

Self-paced Training for System Administrators

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EXECUTIVE SUMMARY

This paper describes an instructional design project developed for IST 522 as part of the MIST (Master of Science in Instructional Science and Technology) program at CSUMB (California State University, Monterey Bay). Using principles described in *The Systematic Design of Instruction* (Dick & Carey, 2009), the project attempts to solve the following instructional design problem: Provide system administrators, in corporate information technology (IT) departments, with the instruction they need to set up and begin using a complex systems management software product, which is referred to in this paper as SMSP.

Background on Problem, Target Audience, and Stakeholders

When customers purchase SMSP, they are required to purchase 4 to 12 hours of training because the software is difficult to master without training. This training is currently provided in multiple two-hour sessions using WebEx online meeting software, and presented by in-house trainers or by third-party partners and resellers. However, there are problems with the timing, referencing, and scalability of this training and a new solution is needed. These problems are explained in detail in the Needs Analysis section of this paper. The target audience for this training is system administrators in IT departments at SMSP customer sites, and stakeholders include SMSP customers, technical support personnel, instructional designers, trainers, partners, and resellers.

Goal Statement

The goal of this instructional design document is to outline a solution to the problem described above. The solution must enable system administrators to configure SMSP without help from live trainers and to begin using the software to manage devices on their network.

Constraints, Resources, and Sources

Although there is support for this project among SMSP customers and trainers, the project is not on the SMSP product roadmap. As a result, no resources have been allocated to the project. A single instructional designer, who is also a subject matter expert (SME), has prepared this proposal. To complete the project, the following additional resources would be required (a “man-month” is the amount of work a single person can be expected to complete in a single month):

Resource	Time Required
Project Manager	Two weeks
Instructional Designer	Two man-months
Content Developer	Two man-months
Product Developer	Two man-months
Usability Facilitator	Two weeks
QA Tester	Two weeks

Timeline and Costs for Development, Implementation, and Evaluation

Because no resources are dedicated to this project, the cost is limited to the time and materials required for the CSUMB MIST program itself. Further, the SMSP company currently owns the hardware, software, and networking resources that would be required to complete the project, so no additional costs for materials would be incurred. However, if the project were to be funded, the cost would include salaries for the following individuals, and incentives for usability testing:

Resource	Estimated Cost
Project Manager	\$ 5,000.00
Instructional Designer	\$16,000.00
Content Developer	\$16,000.00
Product Developer	\$20,000.00
Usability Facilitator	\$ 5,000.00
QA Tester	\$ 5,000.00
Incentives for Usability Tests and Feedback	\$ 200.00
Total	\$67,200.00

The following table shows the timeline for completing the project. For milestones that have not yet been scheduled, time estimates are provided.

Date or Estimated Time Required	Milestone
September 10, 2013	Needs assessment completed
September 17, 2013	Entry skills identified
September 24, 2013	Learner and task analysis completed
October 15, 2013	Instructional objectives defined
October 22, 2013	Instructional materials identified
November. 12, 2013	Formative evaluation planned
December. 15, 2013	Summative evaluation planned
One month	Prototype developed
Two weeks	Usability tests completed
One month	Design refined, based on feedback
Three months	Wizards integrated into the product
Two weeks	Functional testing completed
One month	Field trials completed
One month	Design refined, based on feedback

ANALYSIS

This section examines the need for training; the characteristics of the learners (system administrators); the workplace, the environment, and the setting in which the learning and performance takes place; and the tasks that learners will be trained to perform.

Needs Analysis

There are several problems with the current WebEx-based training program. This section explains those problems and contrasts what is happening now with what should be happening in the future.

Timing. Customers are required to complete the current training within 60 days of purchasing the product, but this timeline might not match their implementation schedule. For example, if customers have a complicated rollout, or if key team members are unavailable, they might not be ready for the training within 60 days. Customers need a training solution that can be tailored to meet their implementation schedule and personnel needs. The training solution should be accessible any time to any customer as needed.

Referencing. Referencing the information in WebEx recordings is difficult. The information is not currently searchable, and customers often spend a great deal of time looking for the information they want. For example, they might remember that a feature was described in a specific training session, but it takes time to go through the session recording and find the 30-second clip that contains the information. If customers cannot find the information they need, they contact Technical Support. This training process is inefficient and frustrating for customers and increases the burden on Technical Support.

Information in the training solution should be easy to reference after the initial training is completed. For example, many tasks are preformed intermittently, and learners should be able to find relevant information about those tasks quickly to refresh their skills.

Scalability issues. Custom WebEx training sessions worked well when there were only a handful of customers and several seasoned trainers. But the company is adding more than 500 customers per quarter, and the Training department is having trouble keeping up with the demand for WebEx training. The training solution should scale with growth, and high-quality training should be available to an ever-increasing number of customers without loss of quality or accessibility.

Train the trainer issues. With the demand for training increasing, the company has had to hire new trainers. After they are hired, new trainers read the product documentation, install and begin using a test system, read Knowledge Base articles, and listen to WebEx sessions conducted by seasoned trainers. This process takes a great deal of time and effort, and the results can be inconsistent, depending on the diligence and persistence of the new trainer and the content of the training sessions he or she listens to (some sessions might be more comprehensive or challenging than others). As a result, new trainers might not be prepared to deliver the same level of quality that seasoned trainers can provide. The training solution should enable the company to assess trainer capabilities, remedy shortfalls, and certify skills.

Customer performance issues. The number of customers contacting Technical Support for help in setting up their product is increasing. To keep up with the need, the company is considering hiring and training additional Technical Support personnel. Resources are limited, however, and the company might not be able to hire and train

Technical Support personnel fast enough. The training solution should enable customers to set up their product without interacting with Technical Support for guidance.

The Gap Between "What Is" and "What Should Be"

The performance gap is growing wider with every customer the company adds. For example, if the timing of the WebEx training sessions does not meet their schedule, new customers sometimes attempt to perform system setup tasks on their own. They inevitably encounter problems and call Technical Support for assistance. As the company grows, more customers are facing this problem.

The Importance of the Performance Gap

Because of the performance gap, an increasing number of customers are contacting Technical Support for help. As a result, the Technical Support costs are climbing faster than research and development costs. Currently, more than 10 percent of the company's operating costs go to Technical Support, whereas the industry average is 4-6 percent. This is not a sustainable business model, and to remain competitive, the company needs a solution that will reduce Technical Support costs.

In addition, as more and more customers contact Technical Support for help setting up and using the product, customer satisfaction levels decrease. To improve customer satisfaction, the company needs to provide a better "getting started" experience for customers. Otherwise, the company might continue to see a drop in customer satisfaction, which might result in loss of customers and loss of revenue. Therefore, bridging the performance gap is vital to the company's continued success.

Causes of the Performance Gap

Most of the performance issues are caused by deficiencies in knowledge and skill. The product is complex and customizable, and customers need special training to use it correctly.

Cost-effective and Feasible Solutions

In the software industry, many companies are finding that instructor-led training is no longer a cost-effective or “viable strategy” (Maxwell 2012, p. 92), and the SMSP product is no exception. These companies are turning to self-paced training solutions, and discovering that self-paced training has advantages over instructor-led training. For example, self-paced training can be provided “at the point of need” (Ji-Ye 2005, p. 28). In other words, learners can get the information they need, when they need it, in the context of performing a task. For software training, this approach can be more effective than having an instructor attempt to teach learners everything they need to know before they need to know it. Further, self-paced training offers ongoing opportunities to reinforce learning. Information learned during instructor-led training, by contrast, has actually been shown to deteriorate over time (Ji-Ye 2005, p. 42).

In future, it might be possible to enhance the user interface of the SMSP software product to make it easier for new customers to get started. However, product enhancements require a significant investment in research and development, and the company needs a more feasible solution for the short-term. As a result, this instructional design plan recommends the implementation of a self-paced training system that will be integrated into SMSP to help system administrators set up and begin using the product.

Self-paced training systems have been proven to be effective substitutes for instructor-led training, and in some cases, self-paced training has been shown to outperform instructor-led training. For example, in a study using Microsoft Access software as the subject matter, researchers divided novice computer users into two groups. They provided instructor-led training to one group, and self-paced training to the other group, then compared the post-training capabilities of each group. The study found that, “the instruction group did not outperform the online task support group on any measure of performance, while the latter did significantly better on high-level tasks” (Ji-Ye, 2005, p. 41). The researchers concluded that the effectiveness of self-paced training, “...is comparable to instructor-led training on every measure of performance and self-efficacy, and sometimes better” (Ji-Ye, 2005, p. 42).

Potential Unintended Side Effects of Taking Corrective Action

If the company shifts its focus from instructor-led WebEx training sessions to a self-paced training solution, the following unintended side effects might be predicted.

Customer-related: As a startup, the company was a small hands-on concern that provided customers with nearly instant access to Technical Support for training and problem solving. Today, the company is part of a much larger business group. Customers might interpret the shift to self-paced training as a less personal “big-company” corporate solution. It will be important to highlight the benefits of self-paced training and to assure customers that the live Technical Support resources will not be going away.

Internal (employee-related): Employees who are responsible for developing and conducting instructor-led training sessions might see the shift to self-paced training as a threat to their employment. It will be important to communicate why the self-paced

training is being introduced, and how it will integrate with live Technical Support and training personnel.

Learner Analysis

This section provides a thorough analysis of learner characteristics, capabilities, needs, interests, and prerequisites.

Characteristics

The learners targeted by this instructional design plan are system administrators who purchase and use SMSP (SMSP customers). In some cases, these learners were not involved in the original purchasing decision, but they are the ones who need to learn to use the software.

System administrators understand that their job is to ensure the users they support have the tools they need to perform their jobs. As a result, system administrators approach their work with a sense of urgency. At the same time, they are even-tempered and they are not easily rattled when troubleshooting.

System administrators approach problems as puzzles that need to be solved quickly, but they do not try to “go it alone.” They understand that if they cannot resolve a user’s problem in a reasonable amount of time, using their own problem-solving skills, they need to escalate the issue, and seek additional help or resources. They enjoy learning about new systems and technologies, and their goal is to become expert in supporting computer networks and systems. In other words, system administrators are highly motivated to learn on their own, and they take responsibility for their own learning experiences. As a result, system administrators are likely to excel when using self-paced training, because such training shifts “responsibility from instructors to learners” (Brown 2006, p. 272).

Capabilities

System administrators are skilled in working with a wide variety of computers and operating systems, including Windows, Macintosh, and Linux. They are familiar with the process of patching computers, or applying software updates to operating systems and applications, and they are skilled in managing and maintaining networks, servers, and other systems. They respond to questions from users, and they assist users in troubleshooting system and network issues.

Needs

System administrators need help understanding how to configure, use, and maintain system management software to meet the needs of their organizations. As employees, they also need to improve their efficiency in light of budget constraints and management demands. In addition, system administrators are often required to maintain records about system and software compliance. For example, if the company is using a particular software application, system administrators must ensure that the program is licensed appropriately. They need an automated way to manage license information to ensure license compliance.

Interests

System administrators are interested in a wide variety of systems and networks. They are aware of the ways in which users depend on those systems and networks, and they have a vested interest in ensuring that those systems and networks are available to users 99.999 percent of the time.

Prerequisites

As part of the learner analysis, three system administrators were asked to list the prerequisites necessary to be a successful system administrator. These system administrators concurred that service providers need an aptitude for technology, a willingness to learn new things, a desire to help other users, and the attitude that they can figure things out. In some cases, system administrators might also need specialized training to understand protocols, scripting, and programming.

Required Skills, Knowledge, and Attitudes. System administrators should have the following skills, knowledge, and attitudes:

1. Demonstrated understanding of systems management.
2. The ability to apply patches to software and devices.
3. The ability to manage software licenses.
4. The ability to use a web-based graphical user interface.
5. The ability to respond positively to user requests for assistance with computer systems and networks.
6. The ability to demonstrate perseverance when troubleshooting systems and devices.
7. The ability to identify potential problems related to computers and networks and prevent them whenever possible.
8. The ability to work well with non-technical users, demonstrating patience without being patronizing.
9. The ability to improvise and synthesize solutions to complex computer- and system-related problems.

Workplace, Environment, and Setting Analysis

This section describes the context in which system administrators perform tasks related to this instructional design plan. In addition, this section discusses factors related to the environment and setting in which system administrators perform tasks.

Context

System administrators perform their jobs in the following context:

1. **In the office, on the road, and any time of the day or night:** System administrators need to be able to respond to user requests whenever those requests come in. As a result, they use a variety of resources, from laptop computers to mobile devices, to make sure they can do their job any time, anywhere.
2. **Under extreme pressure:** If computer systems are down, users are idle and business suffers. As a result, system administrators are always under pressure to resolve problems quickly. They are charged with maintaining critical business systems, and mistakes are not tolerated.
3. **With interruptions galore:** System administrators rarely have the luxury of focusing on one task at a time. They are interrupted frequently by phone calls, instant messages, trouble tickets, and other requests for assistance.
4. **Keeping in mind that it's always something:** From a system administrator's perspective, something always needs to be improved. Systems become degraded, users need more disk space, and security risks need to be identified and mitigated. A system administrator's work never ends.

5. **Doing whatever it takes:** System administrators might not always have the perfect resources to resolve an issue. For example, if a server fails, they might not have a spare. In such cases, they need to be able to improvise and adapt existing resources to meet the need.

Workplace and Environmental Setting

System administrators work while seated at desks in standard office settings with few environmental distractions. Sound levels in the office environment are low enough to be considered background noise, and they do not pose a challenge for training or job performance. Lighting is adequate to operate computer equipment and to read printed reference materials.

In some cases, system administrators might perform tasks while away from their desks and using mobile devices (laptops, tablets, and phones). In these cases, the environment is less controlled. However, environmental factors do not typically affect the system administrator's ability to complete tasks using mobile devices.

System administrators typically cannot devote extended uninterrupted periods of time to software training. They have to be available to help users and respond to calls for help whenever those calls come in. As a result, training systems developed for system administrators must be flexible, self-paced, and targeted to specific tasks. System administrators need to be able to start and stop training modules at any time.

Task and Work Analysis

This instructional design plan expects that system administrators, or learners, are familiar with graphical user interfaces and that they have prior experience navigating the Internet using web browser software. In addition, this plan assumes that learners are

familiar with general system management tasks, such as installing patches and running scripts on devices. It also assumes that the system software on which learners are being trained is installed, and initial configuration is complete.

Content and Procedures

The following tasks will be covered in the training solution:

1. Configure System-level General Settings.
 - a. Access System-level components.
 - b. Configure General Settings.
 - c. Configure User Portal and Logo Override Settings.
 - d. Configure Data Sharing Settings.
 - e. Configure Locale Settings.
2. Configure Organization-level Settings.
 - a. Access Organization-level Settings.
 - b. Configure General Settings for Organizations.
 - c. Configure Agent or Client Settings.
 - d. Configure User Authentication Settings.
3. Configure Mobile Device Access:
 - a. Enable Mobile Device Access at the System Level.
 - b. Enable Mobile Device Access at the User Level.
4. Provision the Agent on Devices to Add the Devices to Inventory.
 - a. Create a Provisioning Schedule.
 - b. Run the Provisioning Schedule.
 - c. View Devices Added to Inventory

5. Use a Discovery Schedule to Find Devices on the Network.
 - a. Create a Discovery Schedule.
 - b. Run the Discovery Schedule.
 - c. View Discovered Devices.
6. Enable Agentless Management for Discovered Devices.
 - a. View Discovered Devices.
 - b. Select Devices for Agentless Management.
 - c. Enable Agentless Management for Selected Devices.
7. Apply Labels to Inventory Items to Groups Items for Easy Management.
 - a. Add Manual Labels.
 - b. Add Smart Labels.
 - c. Apply Manual Labels and Smart Labels to Devices.
 - d. Apply Manual Labels and Smart Labels to Software.
8. Enable Metering for Devices and Software.
 - a. Create a Metering Label.
 - b. Apply the Metering Label to Devices.
 - c. Select the Software Applications to Meter.
 - d. Enable Metering for Selected Software.
9. Configure Options for Patching Operating Systems and Software.
 - a. Subscribe to Patches.
 - b. Schedule Patch Downloads.
 - c. Enable Patching for Devices.

10. Create HTML Reports that Show Device Statistics.
 - a. Create a Report Showing Device Disk Usage.
 - b. Generate the Device Report in HTML Format.
 - c. Create a Report Showing Software Information.
 - d. Generate the Software Report in HTML Format.
 - e. Configure Notifications to Alert Administrators When Devices Are Low on Disk Space.

Instructional Goals

The goal of this instructional design project is to enable system administrators to perform the following tasks. Subordinate skills are listed with each task:

1. Become familiar with components of the software user interface. **Subordinate skill:** The ability to use a web-based graphical user interface.
 - a. Be able to access System-level components
 - b. Be able to access Organization-level components
2. Configure System-level settings in the interface. **Subordinate skills:** The ability to use a web-based graphical user interface and an understanding of systems management concepts.
 - a. Configure general settings.
 - b. Configure web server settings.
 - c. Configure locale settings.
 - d. Configure security settings.
 - e. Configure data-sharing settings.

3. Configure Organization-level settings in the interface. **Subordinate skills:**
The ability to use a web-based graphical user interface and an understanding of systems management concepts.
 - a. Configure general settings for organizations.
 - b. Configure Agent or client settings.
 - c. Configure user authentication settings.
4. Add devices to inventory. **Subordinate skills:** The ability to use a web-based graphical user interface and an understanding of systems management concepts.
 - a. Add devices using the Agent.
 - b. Discover devices and enable Agentless management for them.
 - c. Add devices using the API (application programming interface).
5. Apply labels to inventory items, which groups them for easy management.
Subordinate skills: The ability to use a web-based graphical user interface and an understanding of systems management concepts.
 - a. Add manual labels.
 - b. Add Smart Labels.
 - c. Apply manual labels and Smart Labels to devices.
 - d. Apply manual labels and Smart Labels to software

6. Enable metering for devices and software. **Subordinate skills:** The ability to use a web-based graphical user interface and an understanding of software license compliance.
 - a. Create a metering label and apply it to devices.
 - b. Enable metering for specific software applications.
7. Configure options for patching operating systems and software. **Subordinate skills:** The ability to use a web-based graphical user interface and an understanding of patching for software and devices.
 - a. Subscribe to patches.
 - b. Schedule patch downloads.
 - c. Enable patching for devices.
8. Create a report using inventory information. **Subordinate skills:** The ability to use a web-based graphical user interface and an understanding of systems management concepts.
 - a. Create a report showing device information.
 - b. Create a report showing software information.

Instructional Objectives

This training solution has the following ten objectives:

1. Using the SMSP interface, configure System-level settings that are appropriate for the work environment.
 - Domain: Cognitive
 - Level: Comprehension

2. Using the SMSP interface, configure organization-level settings that meet the organization's requirements for the User Portal and locale.
 - Domain: Cognitive
 - Level: Comprehension
3. Using the SMSP interface, access inventory and Service Desk information using the mobile app by enabling Mobile Device Access at the System and user levels.
 - Domain: Cognitive
 - Level: Knowledge
4. Using the SMSP interface, manage devices by creating a provisioning schedule that installs the Agent on appropriate devices using device IP addresses and makes information about those devices available in inventory.
 - Domain: Cognitive
 - Level: Comprehension
5. Using the SMSP interface, identify devices on the network and view information about those devices by creating and running a device Discovery schedule.
 - Domain: Cognitive
 - Level: Comprehension

6. Using the SMSP interface, manage devices that cannot have the Agent installed, such as devices with unsupported operating systems, by enabling Agentless management for devices that have been discovered.
 - Domain: Cognitive
 - Level: Comprehension
7. Using the SMSP interface, manage devices and software as a group by adding manual labels and applying those labels to devices and software.
 - Domain: Cognitive
 - Level: Knowledge
8. Using the SMSP interface, monitor software application usage by enabling metering for managed devices and for selected applications.
 - Domain: Cognitive
 - Level: Knowledge
9. Using the SMSP interface, ensure the security of managed devices by subscribing to patches, scheduling patch downloads, and enabling patching for devices.
 - Domain: Cognitive
 - Level: Comprehension
10. Using the SMSP interface, identify managed devices that are low on disk space and take action to resolve disk space issues before they become problematic.
 - Domain: Cognitive
 - Level: Comprehension

DESIGN

This project will produce a series of self-paced wizards for use in the SMSP interface. Learners access the SMSP interface using Internet-connected computers and standard web browser software, such as Microsoft Internet Explorer or Mozilla Firefox. After learners log in in to the SMSP web interface, they will click a link to access the wizards. The wizards will, “consist of a set of simple dialog boxes that guide users through tasks” and “provide scaffolding” for learning (Ji-Ye 2005, p. 28). As Ji-Ye puts it, the wizards will make the configuration tasks, “less cognitively demanding” because the wizards enable learners to, “concentrate on one sub task at a time rather than approaching the task as a whole” (Ji-Ye 2005, p. 28). Further, the wizards will be accessible for future reference whenever learners need to perform a configuration task.

Test Instruments

This section describes the test instruments that will be used to determine whether the objectives presented in the Instructional Objectives section have been met. These test instruments, or assessment items, will be authentic, or based on actual tasks that learners perform, and they will be included as optional final steps in each of the wizards. When learners complete a task, they will have the option of completing the assessment items and submitting them to the SMSP training team. For learners who are SMSP customers, these assessment items are provided as optional steps designed to help improve the product software and training systems, rather than as required elements. For SMSP Technical Support personnel, trainers, and partners, the assessment items will be used to evaluate performance and certify instructor skill.

Sample Assessment Items

The following assessment items will be used to assess learner success for each of the ten objectives:

- Using the SMSP interface, configure System-level settings that are appropriate for the work environment.

Assessment item: Checklist

Criteria for success: Learner is able to complete each task.

Task	Yes	No
Log in to the System-level SMSP interface.		
Select the appropriate data sharing settings.		
Select the appropriate Agent-server settings.		

- Using the SMSP interface, configure organization-level settings that meet the organization's requirements for the User Portal and locale.

Assessment item: Checklist

Criteria for success: Learner is able to complete each task.

Task	Yes	No
Log in to the Organization-level SMSP interface.		
Select the appropriate settings for User Portal.		
Select the appropriate settings for locale.		

- Using the SMSP interface, enable Mobile Device access, which enables administrators to access inventory and Service Desk information using the mobile app.

Assessment item: Checklist

Criteria for success: Learner is able to complete each task.

Task	Yes	No
Log in to the System-level SMSP interface.		
Enable Mobile Device Access at the System level.		

Log in to the Organization-level SMSP interface.		
Enable Mobile Device Access at the user level.		

4. Using the SMSP interface, manage devices by creating a provisioning schedule that installs the Agent on appropriate devices using device IP addresses and makes information about those devices available in inventory.

Assessment item: Checklist

Criteria for success: Learner is able to complete each task.

Task	Yes	No
Log in to the Organization-level SMSP interface.		
Create a provisioning schedule using IP addresses.		
Provision the Agent to devices.		

5. Using the SMSP interface, identify devices on the network and view information about those devices by creating and running a device Discovery schedule.

Assessment item: Checklist

Criteria for success: Learner is able to complete each task.

Task	Yes	No
Log in to the Organization-level SMSP interface.		
Create a device Discovery schedule.		
Run a device Discovery schedule.		

6. Using the SMSP interface, manage devices that cannot have the Agent installed, such as network devices and devices with operating systems that are not supported, by enabling Agentless management for devices that have been discovered.

Assessment item: Checklist

Criteria for success: Learner is able to complete each task.

Task	Yes	No
Log in to the Organization-level SMSP interface.		
View discovered devices.		
Enable Agentless management for selected devices.		

7. Using the SMSP interface, manage devices and software as a group by adding manual labels and applying those labels to devices and software.

Assessment item: Checklist

Criteria for success: Learner is able to complete each task.

Task	Yes	No
Log in to the Organization-level SMSP interface.		
Create manual device labels.		
Apply manual labels to devices.		

8. Using the SMSP interface, monitor software application usage by enabling metering for managed devices and for selected applications.

Assessment item: Checklist

Criteria for success: Learner is able to complete each task.

Task	Yes	No
Log in to the Organization-level SMSP interface.		
Navigate to the device inventory section.		
Select devices to meter and the metering label to devices.		

Task	Yes	No
Navigate to the software inventory section.		
Enable metering for software applications.		

9. Using the SMSP interface, ensure the security of managed devices by subscribing to patches, scheduling patch downloads, and enabling patching for devices.

Assessment item: Checklist

Criteria for success: Learner is able to complete each task.

Task	Yes	No
Log in to the System-level SMSP interface.		
Select patch download settings.		
Log in to the Organization-level SMSP interface.		
Schedule patch downloads.		
Enable patching for devices.		

10. Using the SMSP interface, identify managed devices that are low on disk space and take action to resolve disk space issues before they become problematic.

Assessment item: Checklist

Criteria for success: Learner is able to complete each task.

Task	Yes	No
Log in to the Organization-level SMSP interface.		
Create a report that identifies devices that are low on disk space.		
Create a notification schedule to alert administrators when devices are low on disk space.		

Organizational, Delivery, and Management Strategies

This section describes the strategies that will be used to organize, deliver, and manage the project.

Delivery Format

The wizards created for this instructional design project will be integrated into the SMSP product software. Wizards will have the following characteristics:

1. The first wizard will be a questionnaire that enables learners to provide information about their network and computer environment including the type of devices they want to manage.
2. When learners complete the questionnaire, the system indicates the tasks they need to perform to configure their system.
3. Learners will select a task they want to complete, such as configuring System-level settings, to access the wizard for that task.
4. When a task is selected, the task wizard opens in a new window and shows information related to the task, such as the options available for data sharing.
5. In the wizard, learners can select options and test settings to determine whether they are appropriate for their environment. When an option is selected, the system indicates how that option can be used.
6. When the wizard opens, the SMSP interface changes to show to the page where the learner can perform the task explained in the wizard.
7. The wizard provides links to information about related tasks.

8. When the learner selects a related task in the wizard, the wizard page is updated to show the new task and the SMSP interface opens to the page where the learner can perform the task.
9. The wizards have a demonstration or “show me” mode that presents screencasts of features and tasks.
10. The wizards will include question and answer sections that learners can complete to test their understanding and identify areas where they need additional instruction.
11. Wizards can be accessed in any order, and can be accessed multiple times.

Instruction

This section describes the learning theories and instructional strategies that will be used in this project.

Learning Theories and Instructional Strategies

When creating the materials required for this training, aspects of behaviorism, cognitivism, and constructivism will be used. For example, behaviorism hinges on “response to stimulus” and training by way of conditioning (Mergel p. 4). As part of the proposed training, system administrators will be asked to locate settings, and they will be rewarded with immediate positive feedback when they locate the settings correctly.

Similarly, the project will use aspects of cognitivism. As they use the training materials, system administrators will build mental maps that indicate relationships among the various components of the SMSP software user interface. The training will employ parts of the “Three-Stage Informational Processing Model” (Mergel p. 8). For example, as system administrators learn to access software components and settings, they will

transfer the information from short-term memory to long-term memory as a result of having meaningful interactions with those components and settings.

The theory that might have the greatest impact on this project, however, is constructivism. Mergel referenced Schuman's description of constructivism as focusing, "on preparing the learner to problem solve in ambiguous situations" (Mergel p. 3). Further, Merrill's approach to constructivism, as quoted by Mergel, describes learning as, "an active process in which meaning is developed on the basis of experience," and stipulates that, "learning should be situated in realistic settings; testing should be integrated with the task and not a separate activity" (Mergel p. 10). This matches the type of training proposed in this project. System administrators spend the vast majority of their time solving problems in situations that are not straightforward. More important, the proposed training requires system administrators to use the software and perform tasks in the actual user interface. This provides an authentic learning experience. In addition, any testing included in this instructional design will be integrated into the training activities, which is in line with the constructivist approach (Mergel p. 10).

Deliverables

The deliverables of this project include wizards that will be built into the product code and delivered as part of the SMSP product software. These wizards will be primarily text based, but they will contain links to screencasts to demonstrate features and tasks. Learners will access the wizards by logging in to the product software using Internet-connected computers and standard web browser software. Supported browsers include Microsoft Internet Explorer 8.x , Mozilla Firefox 17.x, and Safari 4 or higher.

DEVELOPMENT

This section provides an overview of the resources and processes required to complete this instructional design project. Estimates of project cost as well as time requirements are also discussed.

Materials

The development phase of this instructional design project will use the following computer hardware and software resources:

- **An Internet-connected computer for each developer working on the project.** Developers will use computers running Windows 7 (or higher) or Mac OS X version 10.8 (or higher) with Internet connections of at least 18 MBPS.
- **Web browser software.** Developers will use web browser software to access the SMSP system during development. Supported browsers include Microsoft Internet Explorer 8.x , Mozilla Firefox 17.x, or Safari 4 or higher.
- **Code-editing software.** Developers will use Adobe Dreamweaver, version CS5.5 to edit code in HTML, PHP, and other files.
- **Screencasting software.** Developers will use Adobe Captivate version 6.0 to create and edit screencasts.
- **Graphics editing software.** Developers will use Adobe Photoshop version CS5.5 to edit icons and graphics used in the wizards.
- **Source control software.** Developers will use the Perforce source code repository to manage all source files for the project.

- **Standard productivity software**, such as the Microsoft Office suite.

Developers will use Microsoft Project, Outlook, Word, and other software to track tasks and collaborate on development.

Timeline for Completion

The proposal for development, implementation, and evaluation will be completed in December 2013. The timeline for developing the training is yet to be established.

Cost

Because no resources are dedicated to this project, the cost is limited to the time and materials required for the CSUMB MIST program itself. Materials, including computers, software, and an Internet connection, have already been procured by the company for other purposes, so no additional costs will be incurred for this project.

Process

The process used in this project includes the following steps, which are based on the model described in *The Systematic Design of Instruction* (Dick & Carey, 2009):

1. Analyze the needs, learners, learning context, performance context, and tasks.
2. Identify the strategies and delivery formats to be used.
3. Develop the instructional materials.
4. Implement the training and conduct formative evaluation to assess effectiveness and identify areas that need improvement.
5. Revise the training to incorporate feedback from formative evaluation.
6. Evaluate the success of the training by conducting a summative evaluation.

IMPLEMENTATION

During the implementation phase, it is vital to test materials and get feedback from individuals who represent the target learners to ensure the success of the training. Prototypes will be distributed and tested as described in this section.

Delivery Methodology

Prototypes of the wizards will be provided to system administrators as part of the SMSP software program. System administrators will access the prototypes using their own Internet-connected computers and web browser software. In addition, formative evaluations will be conducted with at least five system administrators to gather feedback and assess the effectiveness of the training.

Formative Evaluation

During the formative evaluation, storyboards and HTML prototypes will be used to simulate tasks and enable learners to click through the wizards to see how they function. The formative evaluations will take place in a comfortable conference room setting free from distractions. The conference room will have a single desk with a laptop computer. Two chairs will be available, one for a learner and one for a facilitator. During each test, a facilitator will sit next to the learner to observe and guide the test.

Each formative evaluation will be recorded, for future reference and analysis, with the learner's consent. Recording will be done using the built-in laptop camera and screencasting software to capture user keystrokes. As compensation for participating in the evaluation, learners will receive a T-shirt and a Starbucks gift certificate.

The facilitator will ask learners to:

1. Respond to the look and feel of the static storyboards.
2. Perform a series of configuration tasks using the HTML prototypes.
3. Describe what they're thinking as they perform tasks.
4. Provide feedback on what they expect from various aspects of the interface.

Facilitators will note where learners have trouble. In addition, facilitators will provide a minimal amount of guidance to help learners figure out how to perform tasks if they get stuck. Learners will be prompted to explain what they like and don't like about the storyboards and prototypes, and to provide any additional comments related to the wizards or the SMSP software product in general.

The results of each evaluation will be analyzed to identify aspects of the interface, design, or content that are confusing, inconsistent, or incomplete. Those aspects will be reworked, and additional tests will be conducted on new storyboards and prototypes if necessary.

Summative Evaluation

One of the goals of summative evaluation, according to Dick & Carey, is to answer the following question: “Did the intervention, including the instruction, solve the problem that lead to the need for instruction in the first place” (Dick & Carey, p. 320). The central problem of this instructional design project is to design a training solution that enables system administrators to configure and begin using SMSP software without help from live trainers. However, the nature of the project, namely, training for SMSP customers, makes it difficult to gather the data needed to determine, with certainty, whether the intervention solved the problem. Specifically, SMSP customers are primarily concerned with using the product to manage their systems, and they cannot be compelled to complete surveys or post-tests during field trials. As a result, the information collected from surveys might or might not accurately measure the success of the training. It is possible that data will be skewed because customers who successfully use the training to configure their systems might not complete surveys, and customers who have trouble might provide more detailed feedback.

To obtain a broad range of input, the summative evaluation for this project will be conducted using both expert evaluation and field trials to evaluate the completeness, accuracy, and effectiveness of the self-paced training solution. The results of the summative evaluation will be used to determine whether to continue using the self-paced training solution.

How Data Will Be Gathered

Because of the nature of the self-paced training solution, data will be collected using optional surveys, which will be accessible from the SMSP user interface. The

surveys will be presented as opportunities to improve the product, and to help identify aspects of the SMSP training solution that are working and aspects that need improvement. Further, an introduction to the survey will make it clear that the data collected will be used to evaluate the content of the training solution, not the system administrator's performance, and that only anonymous data will be used. As an incentive to complete the survey, 20-dollar gift certificates will be offered to the first five system administrators who complete the survey. See the Appendix for a survey example.

In addition, user interaction information will be collected in log files during field trials. This information will include:

- The configuration tasks attempted
- The configuration tasks completed
- The configuration settings selected
- The amount of time spent on each configuration task
- The sequence of configuration tasks attempted
- The wizard links and user assistance accessed

These log files will be used only if system administrators agree to share their data and select the appropriate data-sharing settings. Collected data will be analyzed and aggregated to identify usage trends and common themes, and to answer the following questions:

- Did learners complete all configuration tasks?
 - If not, which tasks did learners fail to complete?
 - Did learners who failed to complete tasks access user assistance?
 - What was the order of tasks accessed?

- What was the order of tasks completed?
- How much time did each task take, and which tasks required the most or least amount of time?
- How did learners use the wizards and user assistance?
 - Did learners click through all fields of the wizard?
 - Did learners access definitions or expanding text in wizards?
- Did learners contact SMSP Technical Support?
 - If learners contacted Technical Support, what were the learners' questions?

Data analysis will be summarized in reports.

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APPENDIX

Assessment Instruments for Summative Evaluation

This section provides examples of assessment instruments that will be used during summative evaluation.

Example of Summative Evaluation Tools: Expert Evaluation Form

The following evaluation form will be completed by subject-matter experts in the SMSP organization.

Expert Evaluation: Congruence Analysis

1. Can training be implemented using available resources? Yes / No
2. Is the strategy appropriate to achieve objectives? Yes / No
3. Can materials be used effectively? Yes / No
4. Do you recommend that we continue to use this training solution? Yes / No
5. Provide any additional comments or feedback.

Expert Evaluation: Content Analysis

For each objective, answer the following questions:

1. Are materials accurate? Yes / No
2. Are materials complete? Yes / No
3. Provide any additional comments or feedback.

Example of Summative Evaluation Tools: Learner Survey

The following survey will be offered to learners when they exit each configuration wizard. The survey will also be accessible through a feedback link at the bottom of each page of the wizard.

Introduction: Instruction to Learner

You can help improve SMSP by rating the configuration wizards. All ratings and comments will be used anonymously to help improve the product. No personal information will be collected. As a thank you for participating in this survey, you will receive a \$20 gift card (available to the first 5 respondents only).

Question	Rating / Comments 5=Excellent 4=Very Good 3=Good 2=Poor 3=Needs improvement
1. How would you rate your overall experience using the wizards?	1 2 3 4 5
2. How relevant were the wizards to your systems and networking environment?	1 2 3 4 5
3. Would you recommend these wizards to a colleague?	Yes / No
4. If you were updating the wizards for your environment, what would you change or customize? Comments: _____ _____ _____	