December 26, 2013

Interim Performance Report Narrative for LG-07-11-0339-11

The Student/Library Collaborative: Toward Transformative Mobile Library Service

As stated in the grant proposal, the main purpose of this grant is to coordinate a two-year student collaboration program that will co-design mobile applications with students that provide location-based services to assist users in finding and locating library resources, collections, and services. This collaborative program will document best practices for working with student design teams, as well as lessons learned and the benefits of student mentoring.

Due to a 6 month delay in hiring our research programmer and project manager, we asked for and were granted a no cost extension. Thus, our end date for the grant activities has been extended to November 2014. In the past year we have accomplished almost all of our intended goals.

Goals of the grant are to:
1. Increase student collaborations and input into library software design;
2. Improve the abilities of libraries of all types to provide services for location-specific information needs;
3. Broaden access to library collections;
4. Create connections between changing student computing uses and library resources and services

Compare actual accomplishments with goals established for the report period. Whenever possible, describe activities or services in both quantitative and qualitative terms. If interim project goals have not been met, explain why, describe what steps have been taken to get the project back on schedule, and discuss the likelihood that the project will be completed by the expiration date of the grant.

Goal 1: Increase student collaborations and input into library software design
Accomplishments:
- We successfully hosted a Student Mobile App Design Competition in February 2013. A total of 27 students, participated, forming 6 teams. Each team produced a design and mock-up for a mobile application to improve their use of library resources and services.

   Highlights of the competition included:

- Designed contest rules and student information packets, based on a similar case study competition in the School of Business.
- Developed a license agreement with Campus Legal and the Office of Technology Management. This agreement was vital to making the ideas and applications resulting from the competition available for further development and sharing with the general library mobile development community.
- Posted a blog on the IMLS site related to the competition (available at: http://blog.imls.gov/?p=3499).
- The Fall CS 492 class has started work on the "Study Buddy" application proposed by one the February 2013 competition teams. The development team from CS 492 has three members that will work on the application through the end of the spring 2014 semester.

- In Fall 2013, we organized a Coding Camp, in which students spent a weekend working with grant personnel on coding mobile apps for library use, based on their own ideas as well as suggestions from the Student Competition
  - A total of 10 participants were chosen, and 6 showed up for the camp.
  - Participants divided into 2 teams, and generated code for 2 mobile apps, both based on location aware services and APIs/data feeds from the library and/or campus.
  - Hosting the Coding Camp required an additional Institutional Review Board application and documents. This was not initially included in the IMLS grant proposal, so we sought permission to sponsor this event, rather than a second Student Mobile App Design competition. The reason was that we wanted to investigate how students with computer programming skills improve or extend existing software used for mobile devices and applications in a library setting, and also to focus on developing a methodology for designing and creating mobile applications in collaboration with undergraduate students. The purpose of the research was to discover best practices for collaborative mobile application development, as well as to identify student needs and interests for future mobile application development. The work that students developed helped us design templates and procedures that can be used for future mobile application development by both students and librarians. We then wanted to compare the two programs (Student Mobile App Design Competition and the Library Mobile App Coding Camp) to determine potential future use for Libraries.
- Computer Science Classes: The partnerships we developed with a Computer Science class to develop mobile location-aware applications continued. The classes that have been working with us for the grant are CS 492 (Fall 2012 / Spring 2013), CS 428 (Spring 2013), CS 492 (Fall 2013 / Spring 2014). Highlights of this collaboration include:
  - Weekly meetings with students to discuss ideas and progress
  - 12 code modules have been prototyped (6 for Android and the same 6 for iOS) to support the students' work and app concepts

- 12 web services based on these modules have been deployed to support student prototypes. The web services provide data to the corresponding app modules. For example, the Citation web service provides data to the Citation Module. There are four new Study Buddy modules that support the Fall computer science course of searching for a course, adding a course, registering a study group for a selected course on campus, managing the length of time for the study session. There is also a registration web service which re-uses the VuFind catalog login to authenticate the user is affiliated with the University of Illinois campus.
- We developed a Universal iOS (iPad, iPhone, iPod touch, etc.) modular infrastructure + 5 modules approved by iTunes Store that can be used as a base for many other Apps that can be modified by Libraries.
- One of the best ideas from the competition is currently being developed (beginning in the Fall 2013 semester and running through Spring 2014) into a fully functioning mobile application. The idea, coined "Study Buddy", allows students to announce to their classmates what they are studying and where they are studying. Likewise, it allows a student to find their classmates at study locations on campus in order to join impromptu study groups. The team that is developing this into a functioning application are students in the computer science senior design class (CS 492/493). This class spans both Fall 2013 and Spring 2014 semesters and is designed to involve students is "real world" software development projects.
- A computer science class in Spring 2013 (CS 428 - Senior software engineering) worked with the grant team to develop improved access to the library's online "Ask a Librarian" synchronous chat service.
- The CS 428 Senior software engineering course initially looked at building out a mobile app component that would provide mobile access to the popular ask a librarian chat service in the library. However, after consulting with the library Software Development Manager and investigating the underlying computing needed to support chat we realized that rebuilding the infrastructure to support chat would be necessary and the senior project class contributed code toward re-architecting the library chat software system. This collaboration with the library included grant staff supporting student coding and software libraries that met librarian and student needs in online virtual reference. After the CS course ended the grant's research programmer worked to improve the applications look and feel, its performance and scalability. Then the research programmer and grant investigator's organized usability testing with other library staff to ensure the application would handle the needs of a virtual reference desk.
- Computer science courses have a valuable contribution in the three-tiered grant structure of competition and coding camps and courses. The computer science courses are the places in which already defined projects with clear deliverables, like a "Study Buddy" application can be coded and implemented. This dovetails nicely with the competition since a competition generates many ideas from a diverse set of perspectives across campus, but doesn't generate code or an implementation. The coding camps do produce code, but this code is exploratory

in nature and students from the coding camp aren't in a position to assist with implementation.
- The partnership with computer science classes has involved 14 students. The collaboration included 3 students from Fall 2012/Spring 2013 CS 492, 3 students from Fall 2013/Spring 2014 CS 492, and 8 from Spring 2013 CS 428.

Goal 2: Improve the abilities of libraries of all types to provide services for location-specific information needs.

The following activities relate to this goal:
- Design ideas from the Student Competition did yield several Apps that the team later developed. The team used the existing Minrva infrastructure to create modules based on the student ideas. Documentation was created of best practices, including documents for consulting with faculty and courses for student involvement in App development, documentation for IRB approval, documents for licensing approval and documentation (16 pages) for App development.
- The code infrastructure for modules, the iOS modular framework and the five iOS modules mentioned above, will allow libraries to use the infrastructure and modify/customize it according to their needs. Also completed are initial library staff-facing applications consisting of 1 module with write up.
- As a test for the implementation of the Minrva codebase in libraries outside of University of Illinois, grant staff reached out to the statewide Consortium of Academic and Research Libraries in Illinois (CARLI) for beta testing of the Minrva Core. The Minrva 2.0 for Android supports location specific modules available to all CARLI I-Share libraries.
  - Specifically, any I-Share library in Illinois can use Minrva 2.0 for Android as the Native mobile app to search their VuFind catalog. In addition to catalog search the Minrva Core includes the following modules available throughout Illinois:
  - Blocks: Displays a list of blocks against a user account. Information includes: the institution that assigned the block, the day and time that the block was instituted, and the description of the block.
  - Checked Out: Displays a list of checked out items. Information includes: the title, institution, due date, and current status ("Checked-out" or "Renewed") of the borrowed item. Users can renew any of their currently checked-out items.
  - Citation: The citation module is designed to allow a user to quickly and accurately cite a wide variety of sources in either MLA or APA format. The module also allows the user to email the completed citation.
  - Course Reserves: Allows you to quickly view all reserves for a particular course, including print reserve materials, electronic reserves, and any media items. Simply search by course, instructor, or department.
  - Favorites: Displays a list of "favorite" items. Information displayed in the favorites module includes: the title of the "favorite" item along with the author(s), artist(s), subtitles, etc.

- o Fines: Displays a list of all fines associated with this account. Information displayed in the fines module includes: title of item, date fine was levied, amount, and type of fine.
- o Question Board: The Question Board module displays a list of questions and answers. The Question Board is an anonymous question and answer service provided by the Undergraduate Library at the University of Illinois.
- o Requested Items: Displays a list of all of the items that a user has requested. This module also allows the user to cancel any requests that they have placed.
- In Fall 2013 we selected 7 CARLI I-Share libraries and contacted them asking if they would be involved in MINRVA 2.0 Android pilot program. Of those 7 we have made the most progress with Harper College Library. With Harper, we are currently preparing promotional materials (social media and flyers) to promote MINRVA to Harper students when they return from winter break around Jan 13, 2014. We are currently having conversations with 2 of the 7 contacted (SIU Edwardsville and Heartland Community College) in order to plan pilot programs. One of the seven we contacted indicated that they would prefer to wait until an iOS (iPhone, iPad, etc) version is available before participating in a pilot program.
- In Spring 2013 results and lessons learned from the competition were presented at the Association of College and Research Libraries national conference
- We are currently planning three publications as part of our communication plan, including one each on the Competition, Coding Camp, and work with Computer Science classes. All three are targeted for submission in the 2014 calendar year, and will be written to provide examples and best practices for libraries looking to replicate each of the specific collaborations we have investigated.
- Code for the Ask a Librarian chat application is planned for release under the NSCA open source license in 2014, furthering the goal of supporting libraries nationally as a with software outputs co-designed by students and grant staff.

Goal 3: Broaden access to library collections.

The development of additional Apps (modules within Minrva) provide easy access to multiple library Apps.
- Minrva 2.0 for Android is now available and includes modules that CS courses helped to develop. (https://play.google.com/store/apps/details?id=edu.illinois.ugl.minrva) The infrastructure used incorporates modular design, documented RESTful APIs, and middleware that can be adapted to and used for other libraries.
- Minrva Builder: The modular infrastructure of the Minrva Apps has allowed for the development of Minrva Builder. Minrva Builder is currently being designed to generate library specific apps (Android and iOS) from prebuilt modules. Libraries will be able to generate apps by downloading the builder along with their favorite modules. The steps to generate an app involve a few simple clicks. In addition, since every library has different data sources, Minrva Builder allows Libraries to easily change the source of the data feeds that provide data to the apps generated. We are currently using the modules previously created for Minrva iOS and Android as test modules for Minrva Builder.

- Virtual Shelf App: Virtual Shelf generates real-time shelf lists from a start and an end barcode number. The initial idea for this App resulted from Michael Doran's ShelfLister program. Due to the initial Web service and Modular codebase that had been previously built for the *Minrva* App, it was a quick process to make the Virtual Shelf app operational. For example, the "Search" module and the "Scan" module provide the barcode inputs for the Virtual Shelf App. In addition, the "Home" module can provide detailed information about a book that is chosen from the Virtual Shelf list. One of the main reasons the development time could be kept to a minimum is because the Minrva framework emphasizes modular development revolving around library items. The modules are very analogous to content management modules revolving around web pages and can build upon each other's functionality. The first round of user experience research for the Virtual Shelf app began in November 2012 with the goal of exploring features that could be added in 2013.
- CS492 Modules: Our work with the computer science class has also produced fruitful results.
    - The CS 492 group has created a Citation Generator module that will automatically create an APA or MLA formatted citation from a digital book record or from user input. The group has included the ability to e-mail the generated citation to an e-mail address.
    - In addition, the CS 492 group has created five apps to integrate library account access into the mobile device. The features the new apps provide include access to a user's favorite books, checked out items, requested items, fines, and holds.
    - If the group finishes the projects ahead of schedule, the group plans to begin work on a Room Reservation module and a Bus Route module. The Room Reservation module will help keep track of meeting room availability, and the Bus Route module will help guide users to the nearest library and/or other academic resource.
    - Other ideas from CS 492 group include an Ask the Librarian module and an Hours and Events module.

- Once the student App competition concludes the team will have student generated ideas to develop during summer and fall 2013.

Goal 4: Create connections between changing student computing uses and library resources and services
- We conducted usability studies to gain insight into the use of the Virtual Shelf app and other Apps that have been created.
- Apps developed by the computer science classes were also tested through usability studies. We also interviewed the students who created the Apps to learn from about their views on importance for the design of those Apps in relationship to finding library materials.
- Although not initially part of the plans for the grant, after hearing a student suggestion, the team implemented an augmented reality sandbox using an already existing codebase from UC Davis found here:

http://idav.ucdavis.edu/~okreylos/ResDev/SARndbox/MainPage.html. This development could be beneficial in our further exploration of tools that might be useful for libraries to provide access to special collections materials, especially any collections that have been photographed with 3D software.

- Students who participated in the Coding Camp were also interviewed to learn of their experience and further ideas for students designing and creating Apps for the Library.
- Our library has accepted the student designed Ask a Librarian web app into production, and we plan to launch it in Spring of 2014 to improve student access to research services, and the overall user experience of accessing library resources

Describe any significant findings or accomplishments in this period.

- A significant accomplishment was the release of Minrva 2.0 for Android, which is the first native app available for libraries as a consortia (82 I-Share libraries belonging to CARLI) implementation.
- Another accomplishment was the planning, documentation and successful recruiting of 35 students for the Student App Competition that took place in February 2013.
- CS students work on helping to re-architect the library chat system for virtual chat integration into mobile apps and library webpages.
- The planning, documentation, recruiting and execution of the Coding Camp was also a notable accomplishment for this period.
- A significant finding from both the Student Competition and the Coding Camp was the need to involve multiple data sources from across campus in order to produce mobile apps that will be useful to students. Specifically, students had a keen interest in space issues, including discovering spaces on campus they didn't previously know about, investigating how busy or loud a space was before they walked across campus to get to it, and communicating the space they were in to classmates.
  - o A related finding was the strong connection students made between classes and working with peers and the use of library services. Most of the competition app ideas revolved around designing a mobile way to identify, locate, and establish ad hoc study groups with peers in ones major or a specific class.
  - o Additionally, students did not view the library as an independent silo of resources, but rather part of the larger context of their class experience. This led to design suggestions for apps that placed the course and classmates at the center of the app, and tied in library resources and services as "features" to enhance the apps experience, but not necessarily the primary focus of the apps design.

Include other comments or anecdotal information that shows project achievements or lessons learned in this period.

- As with the Student Competition, we experienced similar delays in Institutional Review Board approval for the Student Coding Camp. The various interactions planned with students (work with computer science class students, student competition, and general usability studies with students and the Apps) also required IRB approval. It may have been prudent to submit three separate proposals, rather than to put them altogether in one review, because of the complexities involved. Developing the student contracts for

licensing, rights, and intellectual property for Apps being developed added an extra month to the process, but we now have some good examples for other libraries to modify.

- When working with classes, it is helpful to have some tie-in with grades or course expectations. Direct involvement with professors is a good way to provide students with motivation to complete work. For example, a potential group of students from CS 465 backed out of their volunteer work obligations after encountering the first potential technical issue. Conversely, the CS 492 group has remained because of the tie-in with a grade.
- Small cash rewards seem to be a large motivation for student participation. When trying to reach out to student ACM (Association for Computing Machinery) groups, they were very reluctant to work on projects for the library in fear that their work would be overshadowed by the library's name. On the other hand, when we sent news of a competition with small cash rewards, the ACM group was more than happy to advertise for our project. We found the same to be true with the Coding Camp. Students reported that having some incentive/competition or reward might have resulted in more students participating.
- Providing food at the Competition and Camp events was a vital part of their success. Student feedback showed that this helped break the ice and accelerate building the trust necessary to be productive in the short turnaround time of both of these events.
- We gathered data from students on how to run another Code Camp if we are to plan another we would offer additional more coding training up front, provide multiple opportunities for feedback and closer guidance in order to steer students toward more open frameworks earlier on. We may, additionally try to offer the coding camp for a longer time frame so that students can gain coding familiarity while producing products that the library can use.

Timeline from Year 1: Because our last report (December 2012) described activities from our first 6 months, we include here our Year 1 goals, which were all accomplished:
- Hire a programmer
- Work with partners to gather input for tools
- Create initial APIs from ideas
- Plan the student competition to select teams
- Train and mentor students
- Do usability testing
- Create documentation

From our timeline for Year 2, our goals were to:
- Develop Apps and conduct user testing of the Apps
- Create best practices documentation for student/library collaborative projects.
- Make APIs for extending previously un-used library data openly available to the library
- Make mobile application code made freely available for libraries to re-purpose.
- Create lessons learned documentation/videos in the location-based needs of students are produced.

- Make stable, production level applications freely available on device specific application stores such as the iPhone App store and the Android Market.
- Present information and results at Conferences

We have made excellent progress at accomplishing the goals for year 2, even though we still have six remaining months until the end of year 2. As noted above, we have developed Apps based on student feedback and user testing, have made stable production level applications freely available on device specific application stores, have made the code and APIS available for libraries to re-purpose and have already created much of the documentation and examples that may benefit others.   We are finishing up the efforts for making everything available and accessible to the public, and will be using the remaining six months to create best practices documentation and lesson learned documentation/videos, as well as concluding the activities of the Computer Science Classes. The information will be added to our webpage: http://www.library.illinois.edu/nlg_student_apps.

We have already presented our efforts at local and national conferences, with another one anticipated for Spring 2014. In addition to the blogpost about the student competition that was already created (mentioned above) we are working on a couple of articles we hope to publish about our efforts.