district technologist)
3. Comparative analysis of mobile apps and features that would work well with Digital Special Collection services

While more primary source users from both higher academic research and K-12 landscape need to be surveyed to get conclusive evidence on their mobile behavior, our examination of the mobile landscape surrounding primary source material shows strong indication that Digital Special Collections content can easily be adapted to the mobile environment in interesting ways that fully utilize mobile device characteristics.

This report is part of the California Digital Library Mobile Device User Research Project. It provides mobile recommendation information that is relevant to CDL's Digital Special Collections program, particularly Calisphere and Online Archive of California.

Some information about research methodology, a summary of general findings, and information on designing mobile tools are included in this report, but more complete details on these subjects can be found in the general report, available on the wiki. A section on related mobile tools can also be found in the comparative analysis report, available on the wiki.

This report also provides findings and recommendations that are specifically applicable to Digital Special Collections. An appendix to this report contains screenshots and details about using Calisphere and OAC on three mobile device platforms.

RESEARCH METHODOLOGY

We conducted two surveys, both administered online. The first survey was distributed through Facebook and Twitter posts and ads. Most of the respondents (27) were librarians, so only their responses were analyzed. The second survey was distributed to random undergraduate, graduate, and faculty at UC Berkeley. 268 people responded to this survey.

We conducted 14 interviews with CDL service users or potential users. In general we sought participants who owned a mobile device with internet access. Two participants did not own a mobile device with internet access; one was a heavy user of the Online Archive of California, another was a faculty member who conducted field research. Participants were offered a $25 Amazon.com gift card in exchange for participation.

We conducted on-campus interviews at UC San Francisco (4 interviews), UC Berkeley (3 interviews), and UC Davis (3 interviews). On-campus interview participants were solicited in-person. Although we would have liked to interview subjects at all UC campuses, we were limited by logistics, schedule, and budget. We also conducted 4 phone interviews with two K-12 teachers, one special collections librarian, and one faculty member. The first 3 participants responded to a request for interviews emailed to a Calisphere mailing list or in conjunction with the first survey; the faculty member was contacted based on a personal connection.

Five interviewees had experience with using special collections materials, in particular OAC or Calisphere.

Campus	Occupation	Academic Field	Mobile Device Ownership	Mobile Internet Usage*	Library Usage**
UC Berkeley	Student, 4th year PhD	Information Science	Feature phone	N/A	High
UCSF	Archivist	N/A	BlackBerry	Medium	High
Other university	Teaching Librarian/Special Collections Librarian	N/A	iPhone	High	High
K-12 School	8th-grade teacher	History & English	iPhone, iPod Touch	High	High (Calisphere)
High School District	Technology specialist	N/A	iPhone (personal), iPad and iPod Touch (district)	High	High (Calisphere)

SUMMARY OF GENERAL FINDINGS

The following is a snapshot of the key information discussed in more detail in the general report, which can be found on the wiki.

- Slightly more academic survey respondents own mobile phones *without* internet (61%) than mobile devices that *with* internet (53%). Faculty were the most likely respondents (63%) to own a mobile device with internet, followed by graduate students (53%) and then undergraduates (41%).
- Of academic survey respondents who own mobile devices with internet, the majority own iPhone (53%) or iPod Touch (20%) devices. The next highest device was Blackberry (10%), and then Droid (9%).
- Most interviewees told us that they prefer to use internet from their laptops rather than their mobile devices, yet many don't carry laptops to campus or have internet access at home.
- Some of the most common uses of mobile devices with internet include finding information and accessing email. They are used less for academic purposes, such as accessing campus or library websites or completing coursework.
- Most interviewees told us that they did not read academic content on mobile devices. Some noted that they prefer to read PDFs on their laptops, while others stated a preference for reading material on paper.
- Out of survey respondents who use internet on their mobile devices, 26% said that they read "academic content (e.g. books, articles)" on their devices at least daily.
- Few survey respondents are using eBook devices and tablets for academic reading.
- Most interviewees noted that they did not want to do actual academic research on mobile devices. Many see research as a difficult activity that would only be more difficult on a mobile device.
- Sending oneself email is a way to transfer information and files between devices.
- Survey respondents ranked immediate community members—colleagues and fellow students—as the most likely sources for finding out about new tools and services (66% and 60%, respectively).

SPECIAL COLLECTIONS FINDINGS

Although not many academic survey respondents reported that they use special collections frequently, it was significant that almost equal numbers reported interest in viewing special collections in general as they did in viewing special collections on mobile devices. This could mean two things: 1) those who already use special collections materials would use them on mobile devices, or 2) the ability to view special collections on mobile devices would attract new users.

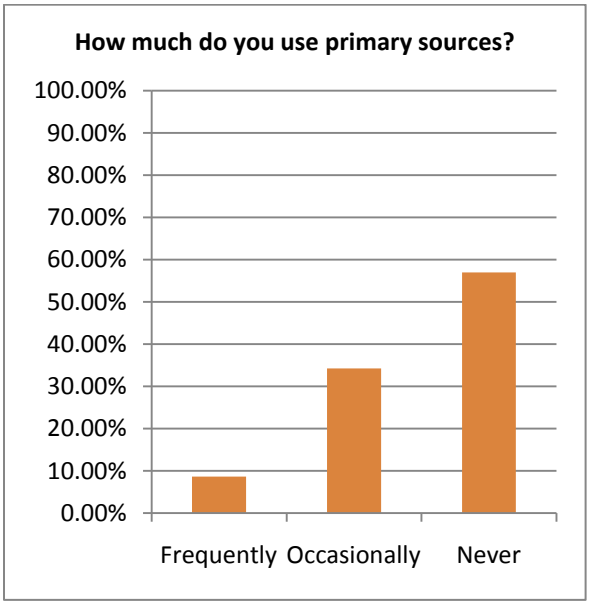

Figure 1 How often do you use the following library/academic information or resources? N =242

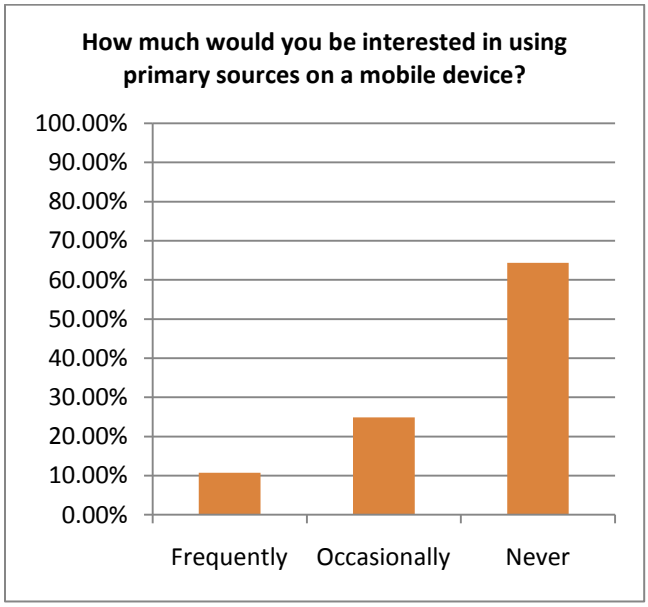

Figure 2 How often do you use the following library/academic information or resources? N =233

K-12 AUDIENCE

The following findings are based on interviews with an 8th-grade teacher who uses Calisphere extensively in the classroom and a high school technologist who helps teachers use technology in the classroom. Both of these instructors consider Calisphere an important tool for the classroom. The eighth-grade teacher uses Calisphere as writing prompts and encourages students to use Calisphere as primary resources for research projects.

USE IN CLASSROOM

Mobile devices are used in the classroom as part of learning activities and instruction, both by teachers and kids. An eighth-grade teacher reported that she uses her smartphone frequently in the classroom to look up information to respond to students' questions, particularly when they work in small groups: "We make a lot of our connections through people in California and California writers and things like that. When we can do that, we try to find pictures of them…it's off topic but that's something you can quickly look up on your phone. And then you can show the kids, because it's only 1-2 kids asking about it or a small group, then you let them have your phone."

She also finds it faster to look up information on her phone rather than use her classroom computer: "When it's something where I need to look something up quickly like the meaning of a word or background reference

information, I'll look it up on the iPhone. It's just faster if I'm around the side of the room or not near the computer."

This teacher likes using her mobile device's cellular connection to access the internet because it allows her to get around the school's internet restrictions. Sites like Wikipedia, YouTube, and Twitter are blocked from the school's network, so she uses her cellular connection to access these materials for use in the classroom.

A high school district technologist reported that her schools are buying sets of iPod Touches and iPads to use in the classroom. These fleets of mobile devices are cheaper for the district to purchase than sets of laptops: "Many of the things that teachers want to have students do as far as accessing information and some interactive assignments can be done on these devices in a much more cost effective way than on a laptop."

In this particular district, 180 iPod Touches have been purchased and in use over the last year. Each cart has 30-40 devices. Demand for these carts has been increasing. This fall, the district will provide iPad carts. This technologist specializes in showing teachers how they can use these tools effectively in the classroom.

One benefit of using mobile devices in the classroom is that teachers don't have to sign up for time in computer labs or to check out sets of laptops. This allows usage to be much more spontaneous: "[Calisphere on iPad] would be a really great thing to have in the classroom because you don't have to march down to the computer lab and try to get a day in there. You could say, 'hey, we're studying the great depression, let's go look at a few pictures. And so it's a more spontaneous kind of thing'."

LIMITATIONS

Calisphere is not currently optimized for use on mobile devices. Although the technologist told us that kids are really skilled at using non-mobile sites on the iPod Touches—"kids are not having any kind of problem doing that, zooming in and getting the information they need"—there are some limitations to using Calisphere with a mobile browser. For more details on how Calisphere functions on mobile devices, see the appendix of this report.

Fast load time is particularly important in the classroom. For a teacher answering students' questions on the fly, a bulky or difficult to use site is particularly problematic: "If it's not mobile friendly it takes a lot of longer to load, halfway through load time I exit out of it and don't even bother."

Another limitation of using mobile devices in K-12 is that many students aren't allowed to bring their own mobile devices to class. A Pew Internet & American Life report says that only 12% of teens are allowed to have cell phones with them at all times at school (Lenhart, Ling, Campbell, & Purcell, Kristen, 2010). In fact, the report authors say "most schools treat phones as a disruptive force to be kept turned off and away from the classroom." The teacher we talked to told us that she does allow students to use their phones in class to look things up as long as they ask permission, but they have to hide the phone if an administrator walks in. While cell phone bans don't preclude using school-provided devices like iPod Touches or iPads, it does limit students' ability to use their own devices to access these tools in the classroom.

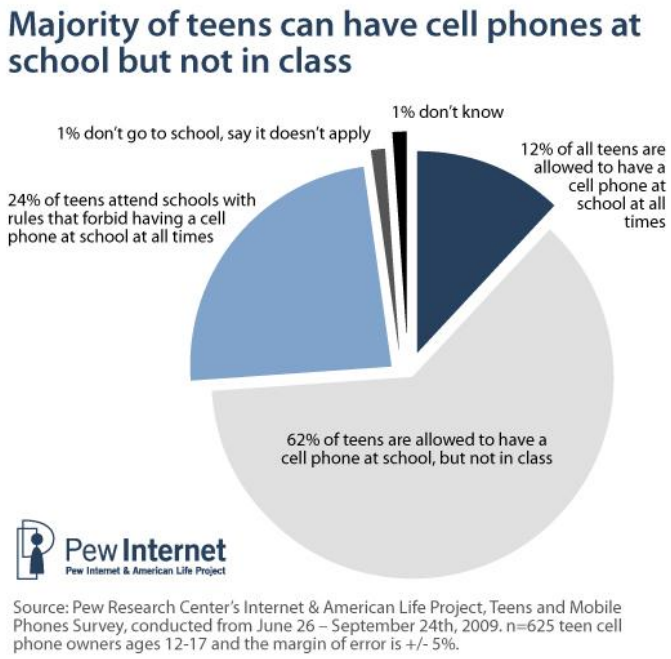

Figure 3 Source: Lenhart, Ling, Campbell, & Purcell, Kristen, 2010

HIGHER EDUCATION AUDIENCE

LIBRARIAN/ARCHIVIST

The following information is based on interviews with and archivist and a higher education special collections librarian who teaches first-year students how to use special collections.

The special collections archivist described finding aids as "the bread and butter." She noted that she would like to have finding aids more accessible from mobile devices so that she can call them up when talking to a student or a direct a student to a finding aid on his or her phone. She also mentioned that about 15% of students come to her asking about items while looking their phones, viewing either the finding aid itself or an email containing information about the collection.

An archivist told us that he would like to be able to use a mobile device when he is away from the reference desk, be he cannot receive a signal in the basement or stacks, so this would not be feasible. When he accesses the OAC on a desktop computer, he typically looks for quick preliminary information such as the collection number and abstract. For more in depth research, he likes to do keyword searching over the container list. He finds highlighting and number of hits useful when doing this kind of work.

RESEARCHER

The following information is based on an interview with a PhD student who is a heavy user of primary sources, including OAC.

This researcher frequently visits physical archives to look at physical finding aids, local databases, and physical primary source items. She notes that most material she needs isn't digitized: "Most of the time when stuff is

digitized, it is a nice hint of what to look at, but it's not going to be my data set." When material is digitized (by any of the archives she uses, not specifically OAC), she struggles to know what in collection has been digitized and why: "It's really hard to figure out what got digitized and what didn't."

When materials are not already digitized, she takes her own high-quality images. For text materials, she sometimes uses OCR to scan documents, so images need to be really high quality.

She does not currently use a mobile device as part of her workflow. It would not be particularly useful to her to view digital objects on a mobile device because she needs to view details: "Using online archives, you need a really amazing monitor. The newspaper text...you have to zoom in and pan around. I dream of the day I have a nice big monitor. For maps, you really need a big monitor to decipher the text and the handwriting." On the other hand, she does think it would be useful to be able to refer to information on a mobile device while she is viewing the physical collection: "Knowing what stuff in that box has been digitized and what hasn't would be really helpful to know on the fly."

DESIGNING MOBILE TOOLS

NATIVE APPLICATION VS. MOBILE WEBSITE

When creating mobile interfaces, designers must decide whether to create a native application or a mobile website. A native application is built specifically for a particular platform, whereas a mobile website is typically accessible by all devices with internet browsing capabilities. There are many tradeoffs in each option.

Native applications can take advantage of the particular device's functionality and capability. In addition, some of the application software is stored on the user's device hard drive, which can decrease load time. Typically native applications are built first for iOS (for iPhone, iPod Touch, and iPad) and then sometimes expanded to other platforms. iOS applications ("apps") are downloaded through iTunes and must undergo Apple's review and approval process, which can take a long time. Another downside is that native applications only work on a limited number of devices. Users who do not have Apple mobile devices are not able to use these products. Furthermore, it is difficult to update content in applications.

A mobile website, on the other hand is accessible to more mobile users. Mobile sites do not need approval from an app store like iTunes, and the user does not have to download anything before use. There is less control, however, of how the site will render on different devices. Each device has different capabilities and will display material differently, though these differences can be mitigated somewhat by configuring the site display based on browser detection. Furthermore, mobile websites are not able to take advantage of the many built-in features of particular devices.

Usability expert Jakob Nielsen has found that apps are generally more usable than mobile websites: "My main conclusion from watching iPhone app users is that they suffered much less misery than users in our mobile website tests. In fact, testing people using iPhone apps produced happier outcomes than testing people attempting to use websites on the same phone" (Nielsen, 2010). Nonetheless mobile websites were still a significant improvement over full sites on mobile devices: "When our test participants used sites that were designed specifically for mobile devices, their success rate averaged 64%, which is substantially higher than the 53% recorded for using 'full' sites — that is, the same sites that desktop users see" (Nielsen, 2009).

It is difficult to determine whether to create a native application or a mobile website. Fling writes in *Mobile Device Design and Development* that a native application is the best route in the following conditions:

- Charging for it
- Creating a game
- Using specific locations (though some devices are able to detect location through browser applications)
- Using cameras
- Using accelerometers (to detect motion or rotation)
- Accessing file systems
- Offline users (Fling, 2009)

GEOLOCATION

When creating a native application, designers can take advantage of features that are often built into smartphones, such as geolocation. Geolocation software allows programs to utilize the user's physical location. This software uses embedded GPS chips or triangulates cell phone towers. Knowing a user's exact location allows an application to provide filtered results. For example, the WorldCat library application (discussed in more detail later) will determine libraries with a particular item closest to the user. Although many devices require a native application to take advantage of geolocation information, newer browser standards are changing this, so some mobile websites can detect location as well (Fling, 2009).

One use of geolocation is augmented reality, where computerized data or images are superimposed top of the real world. The device's camera operates as a lens to the real world, and the device screen depicts the additional information. Sophisticated uses of augmented reality include object recognition, where the view of the object triggers recall of data. For example, one technology called Layar for smartphones uses GPS information and the device's camera to provide information. If one points the camera at a building, for example, an application using Layar could tell you if that company is hiring (Bonsor, n.d.).

GEOLOCATION CONSIDERATIONS

Capturing a mobile device user's location involves many privacy concerns. The Electronic Frontier Foundation is concerned about "threats to locational privacy that arise as a hidden side-effect of clearly useful location-based services" (Blumberg & Eckersley, 2009). Although many worry about applications that allow users to intentionally broadcast location data (Ionescu, 2010) or upload location-tagged photos (Friedland & Sommer, 2010), the EFF is concerned that location data that was never meant to be shared will be disclosed. "In the world of today and tomorrow, this information is quietly collected by ubiquitous devices and applications, and available for analysis to many parties who can query, buy or subpoena it. Or pay a hacker to steal a copy of everyone's location history" (Blumberg & Eckersley, 2009). They suggest building applications that use strong cryptography to transfer information and erasing unnecessary data. The CTIA Wireless Association also recommends best practices for location-based services that include providing users with "meaningful notice about how location information will be used, disclosed and protected" (CTIA, 2010).

RELATED MOBILE TOOLS

LIBRARY WALKING TOURS

Both BeaverTracks from Oregon State University (see Figure 4) and WolfWalk from North Carolina State University are walking tours that display historical photos from library archives. As the user walks around the campus, the application recognizes where the user is using GPS data from the mobile device. According to Tito Sierra from the NCSU library, WolfWalk was created to "increase the visibility and accessibility of university archives by integrating this content in a self-directed, location-aware walking tour for mobile devices" (Sierra, 2009).

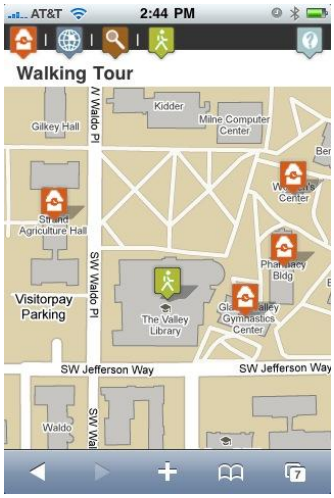

Figure 4 BeaverTracks historical walking tour

MUSEUM APPS AND TOURS

The Museum of London iPhone App, StreetMuseum, uses augmented reality and geolocation to overlay historic photographs on current streets (Barrett, 2010) (see Figure 5). The application instructs users to "hold your camera up to the present day street scene and see the same London location appear on your screen, offering you a window through time" ("StreetMuseum," Museum of London).

Figure 5 Museum of London's iPhone App Street Museum

The San Francisco Museum of Modern Art has changed its traditional audio tour to an interactive iPod Touch tour. Museum visitors can check out a device from the museum in order to follow along with images, video, voice, and

interactive features of the tour. According to one museum curator, “Essentially, we’ve liberated the audio tour. We’ve developed five hours of content, made it extremely portable and easy to use, and devoted it to rediscovering aspects of our collection and its history. This is not about techno-fetishism. It’s about focusing on artworks in meaningful sound and video” (Schneider, 2010).

The Brooklyn Museum also has an iPhone App that allows users to browse and search art collections. This particular app is interesting not because of particularly unique features or design, but because it was created using the museum’s API. An API is an Application Programming Interface that allows outside programmers to create software that accesses services or data. The Brooklyn Museum has created its own API so that others can access the museum’s collections and display them in interesting ways, such as mobile applications. A museum curator commented that the API was essential for having a mobile application because “it’s the kind of thing we couldn’t do with our existing workload and quickly realized the API was allowing us to do more by collaborating with the developer community” (Bernstein, 2009).

PHOTO APPS

Browse *Life* magazine photographs using the Life Mobile app for iPhone (http://www.life.com/iphone/). The application includes editor’s picks, news, celebrity, and travel categories (see Figure 6). The app also includes fun features like the ability to upload personal photos to create a magazine cover and a game where players are judged on their editing eye by selecting images to include in the magazine.

LookBackMaps (http://lookbackapps.net/) is an iPhone app that draws historical photos from many databases, including Calisphere, and maps the photo locations. Like the Museum of London app, the application uses geolocation to find images near the user and has an overlay option to see the historical photo on top of the current scene (see Figure 7 and Figure 8). The application has several bugs and runs slowly, but perhaps this will improve over time.

Several other sites map images such as historical photos and art pieces but do not have mobile applications. SepiaTown (http://www.sepiatown.com/index), Geo Coded Art (http://geocodedart.com/), and Historypin (http://www.historypin.com/photos/) are good examples.

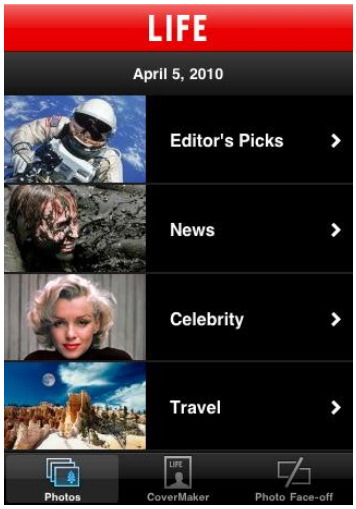

Figure 6 Browse historical photos with the Life Mobile app for iPhone.

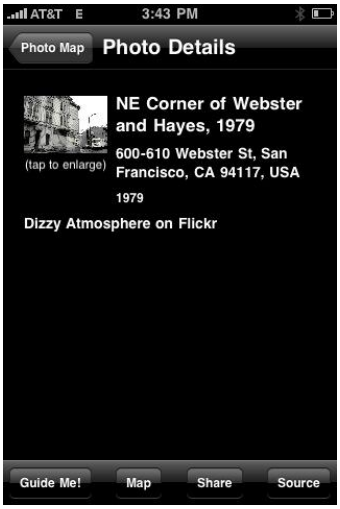

Figure 7 LookBackMaps iPhone app image detail

Figure 8 LookBackMaps historical image overlaid on current scene

SPECIAL COLLECTIONS RECOMMENDATIONS

Although general user findings do not indicate that mobile versions of Calisphere and OAC are necessities, Digital Special Collections content (available through Calisphere and OAC) is a strong candidate for mobile development. Calisphere's image-based content most likely has better potential to engage users in a mobile environment.

MOBILE CALISPHERE OPPORTUNITIES

There are two types of mobile Calisphere tools that may be of interest to users: a mobile version of Calisphere and a "fun" application that showcases special collection content.

The first option is to create a version of Calisphere that is optimized for mobile devices. The content of a mobile version of Calisphere would be similar to the content of the regular website but designed for use on mobile devices. This would likely be used in classrooms such as those that have sets of iPod Touches. Even though kids are good at using non-mobile versions of sites on mobile devices, a mobile version would make this interaction easier. The eighth-grade teacher told us that a mobile version of Calisphere would be useful in the classroom as a research tool: "For kids, a fun app would be interesting, but I think they'd get more use out of more of a searchable app where they'd be able to say this is what I'm searching for, for California history, or I'm looking for information on this and have a wide range of primary source documentation come up, actual documents and pictures, references, everything come up. For their research purposes, I think that would be the most valuable for them as a research tool."

The second option is to create a "fun" application that uses content in Calisphere in unique ways. One possibility would be to use geolocation data to display images in the user's vicinity. Although some applications such as LookBackMaps display historical photos based on location, Calisphere could offer an application that incorporates more of the historical information and special collections that currently exist in Calisphere. Instead of simply showing users photos in the area on a map, users could take a walking tour that points them to various locations that correspond to images in a category. One educator told us that she particularly likes Calisphere because of its grouped content—"For me, it's the stories. I love going in and learning history from the way it's threaded right now"—so it would be ideal to include these unique aspects in a "fun" Calisphere application.

This application could be used by a variety of audiences. The eighth-grade teacher would like an app like this for her own use: "For my own personal use, I would love an app that when you opened it up it was more geared toward adults, would pull you in with stories from history." The district technologist felt that this would be a good tool for students as well: "I'm always fascinated when I see a historic photo and I go to the place where that was taken. I think that would be a really exciting learning tool for students." This kind of application might also generate interest from the general public. Another interviewee, one who was not familiar with Calisphere, told us how she would be interested in an app like this: "If I had an iPhone that could gps me and could like tell things around me, I find that to be really cool."

MOBILE OAC OPPORTUNITIES

A mobile version of the OAC may have some usage, though not as much as mobile Calisphere. A mobile version of OAC would need to be simplified for use on mobile devices, both in terms of content and navigation. In order to really meet user needs in a mobile OAC, further research would need to be conducted to understand key functionality.

Use cases might include a librarian or archivist accessing the record when away from the reference desk or when helping a patron. Students might show a librarian the mobile version of a record when searching for an archive. Researchers might use it to find information while looking at physical archives, but it is not likely that they would be able to use mobile version to carefully study archived materials.

If a mobile version of OAC is created, it should include the entire finding aid as well as the option to search. It should include features like highlighting and numbers of hits. The focus should be on providing the complete finding aid, but digital objects should be viewable as well. Being able to email a link or record to oneself from the mobile site is an important feature. There is currently a button to save or share a record, but it is not optimized for use on mobile devices (see appendix for more details).

DESIGN RECOMMENDATIONS

NATIVE APPLICATION VS. MOBILE WEBSITE

In general, we recommend developing mobile websites rather than applications because of their ease of access (no download required) and cross-platform compatibility. Mobile websites can also be updated regularly, whereas applications can only be updated by downloading updated versions of the application. A website is most appropriate for a mobile version of OAC.

A mobile version of the complete Calisphere site could be either a mobile website or application. If its primary use would be in classrooms using school-provided iPod Touch devices, an application might be appropriate. This would increase usability and decrease load time. If this mobile content has wider appeal, however, a mobile website may be easier to access and update. This would require further investigation to determine.

A "fun" version of Calisphere, however, may be better suited for an application. An iOS application should be developed first, with other platforms following when possible. This application would be able to access the device's GPS capabilities and internal camera. It would also improve usability and load time.

REACHING YOUR MOBILE AUDIENCE

Once mobile tools are developed, it is important to let your potential users know how to find them. An easy way to help users find mobile websites is to auto-detect mobile devices to automatically display the mobile version of the site. This will direct users who try to access the regular site to the mobile version. There should always be a link, however, to the full site so that those with capable devices and interest in accessing full functionality have that option.

Both mobile websites and applications should be advertised through a variety of channels. Survey respondents ranked immediate community members—colleagues and fellow students—as the most likely sources for finding out about new tools and services (66% and 60%, respectively). The next highest method is internet searching (58%). These channels for distribution are particularly difficult to access because they rely on the word of mouth between individuals or discoverability within search engines (and the searchers have to know what they are looking for in order to find it).

The next most common methods drop considerably in percentage, but they are possible methods for dispersion of information. It is possible to spread announcements through campus or department email (34%), the campus website (29%), the library website (29%), or even get coverage in blogs (27%) or through social networking (20%).

Note that the library's Facebook page ranks rather low in percentage (2%), so it should not be the only channel for advertising new tools.

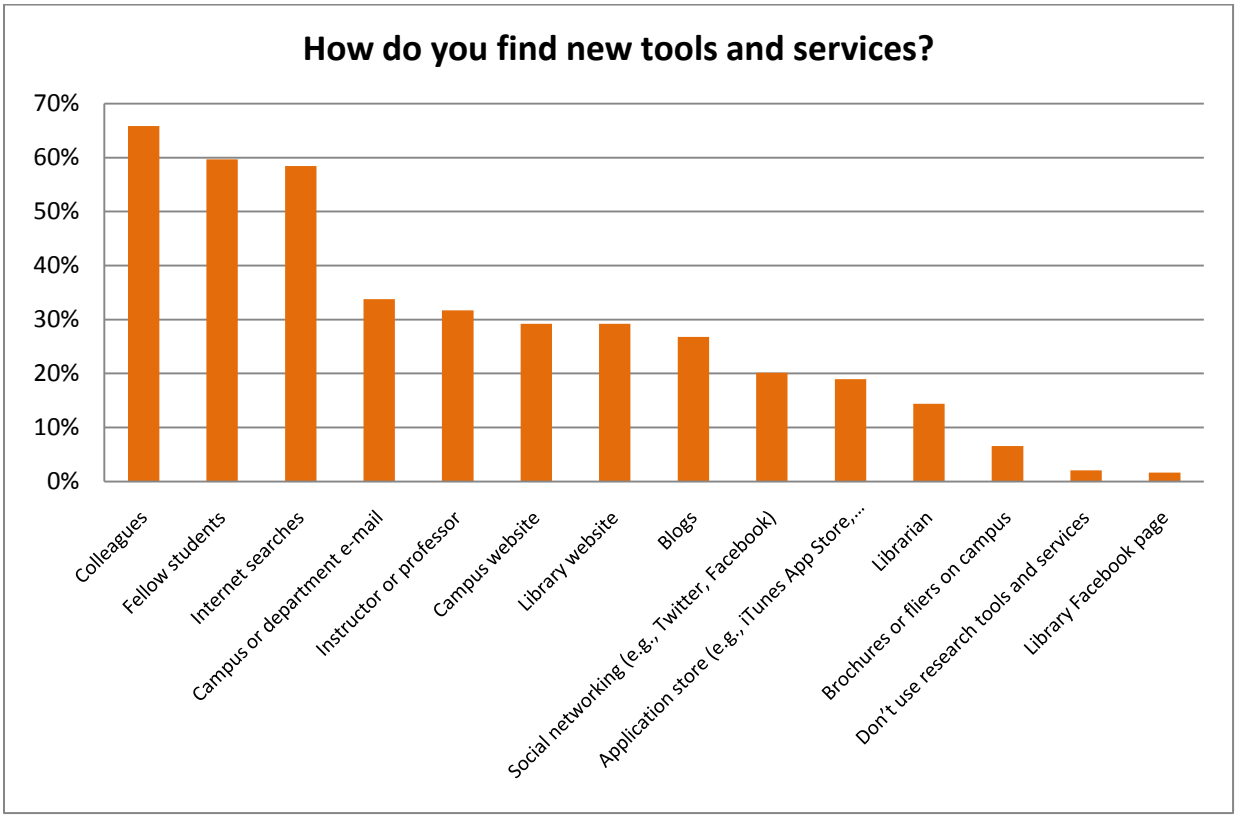

Figure 9 How do you find out about new tools or services that help you in your academic work or research (e.g. Zotero, Ask a Librarian, Dropbox)? (Select all that apply.) N = 243

APPENDIX: CURRENT DSC SERVICES ON MOBILE DEVICES

To help understand how current DSC services function on various mobile device platforms, Calisphere and OAC were tested on three common mobile device platforms: iPhone, BlackBerry, and Android. iPhone screenshots were captured with a real iPhone. Android and BlackBerry screenshots were captured with device emulators and may look and act differently on real devices. Larger versions of these images can be viewed on the wiki.

CALISPHERE

Homepage

The Caliphere homepage loaded correctly on the iPhone and Android emulator, but it not work well on the BlackBerry emulator. On the BlackBerry emulator, the main page kept reloading continuously, each time refreshing the top images. The homepage only loaded eventually on the emulator by letting the device go to "sleep" and then reopening the page. It is not clear why this was an issue or why this fix eventually worked.

Figure 10 Homepage, iPhone

Figure 11 Homepage, BlackBerry

Figure 12 Homepage, Android

Search Results

Search results loaded properly on each of the devices.

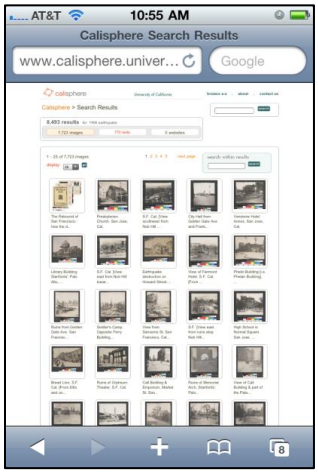

Figure 13 Search results, iPhone

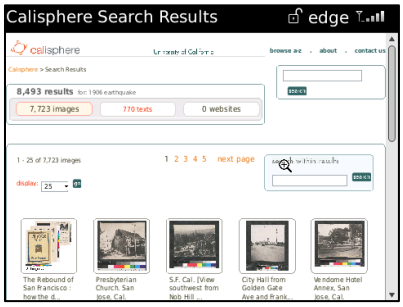

Figure 14 Search results, BlackBerry

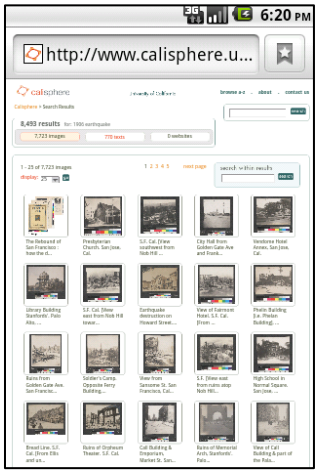

Figure 15 Search results, Android

Image page

Image pages loaded properly on each of the devices.

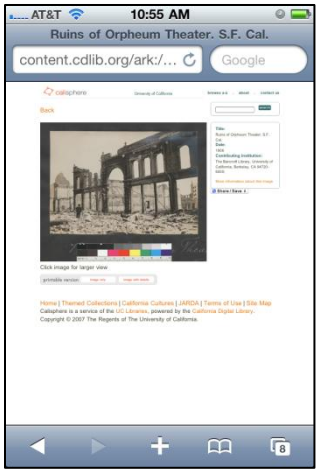

Figure 16 Image page, iPhone

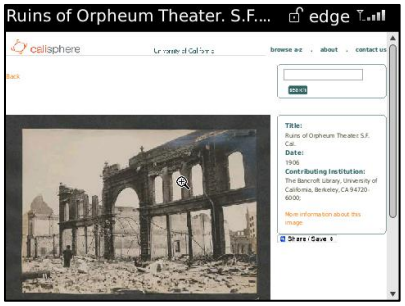

Figure 17 Image page, BlackBerry

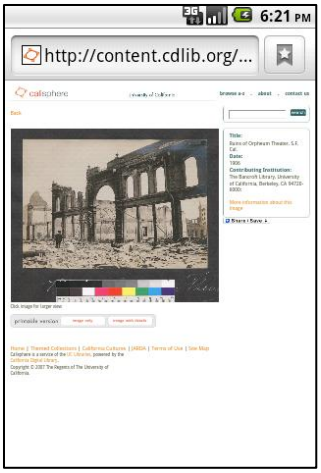

Figure 18 Image page, Android

Collection subtopics

Collection subtopic pages were difficult to access from the homepage on both the iPhone and the Blackberry emulator. It was possible to select the subtopic collection title on each of these devices from the dropdown menu, but the pages do not load on selection like they do on the desktop version. Since there is no "go" button to choose after the title is selected from the menu, there is no way to get directly to these pages. In order to access subtopic pages, it was necessary to first click on the link for themed collections and then select a linked subtopic. This worked much better on the Android emulator, which presented the dropdown menus as clickable buttons.

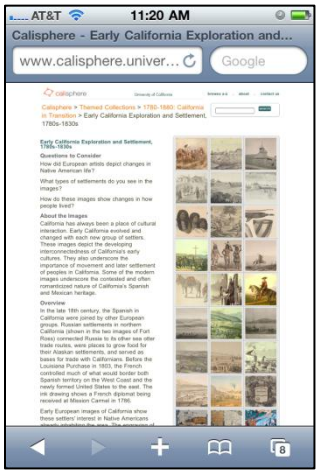

Figure 19 Subtopic collection, iPhone

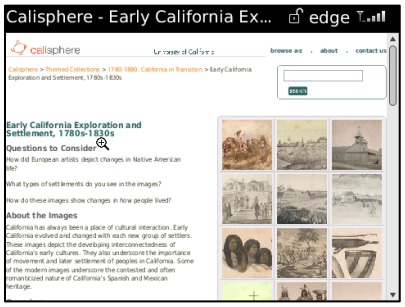

Figure 20 Subtopic collection, BlackBerry

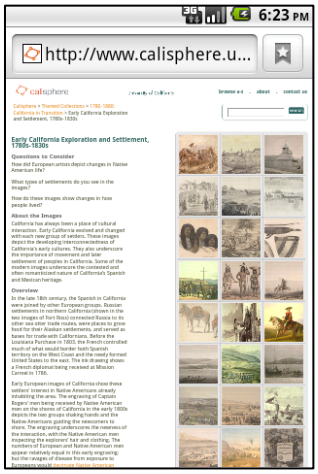

Figure 21 Subtopic collection, Android

ONLINE ARCHIVE OF CALIFORNIA

Homepage

The page's design is wider than it is long, so there is a lot of blank space at the bottom of iPhone and Android screens.

Figure 22 Homepage, iPhone

Figure 23 Homepage, BlackBerry

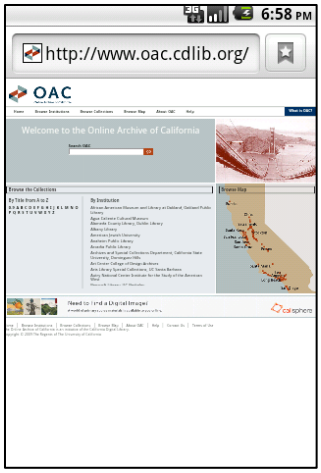

Figure 24 Homepage, Android

Search Results

Search results loaded properly on each of the devices.

Figure 25 Search results, iPhone

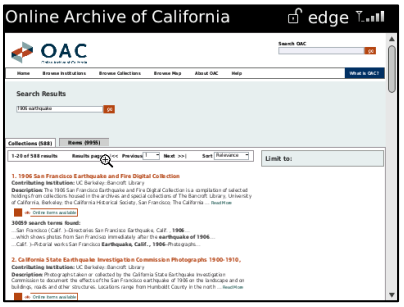

Figure 26 Search results, BlackBerry

Figure 27 Search results, Android

Collection Guide

Collection guides loaded properly on each of the devices. Again, the page is wider than it is long, so there is blank space on the iPhone and Android, but this would vary based on the amount of text on this page.

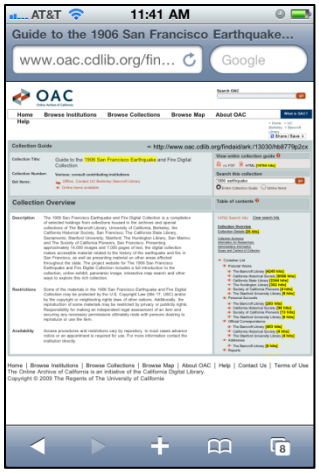

Figure 28 Collection guide, iPhone

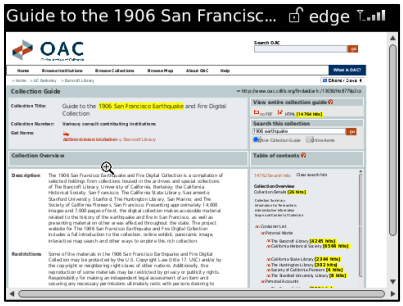

Figure 29 Collection guide, BlackBerry

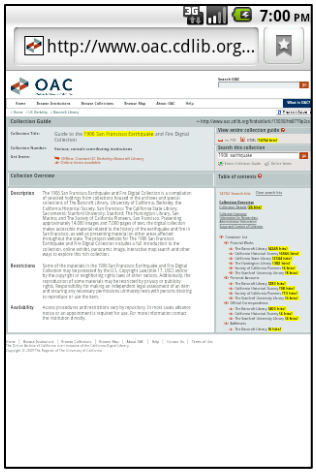

Figure 30 Collection guide, Android

HTML Collection Guide

Only the iPhone was able to load the HTML collection guide properly. The BlackBerry repeatedly presented an error because the requested page was too large. The Android tried to load the complete page for an extremely long time before finally timing out the browser. The PDF version was not tested and should be tested in future work. Although most major platforms can open PDFs, particularly long PDFs can be large files that take a long time to load.

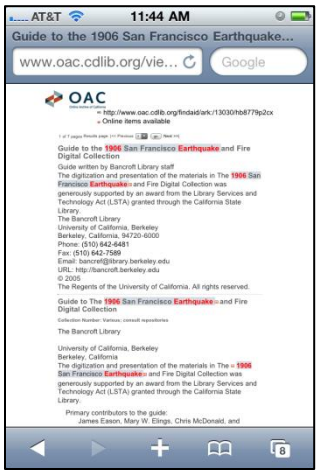

Figure 31 HTML collection guide, iPhone

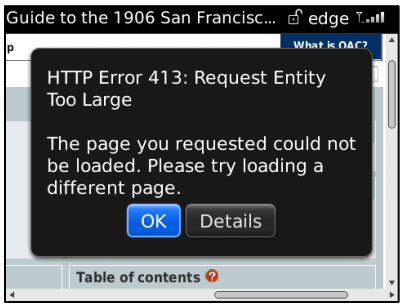

Figure 32 Error loading HTML collection guide, BlackBerry

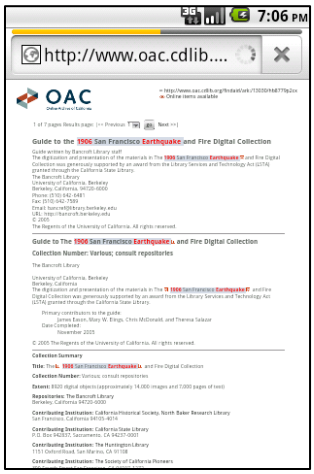

Figure 33 Loading HTML collection guide, Android

Share/Save

The Share/Save widget rendered differently on each device. It opened normally on the iPhone. On the BlackBerry, the image did not render correctly, but the links did. On the Android, a separate page loaded (instead of opening the usual box on the main page) with a complete list of options.

Figure 34 Share/Save, iPhone

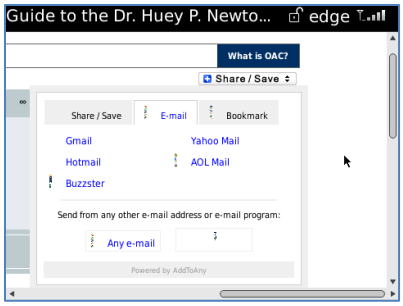

Figure 35 Share/Save, BlackBerry

Figure 36 Share/Save, Android

Email

The “any email” option worked properly on all three devices (and sent emails correctly), though it would be preferable if this option opened the native email client on the phone. As it is, it requires a lot of text entry, including a CAPTCHA (the “type two words” challenge), which are particularly difficult to use on phones.

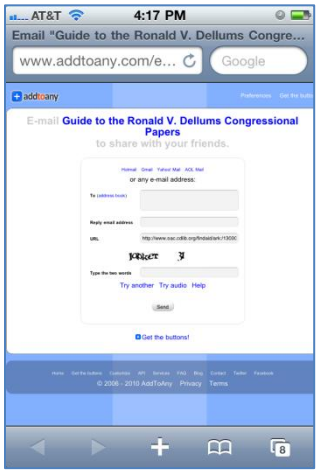

Figure 37 Email widget, iPhone

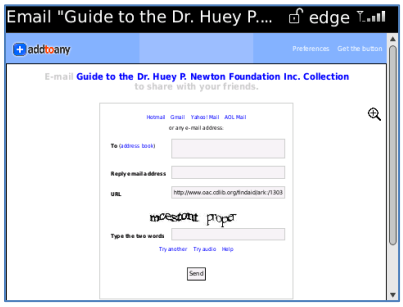

Figure 38 Email widget, BlackBerry

Figure 39 Email widget, Android

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