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Developing Online Templates for ISO 9000-Based Standard Operating Procedures

By Mr. Anbu Lingappan, Dr. Angelo D. Brown, Dr. John W. Sinn & Dr. Todd C. Waggoner

Abstract

Standard operating procedures (SOP) in manufacturing and other environments are used to provide a clear and concise set of instructions to carry out a task. SOPs have become more of a requirement over recent years due to the necessary documentation guidelines set by ISO 9000 and QS 9000 (ISO/QS 9000) standards (Ramsay, 1992). Current documentation is usually only available in printed forms, and changing printed forms frequently can prove to be a costly task for any organization. Therefore, alternate methods of providing documentation need to be assessed.

The results of this study advocate the use of electronic documentation as a better method for disseminating, storing, and updating information typically found in SOPs. This information can be readily accessed via organizational intranets or the Internet (Mendelson, 1997). In order to create SOPs suitable of being placed online, software templates were developed. Results from the study indicated that developing templates would reduce the complexity of creating online SOPs. After careful investigation of the software and hardware requirements needed to complete the task of creating the templates, FrontPage 97 by Microsoft Corporation, running on a Windows-based personal computer, was selected as the primary software package.

The findings of the study suggest that creating online documentation presents some unique opportunities for a manufacturing company faced with the need to update and distribute SOPs on a continuous basis. However, it does require knowledge of certain software packages to develop online documentation, particularly if it contains multimedia. The use of

multimedia such as audio, video, and graphics within the SOP encourages an individual to use the SOP more often due to the interactive nature of the document (Thompson, 1994). In this paper the authors present in detail the purpose of the study, the methodology used by the investigator, the results and the recommendations for developing and using online SOPs.

As organizations compete in the global market, the need to provide information that is readily accessible from various parts of its structure and the world can be accomplished through the use of the Internet. These documents can also be accessed from various branches of the same organization from distant locations at the same time. ISO/QS 9000 requires organizations to document the procedures involved in day-to-day operations. This must be easily accessible to individuals within the organization and their customers (Ramsay, 1992). Currently, such documentation is made available to individuals in the organization in printed form. However, printed documents are not as easily accessible as electronic documents. The simple task of finding instruction for a particular procedure may currently involve shuffling through several manuals, stacks of papers, electronic multimedia, or by retrieving the information by searching a database.

A number of companies committed to using ISO/QS 9000 standards have begun building on a foundation of continuous improvement which encourages the constant updating of documentation (Amsden, Amsden & Ferratt, 1996). Constant updating can be easily achieved in a cost-effective manner using electronic documentation methods. Any individual possessing the correct privileges within the

organization can access the documents rapidly. Overall, the ability to update and support information quickly will set the organization on the right path toward becoming a world class quality organization. With the current availability of software and hardware, users are left in a state of confusion in the selection process of an appropriate software and hardware package that will best suit their needs. After the decisions are made, users are still left without specific guidelines or tools to assist them in creating online SOPs.

Purpose, Importance and Objectives

The intent of this research was to provide users with software templates to assist in developing electronic, online SOPs. The process of creating or updating an SOP is controlled by the organization’s policies and usually has ISO 9000 implications. The process could involve the input of several personnel, ranging from the engineer to the machine operator or end user (DeSain, 1993). Once an SOP is completed, the document is printed and copies are made for archive filing and retrieval in the appropriate areas of the organization.

An SOP must be well organized, have a good layout and contain high quality graphic images. SOPs that contain graphics, animation, or videos are more appealing than an SOP consisting of a list of tools and steps to follow (Cassells, 1996). Such a document can be maintained and updated on a network server computer. Any changes that are made on the server computer could be viewed by the end user in a relatively short time. (Balasare, 1993). Consequently, individuals relying upon SOPs as a means for completing tasks on the job, can be exposed to the most current information available in an efficient manner. The objectives of this study were to:

1. Develop criteria for what an online SOP should look like and the information it should contain.
2. Develop an SOP template that matches the criteria and that is relevant to the manufacturing environment.

3. Identify the software and hardware requirements needed to create online SOPs.
4. Assess the online template against expectation in the field.
5. Determine the effectiveness of the template in meeting user’s needs.

Methodology

Computers and multimedia technology have been used to develop online SOPs and are accessible via an intranet or the Internet in this research. Common requirements of SOPs were studied to develop software templates for creating the online documentation. The software templates were electronic fill in the blank methods for creating SOPs. For example, document control information such as dates of creation, author, purpose, scope, and other similar items are all entered at the prompted locations.

Assessment of Existing SOPs

The first step in reviewing existing SOP development involved conducting interviews with representatives from three difference manufacturing companies. A review of the web sites of companies that display their SOP’s was then performed, and the literature on SOP development was reviewed. Based

on the information obtained from the interviews, Web site review, and literature review, a matrix was developed categorizing the design criteria for the SOP template development.

Four categories of templates were formulated to satisfy the matrix analysis. Based on the design criteria, templates were developed with emphasis placed on function, rather than on aesthetics or artistic document design. ISO/QS 9000 requirements played a critical role in developing the templates.

Coordinate Measuring Machine (CMM) Hardware Consideration

Due to programming capabilities, computer controlled features, accessibility and capabilities, the CMM was chosen as the hardware for this study (Hickey, 1996). The CMM was selected as the device for which the SOPs would be developed because of:

1. Accessibility of the CMM.
2. Availability of technical references.
3. Existing paper type SOPs.
4. The diverse functionality the CMM requires several SOPs.
5. Computer driven control.

Instructions were formulated that were consistent with the operation and functionality of the CMM.

Table 1. Content Matrix and Web Site Review

	Site A	Site B	Site C	Lit. Review
1. Visual content	X	X	X	X
2. Audio content	X	X		
3. Video content		X	X	
4. Get Feedback	X	X	X	
5. Training	X	X	X	
6. Launch other Applications	X	X		X
7. Print Pages	X	X	X	X
8. Import Graphs	X	X		
9. Import/Export Word documents	X	X	X	X
10. Import EXCEL	X	X		
11. Low Price	X	X	X	
12. Good Security	X	X	X	X
13. Templates	X	X	X	X
14. ISO Compliance	X	X	X	X
15. ISO Document Control	X	X	X	X
16. Online Requirement	X	X	X	X
17. Hyperlinks	X	X	X	X
18. Flowcharts	X	X		X
19. Import templates	X	X		

Computer Software and Hardware Selection

Consistent with industrial trends of replacing mainframe computers with PCs for organizational uses, the software and hardware that were evaluated for this project were PC-based (Venezia, 1996). In order to create the templates. Some essential software and hardware requirements were formulated.

Software. After careful investigation of various software packages designed to aid in the creation and management of professional quality internet and intranet sites, such as; Adobe Pagemill, Claris Homepage, and Microsoft Frontpage 97 (MFP 97), MFP 97 was selected as the software package meeting most of the criteria identified in the study. MFP 97 was simple to use after reading the “Getting Started” section of the manual, and completing the first few tutorials provided in the written documentation. It also had a variety of tools that made creating the online templates less difficult. The software provided a navigation tool that assisted in viewing the hyperlinks associated with each Web page. The software also provided the capability to save documents as Web pages or templates.

Hardware. The minimum hardware required to run this software was a 486/50 with 16 MB RAM, 40 MB of hard drive space, and running under the Windows 95 operating system. While these requirements are easily surpassed by most systems in operation today, a faster CPU, more ram and a larger capacity hard drive should provide more speed, storage space, and better performance.

Development of Software Templates

The development of a template-based SOP system was essential. This consisted of designing and creating SOP templates, and providing a means for their use and user customization. The templates were created for the different screens. Based on the review of literature the following design criteria were developed and used to guide elements of the template development process:

1. Layout, or how the data will be organized in terms of page format, fonts and font sizes (Denton & Kelly, 1993).
2. Appearance, including background, foreground, presentation, graphics, strong or weak colors used (Mendelson, 1997).
3. Level of multimedia content, that is, the level of graphics, video, audio and animation used (Hartley, 1993).
4. Frequency of updates, or how often information will be updated or new information added (Petrocelli, 1994).
5. ISO/QS 9000 Compliance, meaning that ISO document and document control requirements needed to be met (Lamprecht, 1992).

After the design criteria were developed the templates were created

using MFP 97. The SOP software templates were created using the following steps:

Template Creation

1. Templates were designed based on the SOP criteria formulated. Which consisted of sketches of layouts and flow of events.
2. The proper software and hardware requirements were assessed.
3. Once the software was selected, the templates were developed. MFP 97 was an easy to use package that provided all the capabilities the users had requested. A sample template is shown in Figure 1.

A template to create a feedback form was provided, along with a search tool to assist in quick document access. A flowchart to assist users in editing

Figure 1. A Sample of the First Page of the Online SOP Template.

Company Name: Enter company name here (insert logo if needed)
Title: Enter Title or Name of SOP Here

Document Information

Document Number:	xxxxxxx	Part Number:	xxxxxxx
Department Name:	xxxxxxx	Department ID:	xxxxxxx

Description:	Enter description of SOP
Scope:	Enter scope of SOP
Purpose:	Enter Purpose of SOP
Responsible Parties:	Who is responsible for performing the documented procedure

Distributed to: Enter departments and individuals receiving a copy here	
Revision Number: Enter latest revision	Approval Date: Enter date approved here

Link to Next Page	Hyperlink to Next SOP	Hyperlink to Help Page
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the templates was also created, and is shown in Figure 2.

By using key words, the end user was able to search and access the Web pages located at that Web site. A table of contents page was also included to list the available web pages. Standard templates were created for header and footer information. These templates were imported into the larger documents thus ensuring a consistent layout.

User Intervention

Users were introduced to the templates by allowing them to browse through the sample Web site that was created. Once the users were oriented to the available templates, they were introduced to MFP 97 and allowed to create SOPs for two operations of the CMM. The users imported photographs into the documents they created, and used them as hyperlinks to access other parts of the Web site. After reviewing user feedback to the SOP format, recommended changes were implemented.

Findings

The ability to take an entire shop online and provide the operators with terminals that facilitated viewing the work instructions on a point and click basis seemed to excite the interviewees. The organizations welcomed the concept of using software driven templates to create online documentation. The ability to import images with relative ease was also well received by the users.

This project resulted in the creation of software templates that could be used by any organization in manufacturing to assist them in creating online SOPs.

The software that was used to create the templates was relatively inexpensive in comparison to the various other packages reviewed. One may argue that templates already exist for the creation of online documentation. But most of those templates come with an expensive price tag (Standard Operating Procedures Index, 1997). Finding practical, cost effective solutions to create online documentation through the use of a simple software package such as MPF 97 was

one of the objectives that was accomplished through this project.

Functionality and Feedback

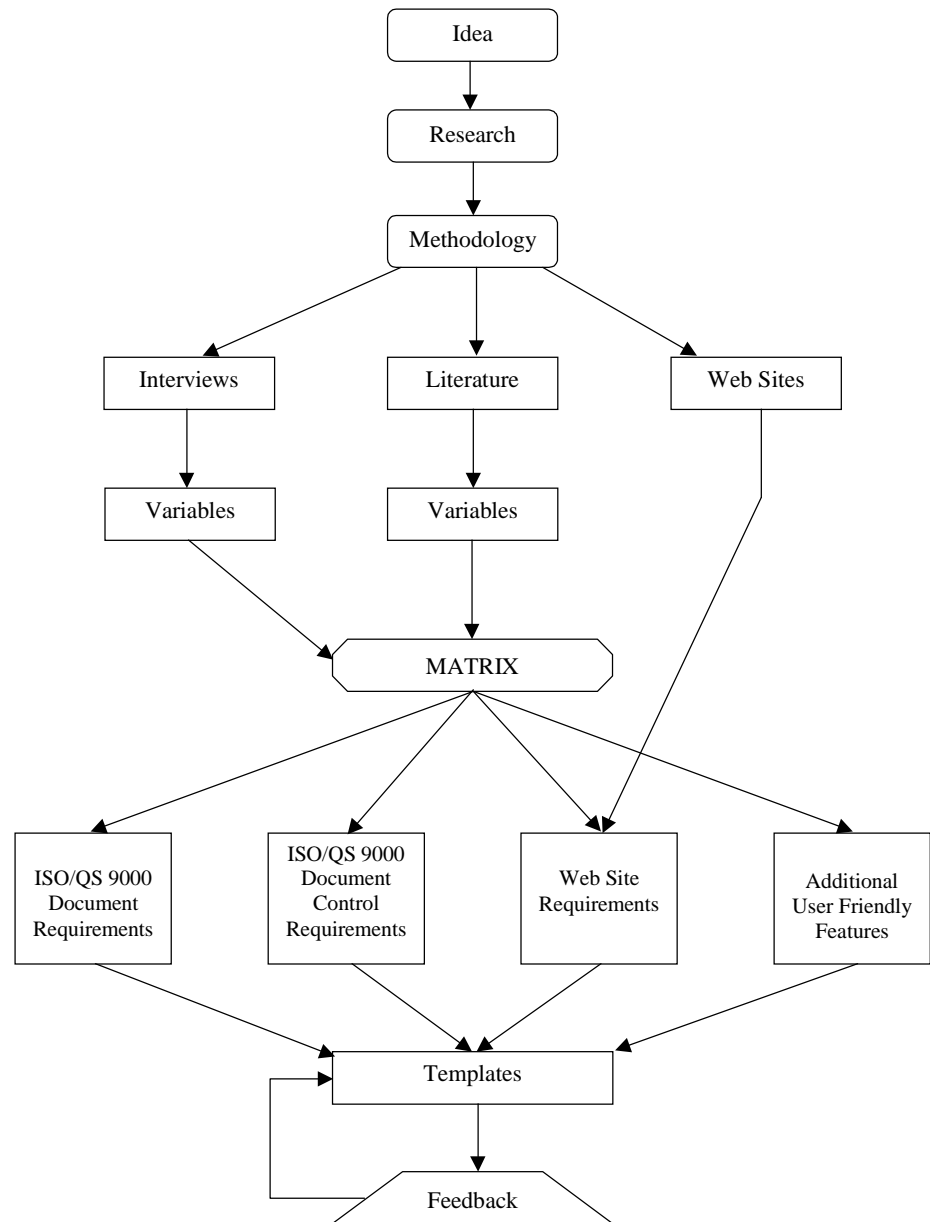
The functionality of the templates was assessed using Web browser software. Predefined and newly defined links were tested for proper functionality. The overall functionality of the templates was reviewed based on user feedback.

User feedback was sought on developing SOPs for two functions of the CMM. These were initialization sequences and the probe qualification

process. These functions were selected because they are key parts of the system. User feedback was analyzed based on ease of use, functionality, compliance with ISO/QS 9000 requirements, and general comments.

Users selected were two graduate students within the College of Technology at Bowling Green State University, Bowling Green, Ohio (BGSU), and an internal auditor. The graduate students were selected for convenience, and because they were not familiar with the CMM. The internal auditor was also a

Figure 2. Flowchart of Study



graduate student at BGSU, however he was very familiar with CMM.

Conclusions and Recommendations

The changing ISO/QS 9000 standards demand continuous updating of online templates and SOPs. The development of simple templates allow users to customize templates to fit their needs. Comments received from users were assessed and used to modify the templates. This resulted in final templates that were both user friendly as well as functional.

Further analysis suggested that online documentation was a priority for the three manufacturing companies who participated in the study. Moreover, the organizations wanted good document control features and the flexibility to import and export information into the Web pages.

Conclusions

Based on the feedback obtained, it can be concluded that the users found the templates both easy to use and edit. They also found that the templates served the purpose of the documents. The users commented on the better organization of information within the tables. Users further indicated that changes were necessary to eliminate user errors when editing the documents. Significantly, one user, the internal auditor, knowledgeable on ISO standards and requirements was asked to review the usefulness and validity of the templates. The internal auditor found the templates to be compliant

with ISO document requirements and document control requirements. The ability to obtain feedback from the operators/end-users, and to launch applications from within the online SOP system were found to be useful tools that provided additional flexibility to the end-users.

Recommendations

The following recommendations all made as a result of this study:

1. Aesthetics and appearance of the online template need to be pursued in greater detail.
2. While beyond the scope of the current study, incorporating CAD drawings into the documents, and using a viewer that would allow users to zoom into certain areas of the images would be one of the next steps in adding visuals to documents. This avenue would be strongly recommended for future users, since CAD drawings are an integral part of a manufacturing environment.
3. Study ways of improving the ease with which audio and video data can be captured.
4. Expand the hardware and software envelope to include scanned pictures, video and audio data.

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