Resource Management System (RMS)

Management Plan

February 26, 2015

Group E

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Scope

Management Plan Purpose

This document maps out the process of our planned user experience research and the resulting revisions to a learning application prototype designed for medical residents. Within are goals, guidelines, and milestones that will guide the research and revisions.

Project Concept Statement

Resource Management System (RMS) is a robust mobile application that supports the professional and academic activities of surgical and podiatry residents at INOVA hospitals. RMS serves as a repository of selected resources identified by both residents and residency program instructors. These resources are essential for the development of industry-leading general surgeons and podiatrists. RMS includes additional features that enable residents to manage their time and responsibilities, to prepare for exams, and to give feedback to educators on how to improve the overall quality of education and training within the residency programs.

Stakeholders

Advanced Surgical Technology Education Center (ASTEC) Administration

- Dr. Graling, Director of Education
- Dr. Dort, Vice Chairman of Education
- Dr. Moynihan, Department Chair, Surgery
- Dr. Bachman, Director of Surgery
- Franco Piscitani, Operations Manager
- Larry Walker, Simulation Technologist

INOVA Fairfax Residency Members

- Residency Faculty
- Attending Doctors
- Podiatry Residents, Post-Graduate Year (PGY) 1-3
- General Surgery Residents, PGY 1-5

Development Team
Dr. Patrick Gallagher
Dr. Brenda Bannan

Research Goals, Questions, and Methods

The main objective is to design the ideal resident user experience with mobile learning and inform prototype revisions. To achieve this, we will need to identify the current assets and gaps of the RMS prototype. This will be accomplished through two cycles of user experience research. Data will be gathered as users navigate through each of the applications functions.

Table 1. Alignment of research goals and questions to research methods.

Research Goals	Research Questions	Methods
To identify what **features/functions** are **most helpful** to the residents in planning learning tasks.	Do affordances allow the user to intuitively understand the purpose of the application and employ natural task-completion strategies?	• Survey that captures which features and functions are quickly understood • Think-aloud prompting the participant to describe what they think each item will do
To identify a **logical structure and flow** of the application.	Do cognitive affordances allow the user to access each planned task? Does the task screen show users what they expect? Do user expectations match how the task functions? Are power users and novices supported in their efforts to find efficient ways to carry out tasks?	• Think-aloud with residents as they perform requested tasks • Pre- and post-survey to gauge whether expectations were met • Analytics to identify gaps (represented by lag time)
To identify if **physical actions** (buttons) are efficient for users.	Are users able to correctly manipulate targets within the application?	• Think-aloud with residents as they perform requested tasks • Usability test with analytics to identify time on task and if users are backing out of getting lost
To identify **"stickiness" and user attitudes** toward the RMS mobile application.	What do they think? What do they feel? Is it useful?	• Open-ended interview after testing • System Usability Scale (SUS) Questionnaire

Schedule

Milestones

Milestone	Due Date	Status Check-In Dates
Project Management Plan	February 26, 2015	
Revisions: Alpha Prototype	March 19, 2015	March 9, 2015
Round 1 Research		March 9-13, 2015
Round 1 Results Briefing	April 2, 2015	
Revisions: Beta Prototype	April 2, 2015	April 2, 2015
Round 2 Research		April 6-10, 2015
Round 2 Results Briefing	April 30, 2015	
Revisions: Gold Prototype	April 30, 2015	
Final Presentation	May 7, 2015	

Work Breakdown

1. Planning and Development

- Assign roles and responsibilities
- Create research management plan
  - Identify research goals and questions
  - Align research methods to goals
  - Identify representative audience
  - Describe success criteria
  - Create testing script
  - Create schedule
  - Identify risks and mitigation techniques
- Review initial prototype pilot test results
- Revise prototype based on pilot test results

2. Round 1 – Implementation and Analysis

Schedule test
Execute test
Analyze data from test
Identify and prioritize a list of prototype updates

3. Beta Prototype Update

4. Round 2 – Implementation and Analysis

Schedule test
Execute test
Analyze data from test
Identify and prioritize a list of prototype updates

5. Gold Prototype Update

6. Report Findings

Development Team Roles and Responsibilities

Planning and Development

Management Plan Lead: Kara Pantalena
Management Plan Writers: Vi Huynh, Candice Bowes, Dina Saffouri
Editor: Kimberlie Fair
Prototype Revisions Lead: Nathan Walby
Prototype Revisions Support: Kimberlie Fair

Round 1 – Implementation and Analysis

Testing Facilitator: Candice Bowes
Evaluators: Kara Pantalena, Dina Saffouri, Vi Huynh

Beta Prototype Update

Prototype Revisions Lead: Kimberlie Fair
Prototype Revisions Support: Nathan Walby

Round 2 – Implementation and Analysis

Testing Facilitator: Dina Saffouri
Evaluators: Kara Pantalena, Candice Bowes, Kimberlie Fair

Gold Prototype Update

Prototype Revisions Lead: Nathan Walby
Prototype Revisions Support: Kimberlie Fair

Final Presentation
Lead: Vi Huynh
Editor: Kimberlie Fair
Presenters: Candice Bowes, Kimberlie Fair, Vi Huynh, Kara Pantalena, Dina Saffouri, Nathan Walby

Communication

E-mail
E-mail will be the primary form of immediate communication between team members and between the team and stakeholders.

Blackboard
Blackboard will be the primary repository for all files. It will also serve as the location to house project brainstorming and prototype specifications. Remote, synchronous meetings will occur using Blackboard Collaborate.

Face-to-Face
When feasible, face-to-face meetings will be held at the George Mason University campus.

Google Documents
Deliverables will be shared via Google Documents so that all team members can synchronously collaborate on creation and editing of a single document, thus eliminating circulation of multiple copies.

Axure
Axure (http://www.axure.com) will be used as the prototype development platform. Benefits include the ability for a developer to design without the need for coding, and the ability to work collaboratively on a single project with version control. The prototype can be hosted on Axure's server, facilitating testing by allowing the prototype to be accessed by any mobile device with a browser.

Project Dependencies

Assumptions

For successful completion of the RMS, the development team assumes:

- Availability of at least 1 resident to provide user experience data. If no residents are available, than RMS proceeds with secondary participants as needed to obtain user experience data.
- Only two user experience research cycles will be conducted regardless of data quality or data volume (Round 1 and Round 2).
- Continued access and use of the Axure software tool for prototype revisions.
- Low-to-medium fidelity prototypes are acceptable for each of the two prototype revisions.
- Availability of development team staff between February and the end of the semester to be five team members supporting project tasks at various levels of effort.
- The final presentation consists of no more than 15 PowerPoint slides and no more than 20 minutes of presentation delivery.

Constraints

The RMS project is limited by:

- Resident schedules. Already working 60-80 hours a week, residents do not have much personal time to devote to user experience research.
- A small pool of potential participants. Our user is a medical resident, of which there are only 30 at Fairfax Hospital.
- The prototype development platform. While robust, the platform limits our ability to develop a fully functioning mobile application.

Project Completion Dependencies

Table 2. A detailed look at how project dependencies divided into project phases.

Phase*	Task	Outcome	Task & Outcome Dependencies	Status (Completed, In Progress, Red Flag)
Planning	T.1 Development of RMS Research/Project Management Plan.	O.1 Approval of RMS Plan.	N/A	Completed
Recruitment	T.2 Identify and recruit residents and other participants for round 1 user experience research.	O.2 Commitment of resident/other participants for round 1.	T.1, O.1	In Progress
	T.3 Identify and recruit residents and other participants for round 2 user experience research.	O.3 Commitment of resident/other participants for round 2.	T.1, O.1	In Progress
Round 1 Research	T.4 Complete round 1 user experience research.	O.4 Raw data from round 1 research ready for analysis.	T.2, O.2	TBD
Round 1 Data Analysis	T.5 Complete round 1 data analysis.	O.5 Round 1 Data Analysis Report outlining key themes and list of potential revisions.	T.4, O.4	TBD
Beta Prototype Revisions	T.6 Complete low-to-medium fidelity prototype revisions.	O.6 Updated prototype ready for round 2 research.	T.5, O.5	TBD

Round 2 Research	T.7 Complete round 2 user experience research.	O.7 Raw data from Round 2 testing ready for analysis.	T.3, O.3, T.6, O.6	TBD
Round 2 Data Analysis	T.8 Complete round 2 data analysis.	O.8 Round 2 Data Analysis Report outlining key themes and list of potential revisions.	T.7, O.7	TBD
Gold Prototype Revisions	T.9 Complete low-to-medium fidelity prototype revisions.	O.9 Update prototype ready for Final Presentation.	T.8, O.8	TBD
Final Presentation	T.10 Develop Final Presentation.	O.10 Delivered Final Presentation.	T.9, O.9, All risks mitigated	TBD

**Each phase cannot begin until all tasks are completed and outcomes are identified from previous phase.*

Risk Mitigation

Table 3 outlines the risks to overall project completion. Core areas for risk mitigation include research design, user testing, data validity, data analysis, and prototype revisions.

Table 3. RMS project risks and mitigation.

Risk Type	Risk Description	Variables	Probability	Mitigation Approach
Research Design	The use of surveys and think-alouds as the only data collection methods results in limited information for prototype revisions.	• Methods selected • Data quality	High	• Incorporate post-test discussion and a questionnaire in Round 2 research. • Review data quality from Round 1 and modify design in Round 2 as needed.
User Testing	No residents participate in Round 1 and Round 2 user experience research.	• Recruitment effort • Testing dates • Resident schedules	High	• Request participation by February 27th and assess commitments 2 weeks before testing begins. • Offer multiple dates and locations for testing. • Limit testing time to no more than 1 hour.
User Testing	Residents unable/unwilling to complete user experience research or provides non-usable data.	• Participant motivation • Participant understanding of research requirements	Low	• Recruitment communications emphasize value and importance of user experience research. • RMS facilitator to provide scripted instructions to participants at start of research.
Data Validity	Data fails to identify real usability issues that need to be addressed.	• Data quality • Data analysis methods	Medium	• Include two rounds of research to ensure adequate data. • Schedule each round of research at least 2 weeks apart to allow for sufficient time for multiple methods of data analysis and reflection.

Risk Type	Risk Description	Variables	Probability	Mitigation Approach
Data Validity	Data identifies a usability issue that is not real (false positive).	• RMS researcher knowledge and understanding • Supporting data	Medium	Prepare RMS researchers to properly assess user experience data by providing historical data (i.e. WAAD, interview data).
Data Analysis	RMS researchers unable to identify and prioritize key revisions to prototype due indecision and volume of data.	• Data analysis methods • Data analysis parameters	Medium	• Review and agree on the objectives for data analysis phase. • Set realistic timeframes and deadlines. • Provide at least 2 members to support data analysis.
Prototype Revisions	Revisions do not adequately address issues identified by test data.	• RMS development team understanding of data analysis and revision requirements	Medium	• Schedule meetings between Data Analysis and Development team members to develop understanding of proposed revisions.
Time	Insufficient time to complete all project requirements on schedule.	• Staffing • Level of Effort	Medium	• Develop a work-breakdown structure to assign allocate resources • Define scope and quality expectations/requirements for each core task.
Staffing	Team member absences and/or limited availability during core phases of project resulting in lack of production.	• Other team member commitments • Unknown	Low	• Rotating staff roles • Early commitment from team members on planned absences.

Prototype Development

Background

We developed a click-through, medium fidelity, “T” prototype for our mobile application: *Resource Management System* (RMS). This initial RMS prototype was designed based on the project team’s contextual analysis, system requirements and modeling, and wireframe design. The RMS prototype was pilot tested to capture user experience, document user feedback, and identify any potential gaps in functionality or design. The project team will develop subsequent versions of the RMS mobile application by incorporating user experience evaluation data.

Pilot Test User Feedback

Our pilot testers identified several areas of design improvement, such as changing the back button, changing wording for resources, and changing icons. Many testers had difficulty moving past the medium fidelity of the prototype, requesting that tasks be more thoroughly completed or that placeholder resources align with their curriculum. Testers also suggested additional features, such as a frequently asked questions page, sharing option, and chat feature. For detailed user feedback, refer to Appendix A.

Alpha Prototype Updates

- Save login
- Add a home screen and button
- Change to INOVA logo and colors
- Standardize menu across all screens
- Create in application and internet search
- Change “Instructor Resources” title to “Assigned Resources”
- Allow for sharing resources
- Create ability to add notes and annotations
- Allow for pushed announcements
- Create a tutorial
- Create a pending evaluation queue
- Add text under the chrome buttons
- Allow uploading PowerPoint files into resources
- Create a new back button

Round 1: Beta Prototype

To be determined by round 1 testing. Will be updated by April 2nd.

Round 2: Gold Prototype

To be determined by round 2 testing. Will be updated by April 30th.

User Experience Research, Round 1

Purpose

The *Resource Management System* (RMS) is a mobile application whose primary user is a medical resident. Changes to the prototype are driven by feedback obtained from pilot testing. See changes under “Alpha Prototype Updates.”

The purpose of Round 1 of the user experience research is to determine how well the changes made in the alpha version of the RMS prototype address user confusion and concerns with the product. Round 1 will focus on task structure and logical flow within the application. Feedback from round 1 will inform prototype updates and methods used for round 2.

Audience and Recruitment

IRB approval was granted prior to research and development of the prototype. Signed consent forms are on file for participating residents and staff.

Our participant profile revolves around medical residents. Our user demographic consists of adults with a medical degree and who are in a residency program at a hospital. They are familiar with technology and all have a cell phone.

As scheduling and availability for residents are an ongoing constraint, participants will consist of as many podiatry and/or general surgery residents and as many instructional staff as are available and willing to participate. Recruitment will be done through one or more of the following methods:

- a request via email for an appointed time wherein all potential users are invited to come participate,
- Guerrilla style, spontaneous face-to-face invitations to participate as residents are available, and/or
- other recruitment methods as may be deemed appropriate.

In the event that an insufficient number of ASTEC resident users can participate, adult users familiar with mobile phone applications will be recruited on an invitational (Guerrilla) basis. This will be an acceptable alternative to the primary user because Round 1 testing emphasizes research to refine tasks and flow.

Resources

The resources for Round 1 of user experience research will include the following:

- A link to the RMS alpha prototype
- A cell phone with internet connection (participant-provided)
- A voice recorder and/or a camera
- Script

- Survey directions and questions
- Writing utensils and scratch paper

Testing Environment

To increase the convenience and ease of user participation, the RMS team will conduct the research in an environment that is most accessible to participants. This may include home residence, ASTEC facilities, and public libraries. However to ensure adequate data collection, test environments will have several of the following characteristics:

- Adequate privacy to minimize distractions and noise
- Adequate space to ensure participant comfort during testing
- Wireless internet

The prototype will be tested on the participants' touchscreen cell phones. With Axure as the development platform, the type of touchscreen cell phone (be it Android or Apple) will not matter because the prototype can be accessed by any mobile browser.

RMS Core Features and Functions for Testing

1. Login
   a. Create Profile
2. Tutorial
3. Calendar
   a. Access Month View
   b. Access Day View
   c. Add Event
   d. Access ASTEC Resource Associated with an Event
4. Resources
   a. Access Resources
   b. Upload Resource
   c. View Resource
   d. Recommend Resource
   e. Add a Note to Resource
5. Evaluation
   a. Access Pending Session Evaluations
   b. Select a Pending Evaluation
   c. Submit
6. Search
   a. Access Search the Web
   b. Add Resource from Search the Web
   c. Access Search Resources
7. Announcements

Testing Methodology

Round 1 testing will focus primarily on cognitive (helps the user in knowing something), physical (helps user physically do something), sensory (helps user sense something), and functional (helps user accomplish work - back end usefulness) affordances. Participants will be asked to perform specified tasks. Because of the functional changes that may result from this round of testing, data collection of emotional impact will be minimal at this stage.

Participants will access the RMS alpha prototype on their own mobile devices. Testing methodologies include pre- and post-testing survey, think-aloud, and usability test with analytics. Face-to-face interactions will be voice or video-recorded. Surveys will be completed by participants and collected by the researchers.

Pre- and Post-Test Survey

The pre-test survey will consist of demographic information and questions pertaining to their expectations of a resource management system before seeing the prototype. Demographic information includes:

1. Age
2. Gender
3. Residency program and year
4. Type of mobile device they own
5. Mobile device operating system
6. Type of data plan
7. How many applications they use
8. Do you use your phone to study? Y/N

Survey questions will be scaled. Example questions include:

- I use the internet to find resources.
- I have difficulty finding resources I have used in the past.
- I want better ways to find study materials.
- I access content to study on my phone.
- I often find resources I share with other residents.
- I like receiving recommendations for resources from other residents.
- I know what a resource management system is.
- I think a resource management system can help me study.
- I feel comfortable identifying application icons.

The pre-test survey will be re-administered as the post-test survey (without the demographic information) to reflect whether the application met the participants' expectations. Additional questions regarding usability will be asked, such as:

- I found it easy to complete tasks in the RMS.
- I would like to use this tool to study.
- This app would simplify my life.
- This app would not be useful to me.

Think-Aloud

Think-alouds will be done face-to-face with the facilitator and evaluators asking the participants to verbally express their thoughts about their interactions with the RMS alpha prototype and to discuss their experiences with it during the session. Questions will be both structured and unstructured to assess the effectiveness of the affordances: cognitive (C), physical (P), sensory (S), and functional (F). Retrospective think-alouds would be used in the event a participant is distracted by the researcher's request that they talk while performing the list of tasks. Discovery think-alouds would be used in the event that participants feel awkward narrating their thoughts during testing.

Table 4. Alignment of project research goals to round 1 objectives and sample questions.

Goal	Objectives	Sample Questions
To identify what **features/functions** are **most helpful** to residents in planning learning tasks.	Determine if the cognitive affordances of the icons and button labels clearly convey the intended meaning. (C)	• Are the icon labels intuitive? • Do you understand next steps? • Is it easy to go back once you are drilled down into a page? • What would make searching easier? • How confident do you feel in your ability to navigate the RMS after the tutorial?
To identify if **physical actions** (buttons) are visible and efficient for users.	Determine if the objects and layout of the RMS alpha prototype are sufficient in size and accessibility. (P) Determine if the font size, background, text, and object color assignments are noticeable and legible. (S)	• Are you able to select the objects in the app easily? • Can you access them easily? • Are the size and color of the text easy to read? • Does the background facilitate your view of the objects? • Is the RMS prototype visually appealing?
To identify a **logical structure and flow** of the application.	Determine if the structure and features of the app help user accomplish their intended actions. (F) Determine if the task flow is intuitive. (C)	• What errors or problems were encountered during the _____ process? • What are 2-3 essential things the _____ feature must be able to help you do? • Is task completion communicated clearly? • What features are difficult to use? Which are easy to use?

Analytics

Google analytics is compatible with the development platform Axure and will be used to track users' paths through the application, and time task completion processes as participants use the prototype. Data collected will provide insight into time spent on tasks, number of clicks, and other in-app usage.

Sample Script

My name is _____ and I'm a Master's student in the Instructional Design and Technology program at George Mason. We're developing a resource management system to improve your residency experience. Today we need your help to test the prototype. This session should take about half an hour.

Before we start, please fill out this short survey.

[Pass out survey with demographic information and writing utensils. Allow participants time to fill out survey.]

You will need a charged mobile phone that is connected to the internet. Are you able to access the WiFi? We are going to give you access to the prototype through your device and then ask you to perform several tasks. During those tasks, we will ask you questions about what you're seeing and ask you to "think aloud" as you use the prototype. Feel free to say anything that comes to your mind - for example "that's interesting" or "I have no idea what this means." The more you can verbalize while you're doing a task, the more I can understand what you are thinking and doing. (e.g.: "Now I'm going to try to use the search") And, if you get to a point where you would naturally stop working, let me know. I'll let you tell me when you complete a task and whether you found what you were looking for. Keep in mind that this is a design in progress so not everything will be functional. In fact, tell me when you've run into something that isn't functioning and the results you expect to see. Note that the documents, photographs, and videos are only stand-ins for actual content that would be used in practice; we are only testing the usability of the concept, not the content itself.

After testing the prototype, I will ask you to fill out a quick survey about your experience.

Do you have any questions before we continue? Okay, let's go to the prototype.

Think-Aloud Sample Questions

Logon task:
What errors or problems were encountered during the login process?
Was creating a user profile easy?
What errors or problems were encountered during the profile creation process?

Tutorial task:
Did you complete the tutorial? Was it helpful?
How confident do you feel in your ability to navigate the RMS after the tutorial?

Search task:
What would make searching easier?
What are 2-3 essential things the search feature must be able to help you do?

General questions:
Are the icon labels intuitive?
Do you understand next steps?
Is task completion communicated clearly?
Were you able to perform all of the tasks on the list? If not, which ones and why?
What errors or problems were encountered during the _____ process?
Is it easy to go back once you are drilled down into a page?
What are 2-3 essential things the _____ feature must be able to help you do?
In the context of your daily work, how would you use this system?
What features are difficult to use? What features are easy to use?
Does the app appear to be error free?
Are the size and color of the text easy to read?
Does the background facilitate your view of the objects?
Are you able to select the objects in the app easily?
Can you access them easily?

Success Criteria

The criteria for success with Round 1 of the user experience research will include the following.

- Increased knowledge of user needs and expectations
- Data on RMS core features and functions from 4 or more participants
- Prioritized list of design revisions for Round 2

Data Analysis

1. Review/code survey data
2. Review/code think-aloud data
3. Review/code analytics
4. Gap analysis

User Experience Research, Round 2

Purpose

The purpose of Round 2 user experience research is to hone in on task flow and emotional experience. By using more than one method (triangulation), we can assess and sift through the fine-tuning stage of the user experience design.

Audience and Recruitment

As in Round 1, recruitment will depend on scheduling and availability of residents. The ideal participant profile will remain the same, and participants will consist of as many podiatry and/or general surgery residents and instructional staff as are available and willing to participate. Recruitment will be done by one or more of the following methods: a request via email for an appointed time wherein all potential users are invited to come participate, spontaneous face-to-face invitations to participate as residents are available, and/or other recruitment methods as may be deemed appropriate.

In the event that an insufficient number of ASTEC resident users can participant, adult users who are currently or were formerly medical residents in any program will be asked to participate. This round of testing requires closer adherence to the ideal participant profile as Round 2 testing emphasizes research on emotional impact and task flow.

Resources

The resources for Round 2 of user experience research will include the following:

- A link to the RMS beta prototype
- A cell phone with internet connection (participant-provided)
- A voice recorder and/or a camera
- Script
- Questionnaire and directions
- Writing utensils and scratch paper

Testing Environment

To increase the convenience and ease of user participation, the RMS team will conduct the research in an environment that is most accessible to participants. This may include home residence, ASTEC facilities, and public libraries. However to ensure adequate data collection, test environments will have several of the following characteristics:

- Adequate privacy to minimize distractions and noise
- Adequate space to ensure participant comfort during testing
- Wireless internet

The prototype will be tested on the participants' touchscreen cell phones. With Axure as the development platform, the type of touchscreen cell phone (be it Android or Apple) will not matter because the prototype can be accessed by any mobile browser.

Testing Methodology

In Round 2 of user research, we will be using think-alouds, interviews, and will incorporate The System Usability Scale (SUS) questionnaire as we narrow down the design and functionality of the RMS. This will help ensure product accuracy by using qualitative and quantitative methods to test the application by collecting data on user attitudes and feelings. By observing the testers directly, we can identify user thoughts and feelings about the RMS through both verbal and nonverbal communication.

Think-Aloud

In Round 2 think-alouds, questions will be mainly unstructured to assess the emotional impact and effectiveness of the affordances: cognitive (C), physical (P), sensory (S), and functional (F). Retrospective and discovery think-alouds will be used if the participant is distracted during the session or uncomfortable speaking while testing.

Table 5. Alignment of project research goals to round 2 objectives and sample questions.

Goal	Objectives	Sample Questions
To identify **"stickiness" and user attitudes** toward the RMS mobile application.	Determine if the RMS is pleasing to use.	• What are your initial opinions on the mobile application? • Is this something you would use every day? • Describe your ideal RMS application user experience. • Would this make your life easier? • What do you like or dislike?
To identify what **features/functions** are **most helpful** to residents in planning learning tasks.	Determine if the cognitive affordances of the icons and button labels clearly convey the intended meaning.	• Is it easy to navigate the RMS? • Do you understand next steps?
To identify a **logical structure and flow** of the application.	Determine if the structure and features of the app help user accomplish their intended actions. Determine if the task flow is intuitive.	• What errors or problems were encountered during the _____? • What are 2-3 essential things the _____ feature must be able to do? • Is task completion communicated clearly? • What features are difficult to use? Which are easy to use?

Questionnaire

The SUS questionnaire is a global measure of system satisfaction and sub-scale of usability. The SUS is a valid measure, correlating highly to other usability questionnaires and shown to distinguish well between usable and unusable systems. This questionnaire has also been shown to be reliable and to distinguish differences well with small sample sizes. It consists of 10 questions (listed below), using a 5-point scale for user responses.

This questionnaire addresses the cognitive and sensory affordances objectives. A space for providing additional commentary would be offered in addition to the scaled responses. The questionnaire will gather the data needed in order to determine the emotional impact of the application. A score above a 68 (50th percentile) is considered above average and a score above an 80.3 (10th percentile) is the point where users are more likely to recommend the app to a friend. By using quantitative data, we are able to measure users' experience, which provides to us an accurate benchmark.

1. I think that I would like to use this app frequently.
2. I found the app unnecessarily complex.
3. I thought the app was easy to use.
4. I think that I would need the support of a technical person to be able to use this app.
5. I found the various functions in this app were well integrated.
6. I thought there was too much inconsistency in this app.
7. I would imagine that the most people would learn to use this app very quickly.
8. I found this app very awkward to use.
9. I felt very confident using this app.
10. I needed to learn a lot of things before I could get going with this app.

In addition to the SUS questions, participants will fill out demographic information on the questionnaire. These include:

1. Age
2. Gender
3. Residency program and year
4. Type of mobile device they own
5. Mobile device operating system
6. How many applications they use
7. Type of data plan
8. Do you use your phone to study? Y/N

Interview

One-on-one interviews will allow us to probe user attitudes, wants, beliefs, and experiences, providing us with a better understanding on how to improve the RMS user experience and design.

Analytics

Analytics data will be collected as participants use the prototype. Data collected will provide insight on "stickiness" with time spent in app and number of times application is accessed.

Sample Script

The same script from Round 1 will be used, but modified to read:

My name is _____ and I'm a Master's student in the Instructional Design and Technology program at George Mason. We're developing a prototype resource management system to improve your residency experience. Today we need your help to test the prototype. We will be testing your emotional experience and attitudes about the prototype. This session should take about half an hour.

Sample Interview Questions

What were your initial opinions on the mobile application? Did they change as you completed tasks?
Is this something you would use everyday? Why or why not?
Describe your ideal RMS application user experience.
How satisfied are you with your RMS experience?
What do you like or dislike?

Script for Questionnaire

Now that we have concluded testing the prototype, please fill out a quick questionnaire.

[Pass out questionnaire and writing utensils. Allow all participants to finish questionnaire and collect.]

This concludes our research session. Thank you, again, for your time and all of the valuable information you have provided.

Success Criteria

The criteria for success with Round 2 of the user research testing will include the following:

- Data on RMS core features and functions from 4 or more participants
- Prioritized list of design revisions
- Above a 70 score on the SUS questionnaire
- Reduction in time on task from Round 1
- Reduction in the number of critical incidents from Round 1

Data Analysis

- Review/code think-aloud data
- Review/code questionnaire
- Review/code analytics

Appendix A: Detailed Pilot Test Feedback

1. The Enter button on the log in page would not work on Franco's or Kerianne's Samsung phones, but did work on Larry's Samsung phone. Reason unknown.
2. The prototype was generally well received. The group gave it a 3.5 on a 5-point scale for ease of navigation.
3. Dr. Bachman noticed that the Search icon led to the Google page screenshot, but then the back arrow led to the feedback/evaluation form. This was confusing for her.
4. The color scheme was well received with a couple of exceptions. The gradient gray was distracting to some and the back arrow on the gray background was not clear to others. Dr. Bachman offered the RGB codes used in the INOVA branding which are as follows.
    a) Inova Blue #004B8D, R O G 44 B 119, PMS 288 C, C 100 M 67 Y O K 23
    b) Inova Red #D52B1E, R 213 G 43 B 30, PMS 485 C, C O M 95 Y 100 K O
    c) Inova Light Blue #6CADDF, R 108 G 173 B 223, PMS 284 C, C 55 M 19 Y O K O
5. The doctors pointed out that the resources embedded for the FLS lab were procedural and not truly FLS skills.
    a) They clarified that FLS skills are specific to the FLS curriculum and involved such things a tying knots and other exercises related to manual dexterity. Procedural skills are related to surgery.
6. The testers did find some things confusing in the design. They are listed below.
    a) The Back button was slow and many did not recognize it as being a "back button" upon first sight.
    b) They didn't like the clicking sounds. (Artifact of Captivate)
    c) They thought the calendar icon was a calculator at first, but liked the calendar features of the daily planner and the option for personalization.
    d) They were confused by the "hamburger" menu vs. the back button in terms of functionality.
    e) One tester said that the app was "not intuitive" and would have liked an intro screen prior to first use.
    f) All testers indicated a dislike for the rotation on the FLS screen which would only stay in place if they locked the rotation button on their phones and seemed to feel that doing so would be cumbersome in real life.
    g) One tester commented that the menu button does different things in different locations and suggested that the options to add an event or resource be on a separate screen.

Dr. Dort

1. Dr. Dort suggested including the APS (SCORE) curriculum as a resource.

2. Including such books as Netter's Anatomy as resources, although this may involve copyright and compatibility (Kindle vs. iBooks) issues. Suggestion to consider adding an e-reader to the app was made to possibly resolve such issues.

Dr. Yim

3. The resident tester, Dr. Yim, she would like a "Share" feature to allow sharing of resources between residents.
4. Dr. Yim also wanted to know if an Internet connection would be required to use the features not directly dependent on such a connection. She said the Wi-Fi at the hospital was "iffy."
5. Dr. Yim also wanted to know if there could be the option of leaving the app open once the user logs in to avoid having to log in repeatedly or with each use.
6. Dr. Yim thought the feedback button was a chat feature and was surprised when it took her to the evaluation form. She wondered if a chat feature that would NOT be accessible by anyone other than the sender and the receiver would be possible. She said that if it was viewable by others, they would likely not use it.
7. Dr. Yim also expressed the desire for an app search feature to facilitate the quick location of specific resources.

Dr. Bachman

8. Dr. Bachman suggested changing "Instructor Resources" to "Assigned Resources" to avoid confusion regarding for whom the resources found therein were for. She thought at first that they were for the instructors because of the name.
9. Dr. Bachman also indicated that residents text each other ALL THE TIME, so a chat feature may be worth including.
10. Dr. Bachman also thought that a FAQ page would be helpful.
11. Dr. Bachman wanted to know if it would be possible to create cohorts of residents to facilitate sending the appropriate resources and evaluation forms to the appropriate groups. She wanted to know how to do it from the back end of the app and that instruction on that would be needed.
12. Dr. Bachman also expressed a desire to be able to keep PDFs and other resources on her computer at her desk as opposed to storing them on her phone. This was projected to be the desire of the resident users as well.
13. Dr. Bachman also indicated that "Add a Resource" needs to be linked to an event and that an App Search feature separate from the Internet Search feature would be helpful.
14. Dr. Bachman also indicated that a queue with all the individual residents' pending evaluation forms be included.
15. Dr. Bachman also expressed the desire for a Notes feature and a picture capture feature both of which could then be added to "My Resources."