

Designing Learning Environments: Operating Room Performance Support System

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Executive Summary

Working as partners in Dr. Laffey's course, Designing Performance Support Systems, Sherita and I designed and prepared storyboards for an application to be used by doctors, nurses, and technicians in an operating room setting. We then individually created and conducted usability testing on an interactive prototype of the design.

Description

Purpose

The OR-PSS application is designed to provide troubleshooting and support for nurses and scrub technicians working as part of an operating room team. It would ideally be accessed from an iPad or similar device available in each operating room for use by multiple teams throughout the day and kept sterile. However, depending on hospital preferences, the application could also be accessed on an iPad transported between rooms, or even an iPhone. OR-PSS is a web-based application and can be updated at any time by users. Updates are saved to a central database (much like a wiki) so that all instances of the application are up to date.

Context

Often nurses need immediate information or assistance while in the operating room and call on team members or equipment vendor reps for support. Our goal is to provide nurses in the operating room with support for setup, use of unfamiliar equipment and troubleshooting, so that they can access the most essential information right when they need it.

Key PSS Ideas

- On-demand, just-in-time support: The right information needs to be accessible when and where the nurses need it.
- Learning within an authentic context: We are designing a support system for use within the operating room.
- Just enough information, and task-specific: The nurses do not necessarily need to know what something is called or what function it serves, just what to do with it.
- Easily searchable: Minimizing how much energy and time nurses need to focus on the PSS enables them to focus on the task at hand.

Role

As a team,

- Analyzed background information and conducted additional research

- Created a requirements document, including personas and context scenarios
- Designed and annotated storyboards; revised these based on peer review

Individually,

- Created an interactive prototype in Powerpoint and revised based on peer review
- Converted the interactive prototype to HTML5 format using iSpring software so that it could be tested via iPad as a touch-interface application
- Conducted usability testing on the application

Reflection

Throughout the design process, Dr. Laffey encouraged us to reflect on our participation, identity, contribution and team, so that we might recognize and learn from mistakes and improve our involvement and communication as well as our design process.

Our team was extremely hardworking and put in a lot of hours on this project, especially the scenarios/requirements document. We divided the work pretty evenly and helped each other out through the rough spots. We sought to address as many of the situations as possible and to thoroughly integrate the personas into our work, so as to have an excellent sense of the requirements.

Everything went smoothly and we were proud of the result. Our storyboards were very different from those of the other teams because we interpreted the assignment just a little differently: We designed a device for team use that could stay in an operating room or move as needed, whereas everyone else designed devices each individual on the team would check out, log into, and carry throughout the day. It was a little disconcerting to see at each step of the way how different our result was from that of the other teams, and we often had to reassure each other that we were on the right track. We were glad we stuck with it though, as ours turned out to be a unique and fairly simple-to-use system, hopefully a good alternative to the more complex individual ones.

Through this project and Dr. Laffey's course as a whole, I gained an understanding of EPSS and how to design products that support performance, both outside of and within the application. The project provided the opportunity for valuable practice in design work, particularly defining product requirements, creating storyboards, and building prototypes. I can easily foresee using these skills in future design projects. I have also gained an appreciation for Apple-style simplicity and sleek design, such as Sherita used in her version of our group's prototype, which had a more professional and at the same time more familiar feel than mine.

Prospectus--Team 4

Goal

Our goal is to provide nurses in the operating room with support for setup, use of unfamiliar equipment, and troubleshooting, so that they can access the most essential information right when they need it.

Overview

Challenges

- Limited or no access to potential users in order to define roles, create personas, and define user requirements.
- Organizing the information (or making it interactive) in such a way that the nurses can find exactly and only what they need.

Key PSS Ideas

- On-demand, just-in-time support: The right information needs to be accessible when and where the nurses need it.
- Learning within an authentic context: We are designing a support system for use within the operating room.
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- Easily searchable: Minimizing how much energy and time nurses need to focus on the PSS enables them to focus on the task at hand.

What's been done

Several examples were discussed in "Performance Support for Using Devices in an Operating Room," including several systems involving YouTube and one that made a perioperative video catalog website accessible in just one click for ease of use by nurses.

Additionally, we can look at <http://pie.med.utoronto.ca/index.htm>. The videos, tutorials, and simulations available on this site are intended to educate surgeons and other medical professionals prior to immersion in a situation that requires this knowledge. These videos are formatted both for the web and for a mobile device. However, performance support designed for use in the OR itself will need to be customized in ways these training videos are not, in order for nurses to find exactly (and only) the information they need. Our focus is also on the RNs, not the surgeons: Rather than providing on-the-job support for how to do a liver

transplant, we'll primarily be providing support for setup and use of the technology necessary for that transplant, such as the bed or operating table and any unfamiliar equipment.

What's been said

In her dissertation titled "The effect of mobile performance support devices on anxiety and self-efficacy of hospital float staff", Megan Riley McKee describes how various materials and apps provided on a mobile device can enable RNs and other staff, providing the confidence and expertise they need when working somewhere unfamiliar. Describing the need for her study, she writes,

Children's Medical Center of Dallas recently received a grant from Hospital U, which was used to purchase 100 mobile devices, specifically 100 iPod Touches... Each iPod houses clinical applications, including videos, articles, reference tools, patient education tools, reference guides, and other memory joggers to be used when staff need performance support on the floor or at the bedside. A project team at Children's wanted to find the best use for the mobile devices, so a request concerning current research was made to Hospital U to identify how other hospitals have implemented the mobile devices. The response affirmed that little-to-no data have been collected to support best practices. This feedback presented a need to study how the mobile devices could best be utilized, which led Children's to decide to pilot the devices on variable staff who float to various units, including registered nurses (RNs) and respiratory therapists (RCPs), to identify a performance support solution.

She proceeds to define a theoretical framework (Bandura's social learning theory and self-efficacy), assess the anxiety levels and self-efficacy of float staff prior to and following the implementation of mobile support devices, and analyze the results. Although she finds no statistical difference regarding anxiety, self-efficacy has increased significantly. The full text of the dissertation is available here:

http://digital.library.unt.edu/ark:/67531/metadc115146/m2/1/high_res_d/dissertation.pdf

This paper titled "Willingness and Preferences of Nurses Related to Learning With Technology " evaluates nurses' willingness to use technology, their preferred method of educational delivery, and demographic factors affecting nurses' willingness to learn with technology. Results from this study will help us understand factors that may predict behaviors of potential users.

http://www.nursingcenter.com/prodev/ce_article.asp?tid=1178997

This article titled "Rationales for developing a perioperative web-based resource:

informatics in action" provides justification for using technology in nurse education. It also provides a sample diagram illustrating a possible layout for a web-based instructional system and includes screenshots of a system developed by a perioperative vascular nurse at the University of Rochester Medical Center. <http://search.ebscohost.com/login.aspx?direct=true&db=rzh&AN=2009646049&site=ehost-live> (Includes Screenshots)

Alternative Link for the "Rationales" article:

<http://healthinformaticsareershere.blogspot.com/2012/09/rationales-for-developing-perioperative.html>

Standards

Any materials produced should be accurate and consistent with practices actually used. The PSS should not interrupt or interfere with operating room proceedings.

Wild ideas

- Web based video instruction with a customized mobile app for iPad or Android OS
- Secure networking feature that allows nurses to communicate via video, voice, or text
- Scan feature that allows nurses instant access to tutorials and troubleshooting for a particular piece of equipment when they use their PSS device to capture its attached QR code. This would eliminate the need to type, search, or navigate, saving nurses a lot of time.

Experts

Donna Russell, Ph.D.

Steve Gentzler, RN

Katie Moore RN, Pediatric ICU at University of Missouri Children's Hospital

Christa Kelly - RN at Jacksonville Hospital in Jacksonville, AL. She does not work in the OR, but could provide information on the overall workplace environment.

Team 4 + Req.

Context Scenarios

Product	Persona	Scenarios
Mobile OR-PSS device	(Mary) An experienced nurse who has worked many surgical operations but is not comfortable with new technology	<ul style="list-style-type: none"> - Set up an electronic surgical device - Troubleshoot an electronic surgical device (OR table)
	(Bob) A nurse who just started taking assignments in the operating room, who is comfortable with new technology as long as he can learn the technology prior to needing it in the OR	<ul style="list-style-type: none"> - Use a new technology such as TissueLink in the OR
	(Sarah) An experienced surgical technician, who is however no longer familiar with certain equipment	<ul style="list-style-type: none"> - Set up a piece of equipment that is no longer familiar (sterile component for hepatic cancer surgery) - Troubleshoot a piece of equipment that is no longer familiar (surgical stapler) - Make a call to a vendor regarding missing pieces
	(Jeanette) Just out of nursing school where many of her assignments included watching and learning from videos is experiencing somewhat of a reality shock in the operating room. Apprenticeship is the key learning method used for operating room orientation. She receives different instructions and conflicting information from various staff members regarding use of strange equipment and supplies. She wonders what is correct and what will happen when she is on her own after orientation.	<ul style="list-style-type: none"> - Review video demonstrations during downtime or from home - Balance a microscope
	(Bill)	<ul style="list-style-type: none"> -Contribute content relating to his

	<p>Has been an operating room nurse for 15---20 years. He has slowly accumulated knowledge that allows him to be effective in his performance.</p>	<p>specialty to the OR-PSS -Alerted by the OR-PSS when help is needed</p>
	<p>(Kara) circulating RN, core experience</p> <p>The supervisor asks Kara who has been off orientation and working for 18 months to go and set up a room for a GYN case. She finds that the bed is one of the new ones that she did not have time to learn to assemble and modify.</p>	<ul style="list-style-type: none"> - Call another RN for assistance while setting up a piece of equipment that is not familiar - Operate an off-sterile field component during surgery - Resolve questions
	<p>(Jack) Curmudgeon. What has worked in the past will still work. Believes he can avoid change. Doesn't own a smart phone, or a digital camera. Uses a computer for documentation at work and for Facebook at home.</p>	<ul style="list-style-type: none"> - Receive training on how to use the OR-PSS - See convincing results when staff begin using it <p>(We have not included Jack in the scenarios below, but he would be a persona to follow-up with after introducing the OR-PSS. He may be won over if he can see positive results, or he may need additional incentives to learn to use this sort of system.)</p>

Requirements

Scenario Text	Requirements
<p>A new piece of equipment, a urological plasma cutting/coagulation device is being employed for therapeutic use. The surgeon, the resident, the circulator, and the scrub tech, none of whom know how to do the final setup of the generator, are staffing the case. Mary, the service core RN, is curious about operation of the</p>	<ul style="list-style-type: none"> - Ability to access equipment-specific reference materials - Ability to view a demo of the equipment working properly - Ability to view step-by-step instructions for setup - Intuitive enough to solve technology challenges without creating new ones

<p>device, never having seen it in action. She uses the OR-PSS to pull up a video of the working device, which everyone gathers around to view. Next she selects a tutorial on setup and walks the team through the setup process. Everyone is pleased with her uncharacteristic fluency with new technology.</p>	
<p>Mary is in the OR during a robotic radical prostatectomy. She feels a little intimidated by the complicated new OR table being used, so she accesses a tutorial via the OR-PSS to become familiar with how to operate the table. While learning about buttons and indicator lights, she notices that none of the indicator lights are on. She indicates this problem to the OR-PSS and finds out that the bed is most likely not plugged in. Mary looks behind the bed and realizes that the plug has fallen out of the socket. She plugs in the bed, checks to see that the indicator lights are appropriate, and proceeds with the tutorial so that she will be able to operate the bed when she needs to.</p>	<ul style="list-style-type: none"> - Ability to access equipment-specific reference materials - Ability to view tutorials silently, without disturbing other members of the surgical team - Ability to access troubleshooting materials mid-tutorial - Ability to identify problems - Ability to identify likely source of problems - Ability to return to previous spot in a tutorial
<p>The last time Bob was in surgery he was embarrassed when he was not able to assist with TissueLink because of his lack of training. To make sure this does not occur again, Bob accesses the OR-PSS from his home and finds training on TissueLink led by a vendor representative. Interrupted by his son, Bob saves the training so that he can continue later.</p>	<ul style="list-style-type: none"> - Ability to access OR-PSS from an external network - Ability to save content
<p>Bob returns to the PSS and continues the TissueLink training. During the training Bob practices setting up the device. When an error is made, he is alerted by the OR-PSS and feedback is given.</p>	<ul style="list-style-type: none"> - Ability to access previous sessions with the OR-PSS - Ability to participate interactively in a simulation
<p>Sarah is working as a substitute</p>	<ul style="list-style-type: none"> - Ability to access equipment-specific

<p>technician during a bowel anastomosis when a disposable surgical stapler that the surgeon is using misfires and locks up. Sarah uses the OR-PSS to recognize the device. She reports that the stapler has misfired and locked and the OR-PSS shows her how to unlock the stapler.</p>	<p>reference materials</p> <ul style="list-style-type: none"> - Ability to identify problems - Ability to see steps to a solution
<p>The equipment for hepatic cancer surgery also has a sterile field component that is assembled and made ready for use by the scrub tech. During the case the surgeon decides to use the device. The scrub tech, Sarah, has not set up this particular component in several months. Because the component must remain sterile, Sarah cannot manually operate the OR-PSS to access instructions. She asks the circulating RN, Kara, to access the appropriate tutorial. The OR-PSS shows one step at a time, with appropriate diagrams. The tutorial progresses to the next step while Sarah is still busy with the previous step. She states "Repeat" and the OR-PSS returns to the previous stage of the setup.</p>	<ul style="list-style-type: none"> - Ability to autoplay steps of a tutorial. - Ability to view diagrams of setup - Ability to give audio commands when operating sterile equipment
<p>While setting up the urological plasma cutting/coagulation device, the team realizes that several pieces of the tray table are missing. They're unsure whether they should continue without the parts. The OR-PSS contains contact info for the vendor, so the scrub tech, Sarah, uses the OR-PSS to place a call. The vendor assures her that they can operate the device safely without the tray table for the time being, although it will be an inconvenience. Sarah makes a note in the OR-PSS listing the pieces that will need to be ordered following this case.</p>	<ul style="list-style-type: none"> - Ability to access contact info for hospital managers or vendor reps - Ability to place a call to a telephone in case of emergency - Ability to make a note for follow-up later
<p>Jeanette is working with her mentor, Bill, to prepare a large operating microscope needed for an upcoming surgery. An</p>	<ul style="list-style-type: none"> - Quick and easy start up - Ability to access equipment-specific reference materials

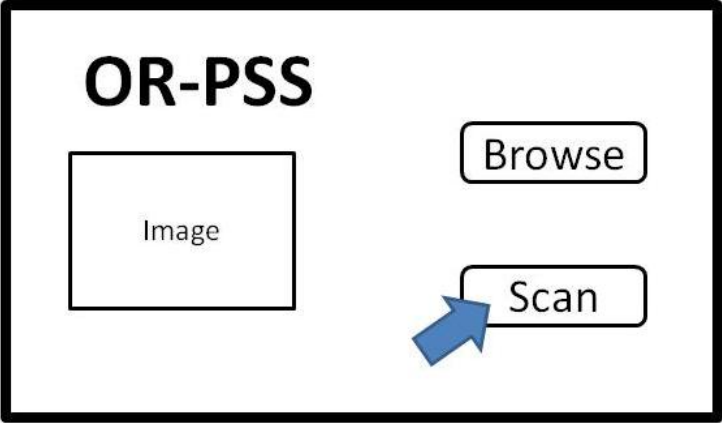
<p>emergency occurs and her mentor is pulled away from room. Bill leaves Jeanette with the preparation reminding her that it's similar to a task they completed a month ago. Jeanette is frustrated because she also recalls working with Mary, who provided completely different instructions. Jeanette pulls out the OR-PSS for guidance. Shortly after starting up the OR-PSS she finds a video tutorial demonstrating how to balance the microscope. This reminds her the days in nursing school where many of her assignments included watching and learning from videos. Jeanette makes it half-way through the balancing procedures when Bill returns. Bill is pleased with the work Jeanette has done and wants to know how he can use the OR-PSS with new orientees.</p>	<ul style="list-style-type: none"> - Ability to follow instructions and perform tasks with no assistance - Provide consistent and reliable instructions
<p>After receiving positive feedback from Bill, Jeanette decides to access the OR-PSS from her personal device while eating lunch in the cafeteria. She accesses a video demonstrating the draping of the microscope with a sterile drape that is somewhat confusing. Jeanette realizes she forgot her headphones and doesn't want to disturb anyone, but this not an issue for the PSS.</p>	<ul style="list-style-type: none"> - Ability to use outside of the OR - Ability to view video content - Ability to view video without disturbing others
<p>A new piece of equipment is on standby for a hepatic cancer surgery. The device has an off-sterile field component that is operated by the circulating RN. The RN, Kara, is core service experienced, but still not quite familiar with all aspects of the equipment's operation. She uses the OR-PSS to access step-by-step instructions, and leaves the screen on as a reference during the surgery so that she won't miss any steps.</p>	<ul style="list-style-type: none"> - Ability to view step-by-step instructions - Ability to prevent the screen from shutting off automatically

<p>Bill is performing a demonstration with his orientees and uses the OR-PSS to record it. He hopes this recording will save time in the future, so that can concentrate on more important aspects of the specialty. Once the recording is complete, it is saved to the OR-PSS.</p>	<ul style="list-style-type: none"> - Ability to record audio and video content from multiple angles - Ability to upload content to a database - Ability to distinguish between types of users
<p>Kara's supervisor asks her to help two other nurses prepare a room for a GYN case. When Kara arrives, the nurses ask for her assistance to put the bed in the correct position for the lithotomy. Kara doesn't know how because she has been off orientation for 18 months and has not had time to learn to assemble and modify it. Normally she would be embarrassed in this type of situation, but she quickly retrieves the OR-PSS from the nearest nursing station. Using the OR-PSS she finds the first available nurse who can assist them with positioning the bed, which happens to be Bill.</p>	<ul style="list-style-type: none"> - Portable - Ability to communicate with other RNs via audio and or video
<p>Bill is just finishing clean-up in one of the operating rooms when his OR-PSS gives him a notification. The OR-PSS shows that one of the nurses, Kara, is requesting assistance. Bill uses the OR-PSS to contact Kara and she describes her dilemma: she doesn't know how to assemble and modify a bed for lithotomy. Bill quickly guides her through the steps and the bed is arranged correctly.</p>	<ul style="list-style-type: none"> - Ability to send and receive notifications - Ability to communicate with other RNs via audio and or video
<p>After assembling the bed with Bill's remote assistance, Kara marks her question as resolved so that no one else will waste time reading or replying to her request.</p>	<ul style="list-style-type: none"> - Ability to "resolve" questions that have been sent with a notification

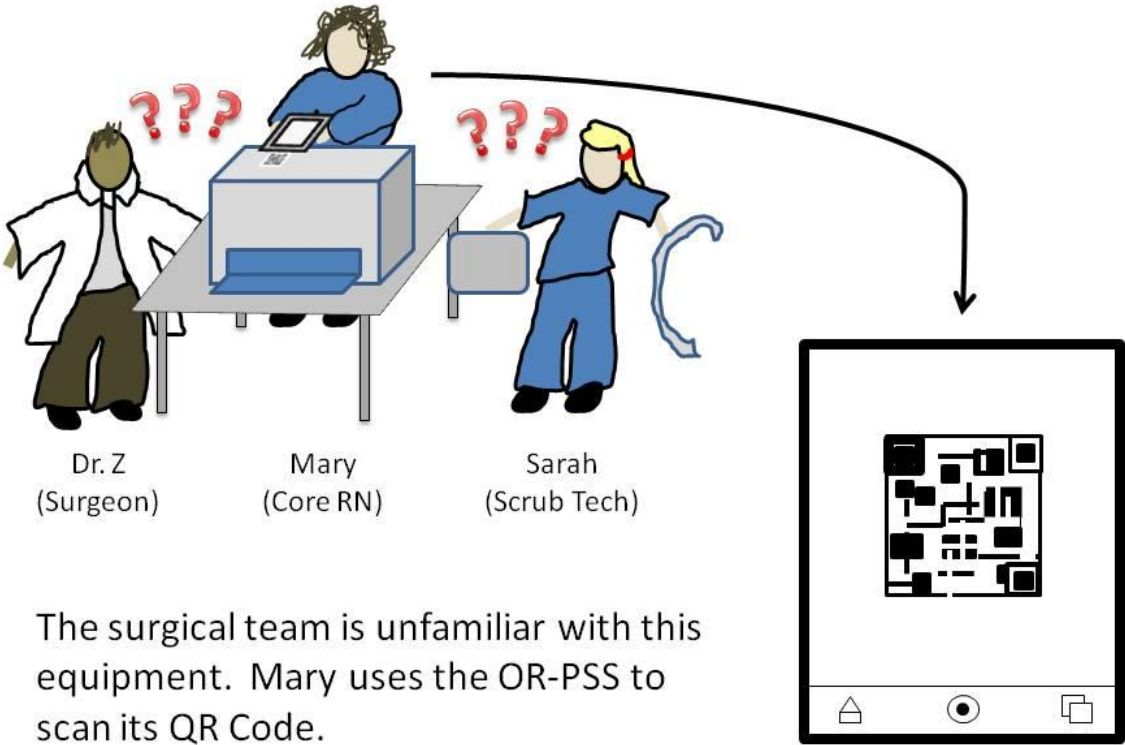
Storyboards

Screen 1

Home Screen

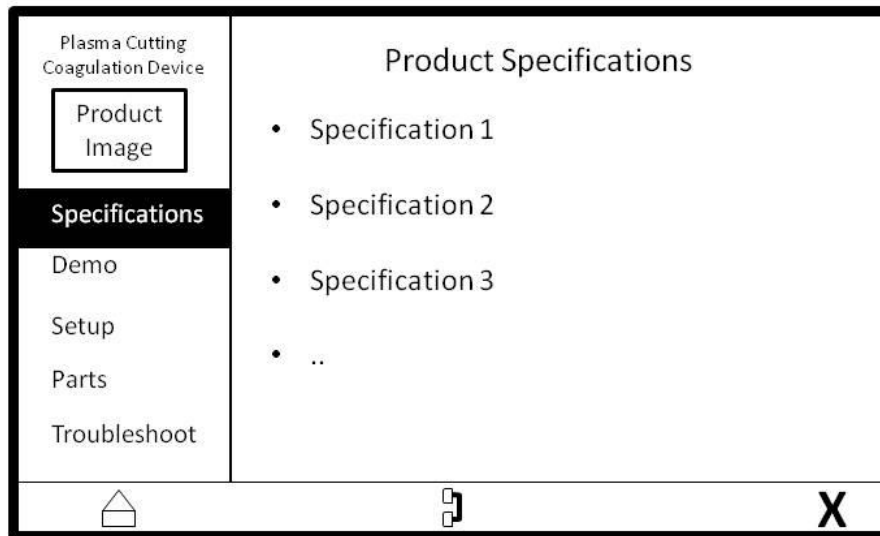


Screen 2

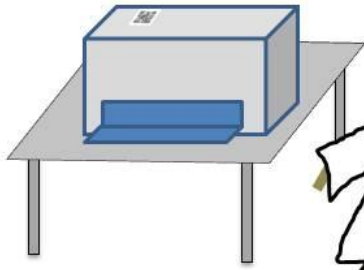


Screen 3

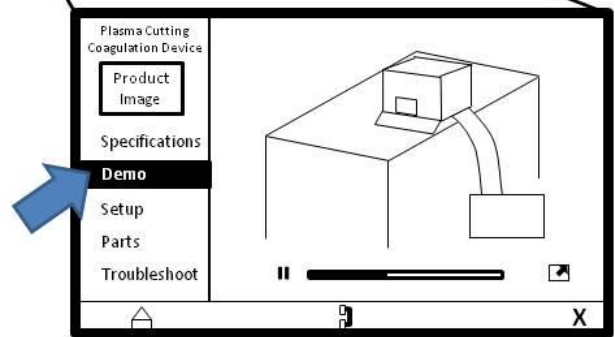
Product Screen

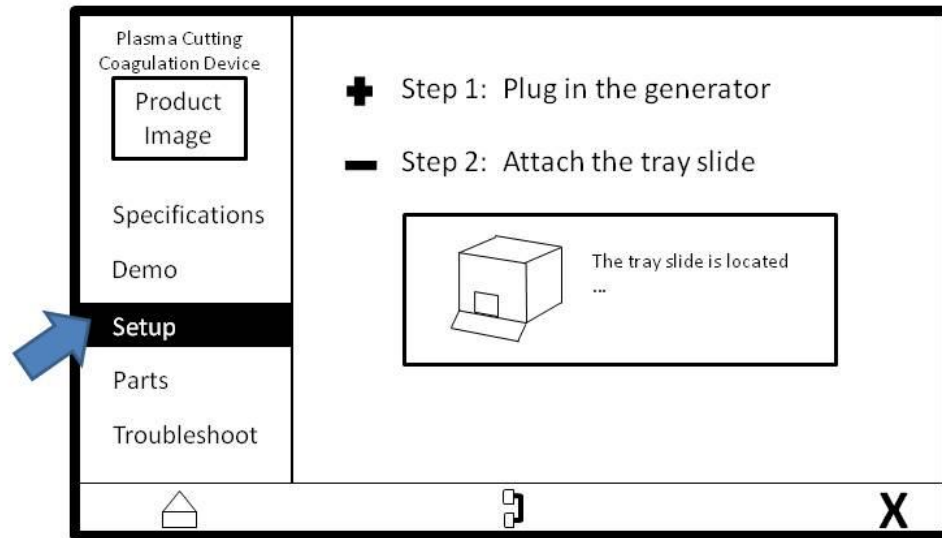


After the QR Code is scanned and processed, the Product Screen for the Plasma Cutting/Coagulation Device appears. Clicking on the product name and image in the top left-hand corner would locate this piece of equipment for Mary in Browse mode (Slide 9). However she already has all the options she needs right now in the navigation pane.

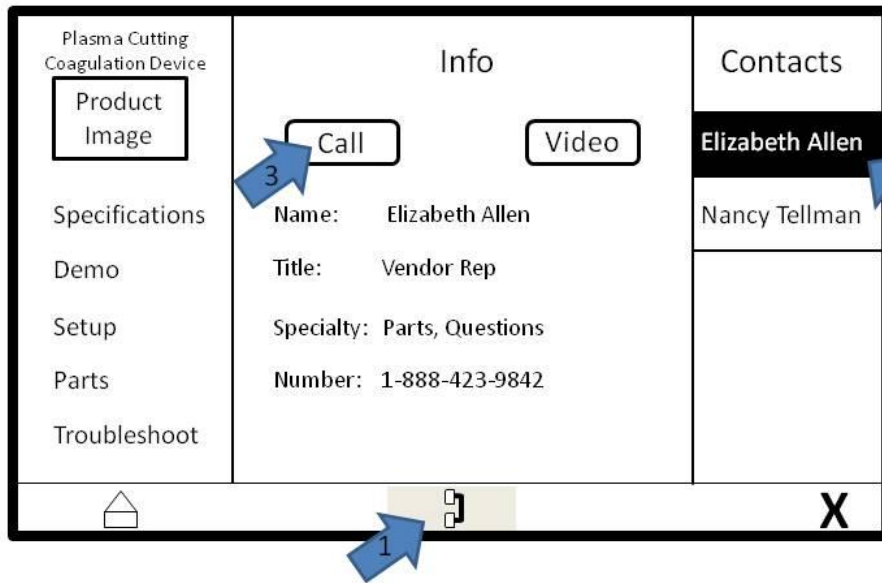


Mary finds a demo for everyone to watch.

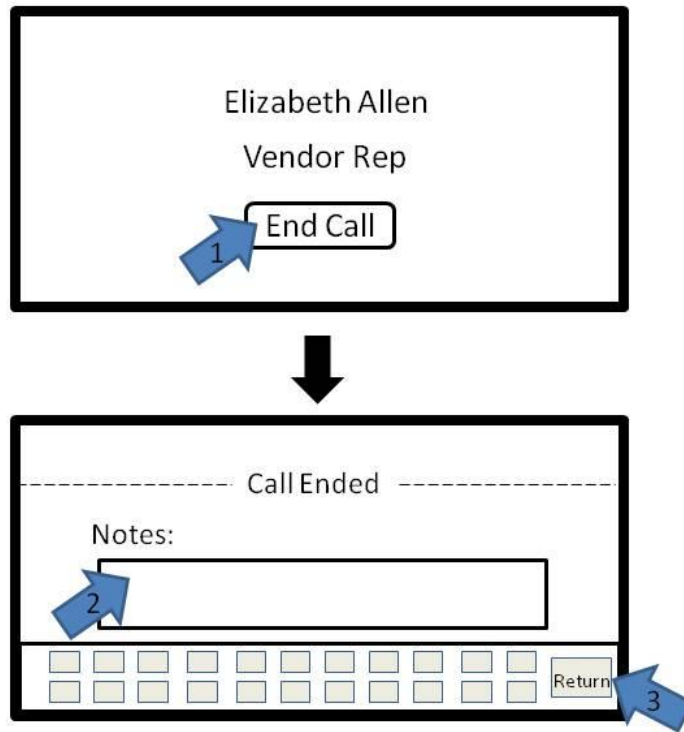




Mary guides the scrub tech, Sarah, through setup.

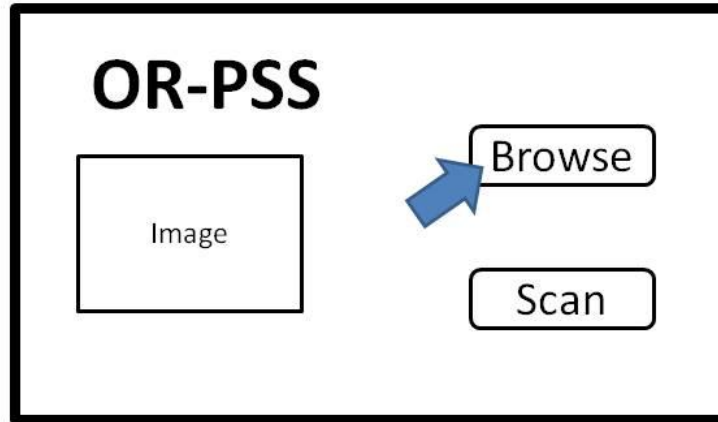


Pieces of the tray table are missing! Sarah contacts the vendor rep.

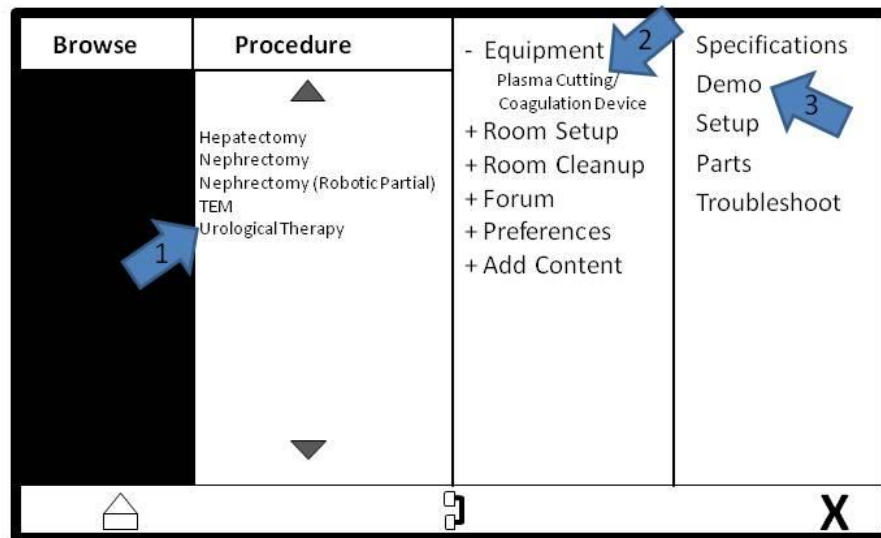


The vendor rep confirms the equipment is safe to use. Sarah makes a note of parts to order and uses the return button to return to the previous screen (Slide 6).

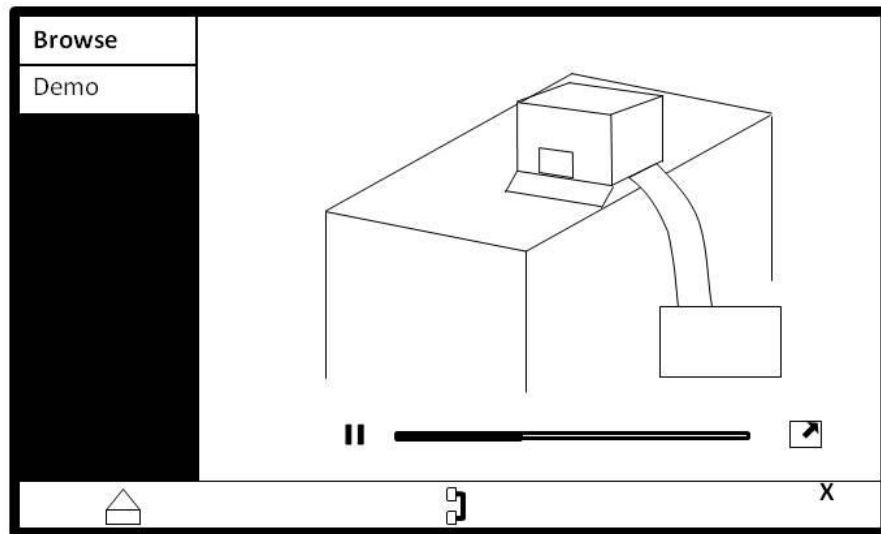
Alternative Path from Home Screen(Without using QR code)



Browse Screen



Mary selects today's procedure in the first pane, and the second pane populates to show categories for this procedure included in the OR-PSS. She selects an item from Equipment, and the third pane populates with the same options she would have seen if she had scanned the QR code. However, there are also many other options via this route, such as adding content to the system or viewing related forum questions on this topic.



When Mary selects Demo, the demo page opens in a new tab. The Browse tab remains open at the same stage where she left it, so that she can go back and choose further tabs to open. Whereas the QR code method sets up tabs conveniently for a particular piece of equipment, the browse method allows users more control over the interface.

Dryer 7.3 Usability Test

The purpose of the testing is to determine:

- Whether the size and appearance of objects in the interface are optimal
- Whether the wording and terminology used are appropriate to the audience
- Whether the structure fits users' mental models and expectations
- Whether the application meets users' needs

Introduction to OR-PSS

The OR-PSS application is designed to provide troubleshooting and support for nurses and scrub technicians working as part of an operating room team. It would ideally be accessed from an iPad or similar device available in each operating room for use by multiple teams throughout the day and kept sterile. However, depending on hospital preferences, the application could also be accessed on an iPad transported between rooms, or even an iPhone. OR-PSS is a web-based application and can be updated at any time by users. Updates are saved to a central database (much like a wiki) so that all instances of the application are up to date.

User Profile

The user testing the software today is a former pre-med student now enrolled as a graduate student in Mizzou's PT school. She has volunteered extensively at the University Hospital, including ER and OR settings.

User Introduction

Today you'll be testing a prototype of a system being created for nurses and technicians to use in an operating room setting. You'll have one scenario with three tasks to complete.

- If the prototype is difficult to use or to understand, that's not a reflection of your personal ability. Instead, it helps reveal what improvements are needed before this system could actually be used, especially in a high-pressure setting like an operating room.
- Be honest! Being specific and saying exactly what comes to mind will help us the most in reworking the design.

There are two things I'd like to ask you to keep in mind:

- First, say aloud what you are thinking as you perform the tasks and talk about what you are attempting to do.
- Second, try to perform the activities the best you can with just the information you see on-screen. If you absolutely get stuck and feel you need some help, let me know!
- Third, be aware that the prototype will be smaller than what you'd expect for an iPad screen. The final version of this app will be full-screen, but for now, imagine you are accessing it on an iPhone.

Do you have any questions about the testing before we start?

Tasks

You are a circulating nurse setting up an operating room for a urological therapy procedure. There is a piece of equipment being used today that you haven't used before. You don't know the name of for this equipment, but it does have a QR code attached.

- 1) Where could you learn how to set up the equipment?
The user asked “What does OR-PSS stand for?” She chose browse mode and then realized she didn't know the name of the equipment. She didn't know how to return to the home screen, so she turned the device off and back on. She chose scan, and had no issues scanning the QR code and choosing the setup tab.
- 2) If you discovered a piece of the equipment was missing, how could you contact someone knowledgeable about this equipment?
The user chose the Troubleshooting tab. She read the text on the troubleshooting page, which said she could place a call or look for relevant help in the forums. She didn't want to call anyone, so she looked for a way to access the forum. She clicked to view in Browse and found the inactive forum link. Since the forum was not available, she tapped the phone icon and called the vendor rep.

After the urological therapy is finished, you look for a list of steps for cleaning up the room. It turns out that no one has added to this content section yet! You double check with another nurse to make sure that you're doing everything in the most efficient order. You decide to add these steps to the system as you go.

- 3) How would you add a step, title, and picture to the room cleanup steps? How would you view the result?
The user opened the Steps page and wanted to add content from the page itself. She tried tapping and double tapping the name of the tab (“Steps”), hoping it would give her that option. When this didn't work, she tapped the Browse tab, looked more carefully at the Browse page, and noticed the “Add Content” button at the bottom. She said, “Will this add to Steps or Checklist?” and tapped the button. She had no trouble adding the step, title, and picture, but afterwards looked for a “Save” button. She did not expect the page to update unless she chose to save.

Testing Process

To conduct the testing, I made a new copy of the prototype in PowerPoint and removed all the directions so that only the “application” itself was present. I turned the one vertical slide so that it faced the same direction as the others and would actually appear vertical on an iPad rather than just appearing smaller. I then converted the interactive PowerPoint version of the prototype to HTML5 format using iSpring Converter software. I uploaded the html file to my Bengal account so that it was available online and accessible via iPad. I used my iPad to connect to the new online prototype and test it myself prior to the usability testing. I froze the iPod's “turning” capabilities so that when the user turned the screen in real life, it would not affect the program.

The downside of this format for testing was that the “application” displayed much smaller than it would in actual use. Because it had to be accessed in-browser and because the free trial version of iSpring comes with a logo that takes up much of the screen, the OR-PSS interface displayed at the actual size it would be if accessed from an iPhone even though we were testing it on an iPad.

The benefit of this format, however, was substantial. The user could use the prototype just as if it were a real app, with no hover indicators, just a touch interface. The icons and text were smaller than they would be in the actual app as experienced on an iPad, which allowed for testing of how well the application would work on an iPhone screen and provided an indication of potential performance on an iPad screen. If the buttons were large enough to use at this scale, they would definitely be adequate for use on an iPad.

Debriefing

1) Were the terms used in the application easy to understand?

Yes!

2) Were the images or icons used in the interface easy to understand?

I thought the home icon was an arrow. I kept looking for a way to get back to the main screen. The phone icon was clearly a phone though. I also kept looking for a back button.

3) Do you think the structure or organization of the application is appropriate for use in an operating room setting?

I could see this used pre-setup, pre-operation. Probably not during, because there are too many clicks, too many pages to go through. Look how many times I have to tap somewhere on the screen before I have to get to the information I need [she demonstrates]. It would be a good reference if I already had the right pages open. Another thing that would help is having procedure guidelines, or at least more information on each procedure. I guess most nurses wouldn't need it because they'd know what was going on, but that's something that I'd think should be easy to access for reference.

4) What do you like best about the application?

It's detailed. There's a lot of info available. I'd like to see the forum developed and be able to contact other nurses that way. The scan mode was really neat--at first I thought the idea of QR codes was kind of weird, but it definitely sped things up and got straight to the point. That could work for a lot of the equipment, the bigger things.

5) What do you like least about the application?

It's kind of buggy at this point. Not all links work in the demo. There should be a link to contacts from the troubleshooting section. That's where I expected to find them, not on the phone icon. I thought hitting the phone icon would place a call.

6) If you were working in an operating room as a nurse or technician, which parts of the application would be most useful to you?

Demo and steps. Step-by-step instructions are the most valuable, and I'm assuming the demo would be a video of the steps.

7) Do you have any other suggestions for improvements to the interface of the system?
Just, like I said before, a back button would be really good.

Summary

Aspects of the system that seem appropriate for use include the methods for scanning and browsing, the tabbed navigation style, and the specific tabs that appear in scan mode.

Aspects that seem problematic include icons and the beginning and end of the process of adding content. More way to access the same information are needed including links within tabs to other sections. The available navigation options were workable but did not match the user's mental model. More options need to be incorporated to cater to different users thought processes and needs.

Recommendations

The icons should be revised to include a back button and a better home icon.

Adding links within sections and allowing those links to open new tabs could significantly lower the number of actions required to reach the desired information. Additionally, there should be an easier way to access procedure-specific information, just as the scan mode provides instant access to equipment-specific information. One option would be a Procedure mode (accessible as a third button on the main screen) in which the user selects the procedure and important tabs for that procedure open automatically, including guidelines, the related forum page, and a site-map-style tab with links to all relevant content sections. The Browse mode is better suited to adding, editing, and reviewing content than to immediate performance support.

The process of adding content also needs streamlining. The Browse mode allows users to add entire pages and categories. However, each page should also have a link to add/edit or report problems. Perhaps these options could be included at the bottom of each page or where one user expected to find them: as a small menu on the tab for each page when users select an already-open tab. After adding content, the user should be able to "Save and Exit", returning to the now-updated content page.