

**COMPUTER AIDED MANAGEMENT OF PROCESSES (CAMP)
AT THE
NATIONAL ENVIRONMENTAL SERVICE CENTER**

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ABSTRACT

Computer Aided Management of Processes (CAMP) at the National Environmental Service Center

All business operations, either manufacturing or service, have certain processes they follow to accomplish their goals. These processes change with time due to financial performance, emerging market opportunities, or erosion of market share and they often need to be reengineered to improve their performance. This research aims to analyze and improve the product review process at the National Environmental Service Center (NESC). A supporting organizational structure is proposed. Process improvement was conducted by employee interviews, and a database was developed to integrate information flow between departments. The new software tool facilitates the workflow and helps to track, monitor, and manage various NESC operations. A feedback mechanism has been built in to ensure continuous improvement.

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DEDICATION

To my parents Dr. S. Mathuram Selva Raja and Mrs. K. Raja Rajeshwari without whose love and dedication this work would have not have been possible.

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CHAPTER 1: INTRODUCTION

1.1 The National Environmental Service Center

The National Environmental Service Center (NESC) is a non-profit organization funded by the Environmental Protection Agency (EPA) and the U.S. Department of agriculture's Rural Utilities Service and is affiliated with West Virginia University. NESC provides free and low-cost technical information and training about drinking water, wastewater, environmental training, and solid waste management to communities with fewer than 10,000 residents [1]. The NESC consists of four programs: The National Small Flows Clearinghouse (NSFC), the National Onsite Demonstration Project (NODP), the National Drinking Water Clearinghouse (NDWC), and the National Environmental Training Center for Small Communities (NETCSC).

The NESC is committed to serving small communities by offering different types of free or low-cost educational products and services, either through their Website or personal assistance. This commitment involves a rigorous process of evaluation for every product and/or service before its release. The process establishes a sense of trust to the community about the information they can obtain from NESC and its programs.

1.1.1 National Small Flows Clearinghouse (NSFC)

The NSFC is a non profit organization funded by the U.S. Environmental Protection Agency (EPA). NSFC helps small communities and individuals solve their wastewater problems to protect public health and the environment. As a nonprofit organization,

NSFC provides objective information about onsite wastewater collection and treatment systems for communities of fewer than 10,000 people [2]. NSFC is the only national resource of its type dealing with small community wastewater infrastructure.

NSFC offers a variety of resources useful to local officials, professional engineers and treatment plant operators, contractors/developers, government agencies, researchers, and homeowners. The organization offers two free publications, *Small Flow Quarterly* magazine and *Pipeline* newsletter. *Small Flows Quarterly* features technical articles about small community wastewater issues and is directed primarily toward engineers, and professionals in the field. *Pipeline* is written for the general public and local officials with articles about finance, regulations, and legislation. NSFC's *Wastewater Products Catalog* provides descriptions of more than 386 books, brochures, case studies, database searches, and videotapes focusing on small community wastewater treatment issues.

The technical assistance staff maintain five computer databases (bibliographic database, facilities database, regulations database, manufacturers and consultants database, and contacts and referrals database). Current and updated information about wastewater-related issues is sent to the NSFC listserv subscribers and is also available on the Web site.

1.1.2 The National Onsite Demonstration Program

The National Onsite Demonstration Program (NODP) was established in 1993, to encourage the use of alternative, onsite wastewater treatment technologies to protect

public health, ensure water quality, and sustain the environment in small and rural communities [3]. The NODP is funded by the U.S. Environmental Protection Agency (EPA). The main objective of this program is to provide communities throughout the country with cost-effective alternatives to centralized sewage systems.

1.1.3 The National Drinking Water Clearinghouse

The National Drinking Water Clearinghouse (NDWC) at West Virginia University is a public service organization funded through U.S. Department of Agriculture's Rural Utilities Service (RUS). NDWC serves as an extension of RUS, and its main objectives are to collect, develop, and distribute timely drinking water-related information and to provide technical assistance to America's small and rural drinking water treatment plants.

NDWC provides free technical assistance and information related to drinking water issues to communities with fewer than 10,000 residents and the organizations that work with them. The organization publishes a free *On Tap*, with 23,000 subscribers across the U.S. *On Tap* reports on technical, financial, maintenance, operations and management, source water protection, and health issues relevant to small drinking water systems. NDWC also provides technical assistance through the engineers and technical assistance specialists who answer drinking water-related questions via the NDWC's toll-free telephone number. The NDWC staff research and answer callers' questions or refer them to other appropriate organizations. The NDWC maintains up-to-date information on small water system resources, issues, and trends by actively establishing and maintaining contact with people in the drinking water field.

NDWC offers more than 300 free educational products, including brochures, videotapes, research reports, and government publications with topics that range from drinking water regulations, to financial management, to children's educational literature [4].

1.1.4 The National Environmental Training Center for Small Communities

The National Environmental Training Center for Small Communities (NETCSC) is a nonprofit organization that improves the public health and environmental conditions of the nation's small communities by providing training and training-related information and referral services in the areas of wastewater, drinking water, and solid waste [5].

By providing training information and resources to environmental trainers and technical assistance providers, NETCSC helps to protect human health and the environment by ensuring safe and efficient operation of small drinking water, wastewater, and solid waste systems.

NETCSC training information and resources include a quarterly newsletter, *E-train*, a training resources catalog, training assistance and approximately 200 low-cost products, and an extensive training information repository through its resource center. *E-train* provides the trainers and small community personnel with updated information about environmental management and training. *E-train* also provides news and information about training resources, NETCSC products, model training programs, and drinking water, wastewater, and solid waste training opportunities.

NETCSC training assistants answer questions and provide information about upcoming training events and materials available nationwide. They also put people in touch with trainers and training organizations throughout the country.

1.2 Product Review Process

In order to provide the small community officials, engineers, technicians, regulatory officials, and private citizens with low cost and vital information about drinking water, waste water, environmental training and solid waste management; NESC releases three quarterly publications: *E-train*, *On-tap* and *Small Flows Quarterly*. Along with up-to-date information on drinking water, training, and wastewater related issues, these publications also provide information on the latest catalogue of product offered.

To determine the quality of these products, NESC requires a product review process. With the help of its technical and publications staff, NESC identifies various potential booklets, tapes, training programs, articles and tools and puts them through the product review process, so NESC can recommend and offer them with confidence. The product is evaluated for its technical content to ascertain that it meets the standards for quality information, and whether or not the product has a reasonable “shelf life.” The approved products are then promoted in catalogs, the quarterly publications, at conferences and through the Website of each program.

1.3 Background

In order to sustain the product review process and to track product availability, NESC has a database called the “Products Database.” This database was previously hosted by a FoxPro database system and was accessible only on Macintosh machines across the network. The accessibility of the database was limited to only one person at a time slowing the review process.

Besides problems presented with the database, the product review process was not completely defined. The organizations within NESC had different review techniques, and the database was not designed for their various needs. Furthermore, it was impossible to track down a product once it was in the system for review.

In a previous research project Ragava Nadig [6] tried to analyze the process using a Process Analysis Technique (PAT). Nadig replaced the obsolete FoxPro database with Valentina. Valentina is a database system developed by Paradigma software [7]. He also suggested an additional technical review form in the front end of the database to enable multiple reviewers to gather at a place and take turns to rate the product. Even though Nadig analyzed and improved the process, he did not present an optimized process flow and did not integrate all the departments within the organization using a computer information system. The data was not transferred from the previous FoxPro database to the Valentina because the latter is a single user database system. In practice, it was difficult for all the reviewers to gather at a specific time and place to review a product.

Also, there was only one person in charge of data entry because, depending on the hierarchy of the employees, their access was limited in different ways and only a single person was able to collect the information. No measurement system was available to monitor the process flow, and the general public could not have immediate access of the products being offered.

1.4 Problem Statement

The objective of this study is to:

- Analyze and study the “Product Review Process,”
- Reengineer the product review process so as to eliminate bottlenecks and non-value added activities,
- Assign ownership of sub-processes and tasks by identifying departments or workgroups,
- Conduct process improvement sessions in order to study the suggestions of the employees,
- Design a database-powered software system to integrate the enterprise and facilitate the workflow that is accessible to all the employees across different platforms (Macintosh and Windows),
- Design tracking tools to identify the exact stage of review the product is in,
- Develop a documenting system that allows logging all the activities in the process,
- Design tools to manage the workflow of the process,
- Implement the system by migration of the data from the old database to the new database,

- Conduct training sessions to educate the employees and to ensure the smooth transition to the new system, and
- Design feedback mechanisms to be used by the employees to ensure continuous improvement of the process.

CHAPTER 2: IMPROVEMENT OF THE CURRENT PROCESS

2.1 Introduction to the Popular Process Improvement Techniques.

All organizations, either manufacturing or service, have certain processes they follow to achieve their business goals. A process is defined as a set of interrelated work activities each having prescribed inputs and outputs [8]. These processes, when left undocumented and unstudied, can result in bottlenecks and non-value-added activities. A lack of a supporting organizational structure hinders delineation of responsibility, authority, and interrelation of work functions. Tools that assist management to plan, track, and monitor the processes on a constant basis help to improve efficiency. Significant research has been done to study and improve work processes. Some of the popular process improvement methodologies are:

- Workflow analysis,
- Business Process Reengineering,
- Process Mapping, and
- Six Sigma.

Workflow analysis helps to document and study the process to eliminate bottlenecks and improve system efficiency [9]. Workflow is a collection of tasks performed by several individuals that are organized to accomplish certain business processes. Business process reengineering can be defined as a radical redesign of a business process; the associated systems and supporting organizational structure to achieve a dramatic improvement in business performance [10] [11]. Process mapping is a methodology that helps businesses understand and organize their human, technological, and infrastructure resources to

accomplish their goals. These maps help to understand the purpose of the activities. They provide information about how inputs and outputs are handled and distributed and the individuals associated with them [12].

The Six Sigma approach follow a five step process to define, measure, analyze, improve current processes and control (DMAIC). This is different from other techniques in that it has methodologies to ensure continuous improvement by monitoring process improvement data.

2.2 Improving the Current Process

In this study, the following steps were carried out to analyze the NESC processes:

1. Defining and flowcharting the current process,
2. Identifying the various work-groups or departments,
3. Conducting process improvement sessions with the staff,
4. Identifying the various possible areas of improvement, and
5. Design of the process workflow. (process mapping).

2.2.1 Defining and flowcharting the current process

Defining the process provides a means for understanding and communicating operational details to the staff involved. It also provides a baseline or standard for evaluating improvement. Section 1.2 defined the product review process. Flowcharting helps to identify deficiencies such as redundant steps and other non-value-added activities. These redundant steps and non-value-added activities act as bottlenecks and impede workflow.

Charts can also help administration of workgroups. Figure 2.1 through Figure 2.4 shows the detailed flow chart of the product review process. This flow chart is further explained later in section 2.3 to section 2.7.

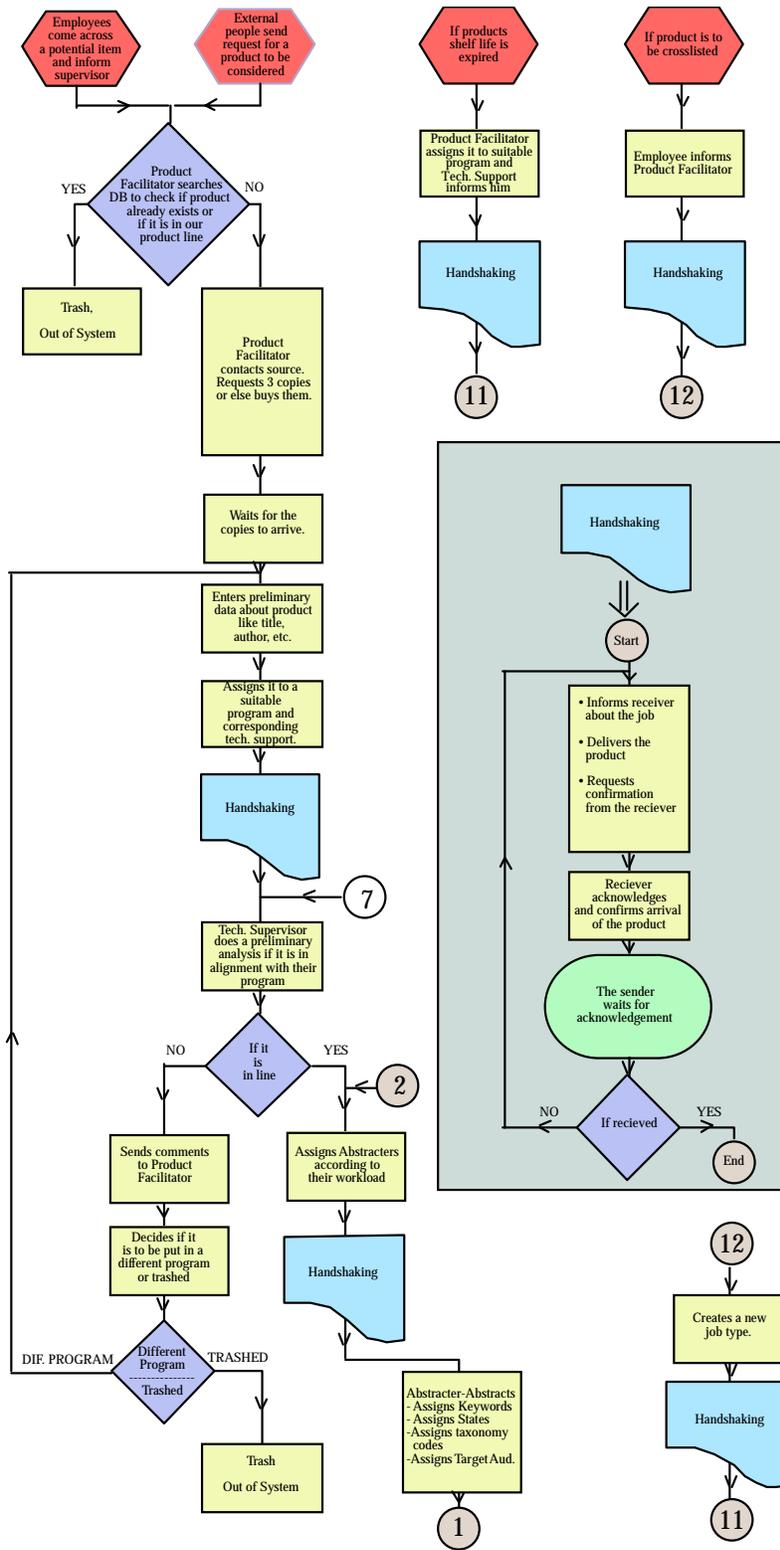


Figure 2.1 Product Review Process- Workflow Diagram (Part 1)

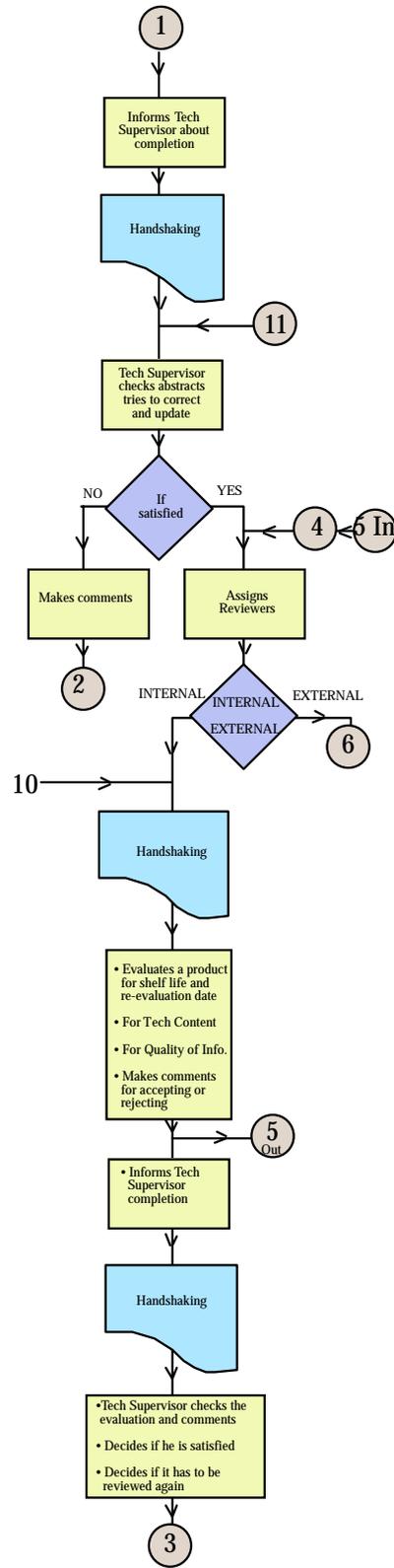


Figure 2.2 Product Review Process- Workflow Diagram (Part 2)

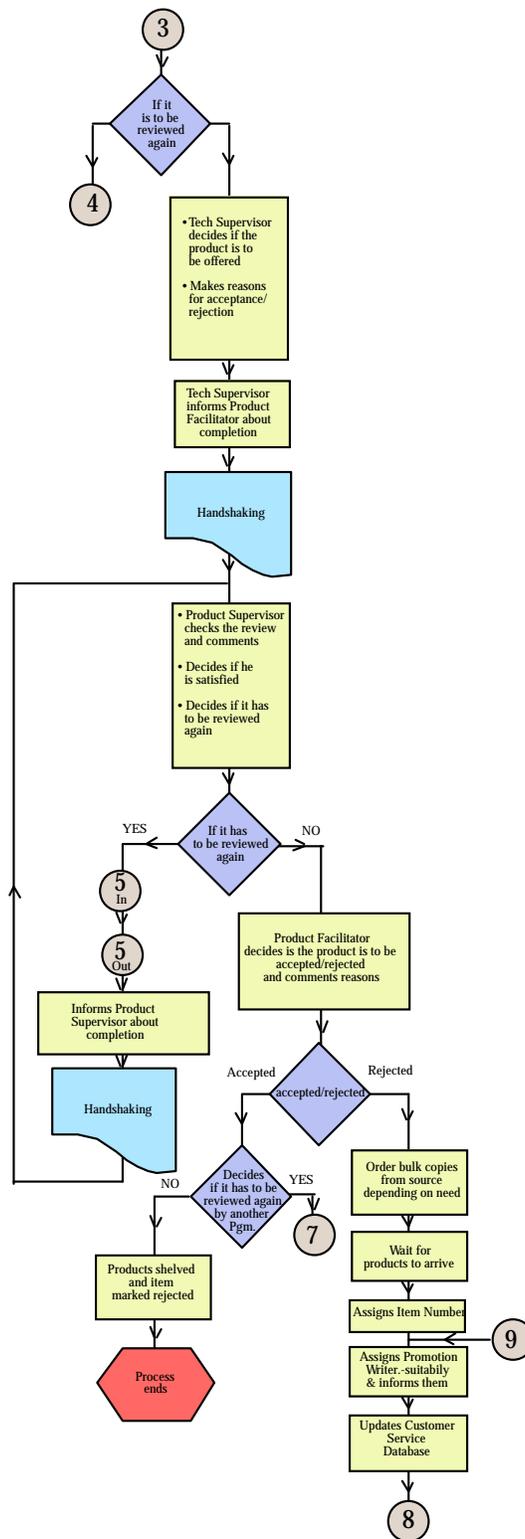


Figure 2.3 Product Review Process- Workflow Diagram (Part 3)

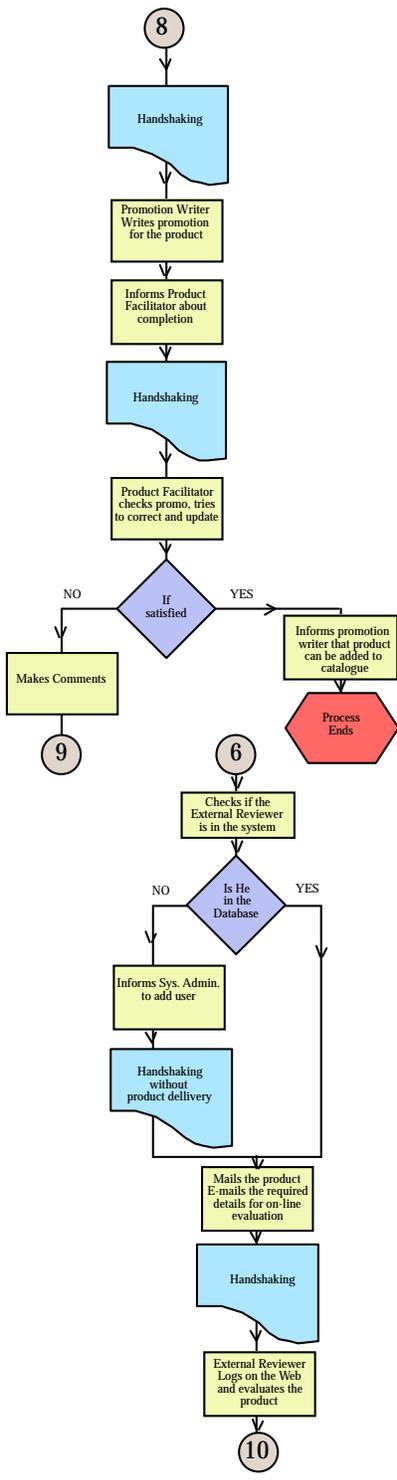


Figure 2.4 Product Review Process- Workflow Diagram (Part 4)

2.2.2 Identifying the Workgroups or Departments

The flowcharts help to group employees for efficient operation. They can also be used to define sub-process ownerships. Defining ownership of tasks is important because it makes employees more responsible and committed to the task. Workgroups help to set up team goals and objectives. After a thorough analysis, Figure 2.5 presents the workgroup structure. Table 2.1 gives information about the tasks performed by the different groups.

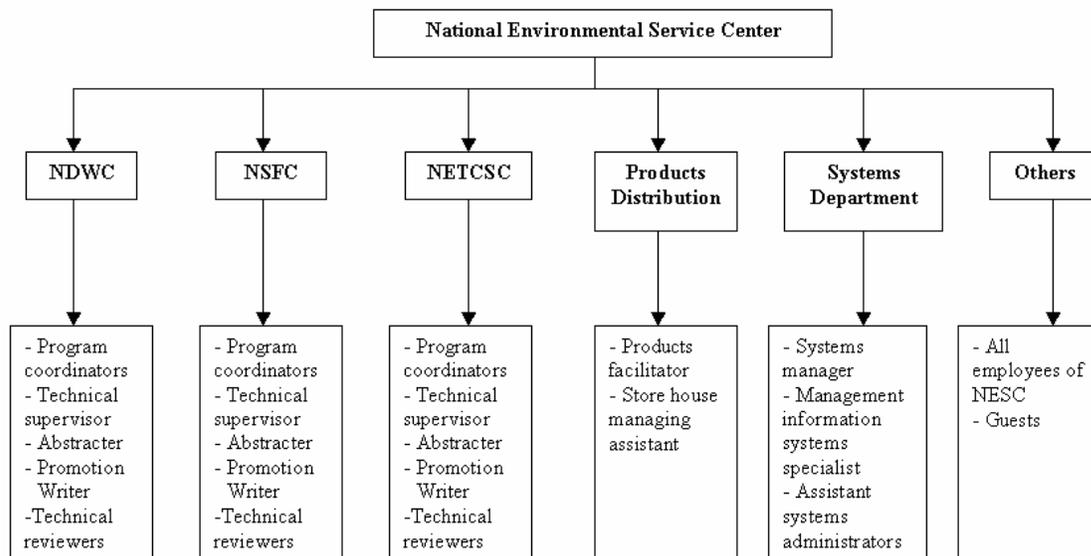


Figure 2.5 NESCC Product Review - Workgroup

Table 2.1 Activities Classification by Workgroups.

Work Group	Activities
Product Facilitator	<ul style="list-style-type: none"> • Identify new possible products • Procure the product from the source • Add products to the system to be put in review • Assign products to different programs • Assign technical supervisors to a product according to their workload • Review the product if assigned to • Check abstracts and promotions written • Assign item number if the product is accepted • Initiate the cross listing and re-evaluation process • Order more copies if a product is accepted • Monitor the various sub-processes involved
Technical Supervisors	<ul style="list-style-type: none"> • Assign abstracters according to the work load • Check abstracts written • Assign reviewers according to their expertise • Reviews the product • Decide and recommend if a product is to be offered • Review keywords list and suggest updating • Decide if a product is to be cross-listed • Decide on the shelf life of a product • Re-evaluate a product after its shelf life • Discuss with technical supervisors on deciding which keywords are added • Identify new possible products
Technical Abstracters	<ul style="list-style-type: none"> • Abstract the product • Assign keywords, taxonomy codes, states, and target audiences • Review a product if assigned • Identify new possible products
Systems Department	<ul style="list-style-type: none"> • Add new users and assign access levels • Install and support the workflow automation software • Take suggestions, and comments, and strive to continuously improve the process • Ensure database security and backup • Train new users on the system • Identify new possible products
General Users/Guests	<ul style="list-style-type: none"> • Identify new possible products • Browse the database for information
Promotion Writer.	<ul style="list-style-type: none"> • Write promotions for the product • Make product catalogues and inform the public about the availability of the product • Review a product if assigned to • Identify new possible products

2.2.3 Conducting Process Improvement Sessions with the Staff.

Process interviews and group meetings were conducted with the employees to get their suggestions, grievances, and ways to improve their tasks. Several meetings were organized both in groups and on an individual basis. Group meetings helped in exchanging ideas about improving the process and to achieve consensus on different issues. Employee meetings on a one-one basis helped to get personal opinions and important feedback. During process interviews several questions were considered to determine and understand the various aspects of the entire process. Some of the process interview questions were:

What do you do when you perform your product review tasks?

What support is needed?

How often is the task done?

What can be done to improve the task?

Through these process interviews, the suggestions and requests of all the employees were studied. The suggestions were then discussed with NESC management to determine the feasibility of implementing them.

2.2.4 Identifying the Various Possible Areas of Improvement.

The process improvement sessions with the staff and a careful analysis of the process led to the development of a cause effect fish-bone diagram (see Figure 2.6). The fish bone diagram shows that the database availability to all the employees will reduce the process cycle time. For example, an abstracter can abstract information and save it directly into the database instead of typing it and submitting it to another person who puts it into the

database. This would increase the responsibilities and involvement of the employees in the process rather than straining a few individuals with the workload.

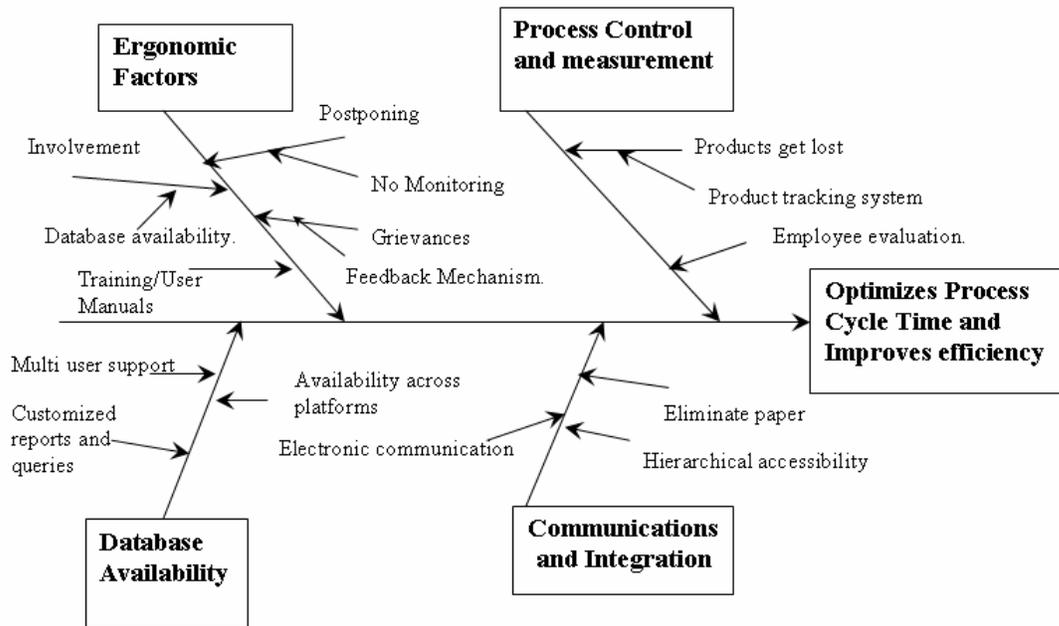


Figure 2.6 The Fish-Bone Diagram

Implementing a process tracking system makes it easy to track the exact status of the product being reviewed. This prevents the product from getting lost during the process. The feature of allowing all the employees to report about a possible product to the facilitator helps to increase the number of products being put into review. The integration of various departments through a software system will allow facilitating workflow. A system for logging all the activities of the employees helps in assigning jobs according to their workload.

The implementation of a step-by-step job completion wizard will help the employees by guiding them through the various tasks in the activities assigned to them. The facility to assign multiple reviewers helps the technical supervisors to make a sound, unbiased decision on whether to accept or reject the product. Developing a complete, automatic, process-documenting system helps to log all the activities during the process for a particular product. A powerful user-friendly query engine would help the employees to generate their own database searches. Development of graphical tools to show a summary of the various activities helps the management to have an overview on the entire process.

2.2.5 Workflow Process Design

Once the process has been thoroughly studied and improved, the next step is to map the workflow. This would require breaking down the entire process into several activities and further breaking the activities into tasks. It would also require mapping each of these activities with a particular staff member in a suitable workgroup. The entire process can be divided into the following five stages:

1. Initiation,
2. Preliminary Evaluation,
3. Abstracting,
4. Review, and
5. Promotion.

2.3 The Initiation Phase

There are three possible ways to start or initiate the whole process (see Table 2.2 for initiation phase summary). The first would be when any NESC employee finds a book, video, training package, etc, is suitable for distribution to the public as a NESC approved product. In this case the employee will report this case along with the product source information to the product facilitator.

The second case of initiation might be when the shelf life of a product, which has already been reviewed and accepted, is over. The shelf life of a product is defined as the period of time in years starting from the date it was accepted during which the product content is current. In this case, the product facilitator assigns the product to the same program and technical supervisor who reviewed it earlier. If the same technical supervisor is not available, then the product facilitator assigns it to another supervisor with equivalent expertise. In this case the process skips the second phase of preliminary evaluation and goes straight into the abstracting phase.

The third case of initiation is when a product, which has already been accepted by one program, is to be reviewed by another program to offer. In this case the program's technical supervisor requests the product facilitator to initiate the process. The facilitator then initiates the process, and the process skips the second phase.

Table 2.2 Initiation Phase Summary

Phase	Activity	Workgroup	Tasks
Initiation	A new possible product identified	All NESC employees	<ul style="list-style-type: none"> Notifies the Product Facilitator about the products information like the title, no of pages, price, author, affiliation, medium, publication year and source. If the material is an EPA material its EPA document no is also to be sent. Also the contact information from where more copies of the material can be obtained is also to be quoted.
	Re-evaluation of a product	The system is supposed to automatically flag if the products shelf life is exhausted.	<ul style="list-style-type: none"> Notifies the product facilitator about the reevaluation.
	Cross listing of a product.	NETCSC technical supervisor	<ul style="list-style-type: none"> Notifies the product facilitator about their interest to cross list the product.

2.4 The Preliminary Evaluation Phase

Once a new potential product has been reported to the product facilitator, the product must go through the following activities.

- Preliminary evaluation by the product facilitator, and
- Preliminary evaluation by the technical supervisor.

During the preliminary evaluation, the product facilitator checks if the product has been reviewed already. The facilitator also does a quick preliminary evaluation to determine the program to which the product would fit, contacts the source, and checks if more copies can be procured. If any of the three criteria does not meet the requirements, the product facilitator rejects the product and the process ends here. Once three copies have been procured, the facilitator assigns the product to a suitable program and a suitable technical supervisor, depending on their expertise. The facilitator then sends a copy of

the product to the technical supervisor. This then triggers the next activity of preliminary evaluation by the technical supervisor.

During this activity, the technical supervisor checks if the product falls within his/her expertise. If not, the supervisor sends it back with their comments to the product facilitator who then decides whether to reject the product or to assign it to a different program. If the technical supervisor decides to work with the product, the product is assigned to an abstract writer. Table 2.3 summarizes this phase.

Table 2.3 Preliminary Evaluation Phase Summary

Phase	Activity	Workgroup	Tasks
Preliminary evaluation.	Preliminary evaluation by product facilitator	Product facilitator	<ul style="list-style-type: none"> • Checks if the product has already been reviewed, If yes, rejects it • Checks if more copies can be procured, if not rejects it • Procures more copies from the source • Assigns the product to a suitable program and a suitable technical supervisor for preliminary evaluation • Delivers the product to the Technical supervisor • Waits for the supervisors' decision • If it was rejected then decides whether to trash the product or to assign it to another program.
	Preliminary evaluation by technical supervisor	Technical supervisor	<ul style="list-style-type: none"> • Checks if the product assigned is in his expertise. • If not sends the comments and the product back to the product facilitator.

2.5 The Abstracting Phase

The abstracting phase consists of two activities

- Abstract management of the technical supervisor
- Abstracting (see Table 2.4 for abstracting phase summary).

After the technical supervisor has decided to accept the product in the preliminary evaluation, a suitable abstracter is assigned depending on the abstracter's workload and expertise. In addition, comments about the product are sent to the abstracter.

The abstracter assigns keywords, taxonomy codes, target audience, and the states suitable for the product. The abstracter writes a short abstract on the product and sends it back to the technical supervisor who checks the abstract for mistakes.

Table 2.4 Abstracting Phase Summary

Phase	Activity	Workgroup	Tasks
Abstracting	Abstract management by technical supervisor.	Technical Supervisor.	<ul style="list-style-type: none">• Assigns the product to a suitable abstracter according to his workload• Sends the product to the abstracter• Checks the abstract and corrects it
	Abstracting	Abstracter.	<ul style="list-style-type: none">• Writes a short abstract about the product• Assigns keywords, taxonomy codes, states and target audience• Returns the product to the technical supervisor

2.6 The Review Phase

This phase consists of three activities:

- Review management by the technical supervisor,
- Review, and
- Review management by the product facilitator.

Once the product has been abstracted, the product facilitator assigns the product to one or more reviewers to review it. The reviewer also sends comments along with the product. The reviewer can be someone within or outside the organization. The reviewers are also given a questionnaire on which they rate the product on a scale of 1 to 10 for a set of different questions. They also give reasons why they think that the product must be accepted or rejected. Assigning different reviewers helps the supervisor to make an unbiased decision on the product. Once reviewed, the technical supervisor makes a decision on whether to accept or reject the product. The supervisor also decides the product's shelf life and requests the product facilitator to accept the product and to assign it an item number. If the product has been rejected, the product facilitator checks the review history and decides whether to reject and shelve the product or to assign it to a different technical supervisor. This phase is summarized in Table 2.5.

Table 2.5 Review Phase Summary

Phase	Activity	Workgroup	Tasks
Reviewing	Review management by technical supervisor.	Technical Supervisor	<ul style="list-style-type: none"> • Assigns the product to one or several reviewers • Delivers the product to the reviewers • He might also be the only reviewer • Analyses the review questionnaire and makes a decision on whether to accept or reject the project • Also gives comments to justify his decision • If accepted gives a shelf life to the product • Informs the product facilitator about the decision • Delivers the product back to the product facilitator
	Review	Any suitable NESC employee or an external reviewer like a professor from an university	<ul style="list-style-type: none"> • Reviews the product and completes the questionnaire • Suggests a shelf life for the product • Delivers the product back to the product facilitator
	Review management by product facilitator	Product Facilitator	<ul style="list-style-type: none"> • If the recommendation from the supervisor was to reject the facilitator decides whether to trash or to reassign it to another program depending on the review history • If accepted, orders for more copies to stock the inventory • Assigns an item number to the product once the product arrives • Updates the category type under which the product falls

2.7 The Promotion Phase

This phase consists of two activities:

- Management promotion by the product facilitator
- Promotion writing

Once the item number has been assigned, the product facilitator assigns the product to a program's promotion writer. The facilitator delivers the product to the promotions writer.

The product promotions go into the products catalogue available to the public. The

promotions writer also checks the assigned keywords, target audience, and taxonomy codes and edits them. Once the promotion has been written, the promotions writer delivers the product back to the facilitator. The facilitator finally checks the written promotion and updates the customer service database, which the product distribution department uses to provide service to the public who order these products. Table 2.6 summarizes the various activities in this phase.

Table 2.6 Promotion Phase Summary

Phase	Activity	Workgroup	Tasks
Promotion	Promotion management by the product facilitator	Product Facilitator	<ul style="list-style-type: none"> • Assigns the product to a program's promotion writer • Sends the product to the promotion writer • Checks the abstract and corrects it
	Promotion writing	Promotion Writer	<ul style="list-style-type: none"> • Writes a short promotion for the product • Checks the assigned targeted audience, keywords, and taxonomy codes

CHAPTER 3: DESIGN OF COMPUTER AIDED MANAGEMENT OF PROCESSES SOFTWARE

3.1 Analyzing the Organization's Infrastructure

The organization has a network of Windows and Macintosh machines connected across a TCP/IP network. The systems department maintains the database server. The database server is to be mounted on a Mac OS X machine. There is a firewall installed to ensure security of the servers and the infrastructure.

There is a wide range of versions of the operating systems on different machines. The database must be set up to be configured for Web access. The database server should have capabilities to allow any number of users to log on to the database at any time.

When selecting the software, several factors should be considered. The first one is a front-end software able to be compiled for various versions of Mac and Windows operating systems. The software should be simple and user friendly. In addition, the back-end database should be multi-user, scalable, and secure. Considering the factors mentioned above, the front-end software selected to perform these tasks was Real Basic[13], and the back-end database was OpenBase[14].

3.2 Designing Management Tools

Management tools were developed not only to give the current status of the different products in the system, but also to provide different measures of productivity and efficiency of the staff and the process in general.

The first management tool discussed is the employee workload determination. This tool shows the current number of pending jobs for each person, which allows the management to assign tasks to employees depending on their workload. The second management tool is the employee evaluation system. This tool evaluates the employee performance based on the number of jobs in queue and the time they take to finish the task.

In addition, tracking mechanisms are offered as management tools. One of them is the workflow tracking mechanism. It helps to determine the number of products currently in review by different programs and the number of jobs in queue at various stages. The product tracking mechanism helps to determine the current status of a product, in other words, the localization of the product in the system (i.e., the current employee in charge and the phase the product is in).

Furthermore, all the individual activities or tasks through which the product flows is automatically documented or logged by the documentation system tool. Among the performance characteristics of this tool is a list of people involved in each product, their department, the date assigned with a specific task, the completion time, the ratings for the review questionnaire of the product, and the reasons of acceptance or rejection. Thus, every activity that adds value to the system is observed and documented. Other activities such as the waiting time between certain points of the process, which are non-value activities are also documented. In addition there is a feedback tool that allows users to provide suggestions and/or comments for continuous improvement. There is a reports tool, which allows management to analyze graphically relevant information in different

periods of time (i.e., daily, weekly, monthly, quarterly, and annually) about the number of products accepted and the total number of activities.

The product review process is governed by a decision rule system, which leads its flow through the different decision stages. Finally, there is a powerful search engine tool that is based on numerous lists of individual or mixed criteria that enables the user to execute complex queries.

3.3 Designing User-Computer Interfaces and a Database Management System

The user-computer interfaces play an important role in the critical junctions between human and machines where human factors are accounted for [15]. The benefits of applying human factors are improved human performance; reduced training cost; reduction of human error; increase of comfort, acceptance, and reliability of the users; increase of system safety; and reduction of skilled users, in other words the development of a software that is friendly and comfortable to the user and does not require a lot of training. The user screens will be explained, documented, and illustrated in the next chapter.

A database can be defined as a collection of tables used to store information in an effective way to ensure easy retrieval of data. It is important to build a well-planned database so that data is stored in the most efficient way possible. This directly relates to the speed with which the database can be queried. Moreover, the tables have to be

properly structured so that information is not replicated (see Appendix A for the database structure).

CHAPTER 4: CAMP APPLICATION

4.1 Introduction to the CAMP Software

The purpose of this chapter is to explain the features of the CAMP software and to guide the reader through its use and application. In this chapter the reader will be guided first through the steps of installing and logging on to a CAMP system. The chapter then elucidates the different tools available to search and print particular records. The chapter also throws light on how the software facilitates the workflow. In addition, the different tools developed to manage the tracking system are explained.

4.2 Logging on to the System

The first step to log on to the system is to enter the user name and password on the login window, as shown in Figure 4.1, and to click “Submit”. This takes the user to the main window, as shown in Figure 4.2. However, the logo and the tools available on the window could be different, depending upon the access level and the program to which the user belongs.

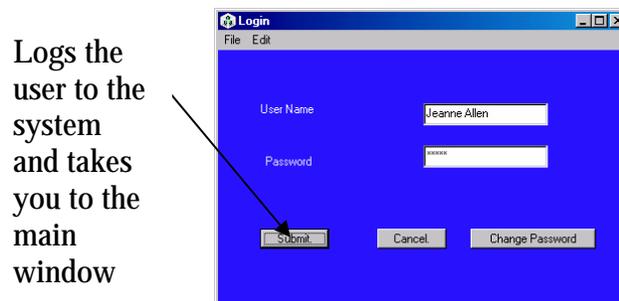


Figure 4.1: The Login Window (How to Log in)

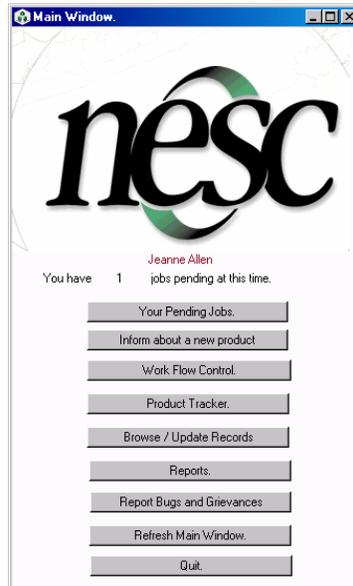


Figure 4.2: The Main Window

4.2.1 Trouble Shooting

When the user clicks on “*Submit*” on the login window, the following screen might come up. This might be due to one of the following reasons:



Figure 4.3: The Wrong User or Password Alert Window

- The user name or the passwords were typed wrong. Since the password is case sensitive, the user must check if the caps lock is turned off and to try logging on again.

- The user name might not be added to the database. The system administrator can then add the new user to the database.
- The database server might be down. The systems administrator must check if the server is up and running.

4.2.2 Logging out of the System

By clicking “*Cancel*” on the login window or “*Quit*” on the main window the quit conformation window appears. (see Figure 4.4)

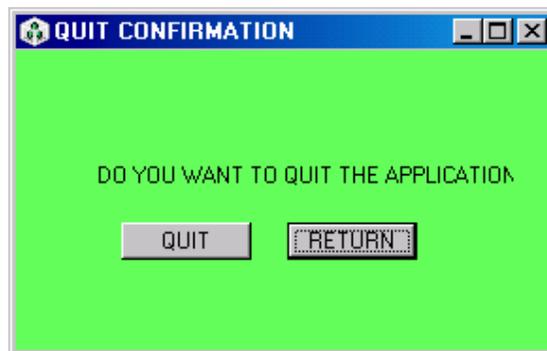


Figure 4.4: The Logout Window

Choosing “*Quit*” exits you from the application.

Choosing “*Return*” takes you back to the previous window

4.2.3 Changing the Password

The first step in changing passwords is to choose “*Change Password*” on the login window (see Figure 4.5).

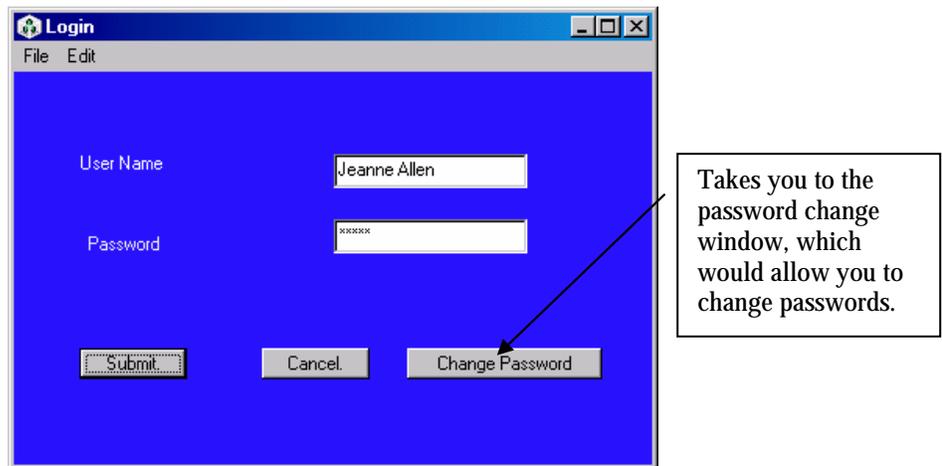


Figure 4.5: The Login Window (How to Change Password)

The second step is to enter the username, the old password, the new password and further confirm the new password. Select the “*Change*” option (see Figure 4.6).

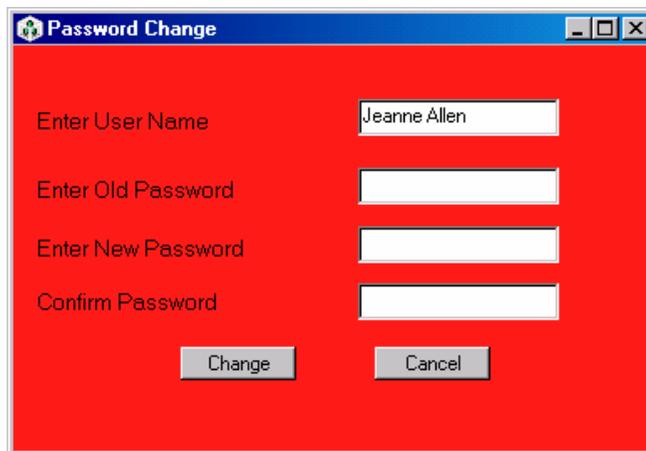


Figure 4.6: The Password Change Window

If the message box reading “*Password changed*” appears, it means that the password has been successfully changed. This would then take the user back to the login window so that the user can log on to the system again with the new password

4.3 Searching for Records

This section helps to understand the different features available to query and search records. The first step to accessing records is to choose the “*Browse/Update*” option on the main window, as shown in Figure 4.7.

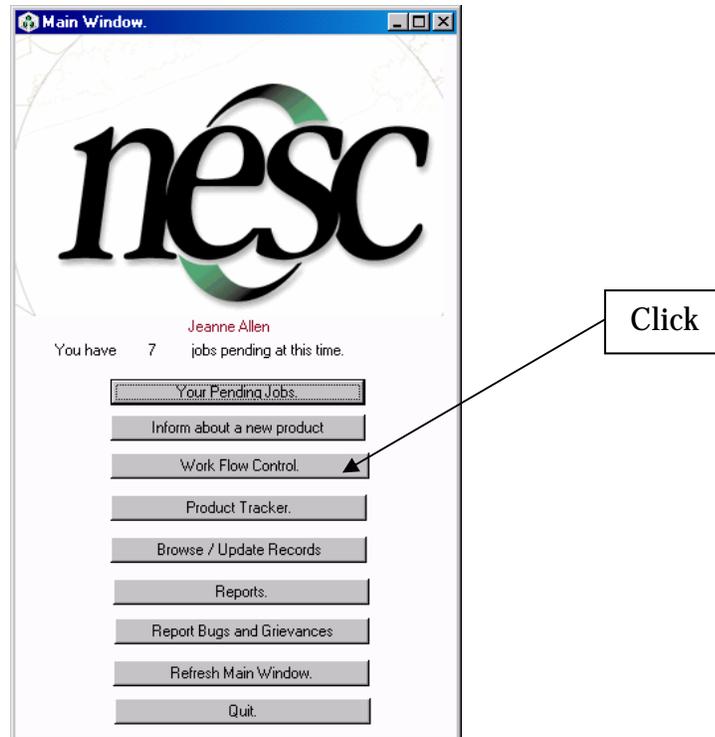


Figure 4.7: The Main Window (How to Access the Records)

This takes the user to the products database window” shown in Figure 4.8.

The screenshot shows a software window titled "The Products Database." It contains a form with the following fields and values:

- PRODUCT #: P000001
- SF Item #: wwwBKDM31
- DW Item #:
- NETCSC Item #:
- Source Doc #: 600880030
- Publication Year: 1980
- Updated: 2003-06-02
- Pages: 157
- Title: Planning Wastewater Management Facilities for Small Communities
- Price: \$47.10
- Author: Municipal Environmental Research Laboratory, Office of Research and Development
- Affiliation: US Environmental Protection Agency
- Medium: Book
- Reviewers: JDH 6/01
- Category:
- Offered:
- Source: National Small Flows Clearinghouse
- Abstract: This manual presents procedures for planning wastewater management facilities for small communities with populations under 10,000. It is designed to aid engineers and the communities they serve in evaluating various options for treatment and disposal of wastewater, which...
- Promo: This manual presents procedures for planning wastewater management facilities for small communities with populations of fewer than 10,000. Designed to help engineers and communities evaluate their options for wastewater treatment and disposal, this manual discusses...
- Taxonomy: 5) Systems Management
- Keywords: planning, wastewater management, community system
- Target Audience: Engineers, Planners, Local Officials, General Public

Navigation buttons at the bottom include: Home Window, FIRST, LAST, JUPDATE, PREV, NEXT, Return, Quick Browser, P000001, Print Current Record, and QUERY.

Figure 4.8: The Products Database Window

The different fields in this form are explained.

PRODUCT # Every product being approved in the preliminary evaluation by the product facilitator is given a unique product number by the system. This field is grayed for the rest of NESC staff to avoid unauthorized user input.

SF Item # This field represents products offered by NSFC. Once a product has been reviewed and has been decided to be offered, an item number is issued to identify it. A “NLA” in this field represents that this product is no longer available. A “REJECTED” in this field means that this product was rejected during the review process.

DW Item#	This field represents products offered by NDWC. Once a product has been reviewed and has been decided to be offered, an item number is issued to identify it. A “ <i>NLA</i> ” in this field represents that this product is No Longer Available. A “ <i>REJECTED</i> ” in this field means that this product was rejected during the review process.
NETCSC Item#	This field represents products offered by NETCSC. Once a product has been reviewed and has been decided to be offered, an item number is issued to identify it. A “ <i>NLA</i> ” in this field represents that this product is No Longer Available. A “ <i>REJECTED</i> ” in this field means that this product was rejected during the review process
Source Doc#	This field represents the source document number. For example, if the product is an EPA document, its associated document number is stored here.
Publication Year	This field represents the year of publication. This field is in the “yyyy” format
Updated	This is the last date when any changes were made to the product information. This field is automatically maintained by the software system.
Pages	This field gives the number of pages the document has. The product facilitator sometimes uses this field to fix the products price.

Title	This is the title of the document. This would be used for inventory and for publication listings.
Price	This field represents the price of the product. If this field is empty it means that the product is meant for free distribution.
Author	This field represents the author of the document under review. It might contain several names depending on the number of authors who worked on it. If the product does not have a author, the division and department of the organization which developed the product is listed.
Affiliation	This field represents a listing of the organization to which the product is affiliated.
Medium	This field represents the type of the product. This might be a book, journal, video, CD, etc.
Abstract	This field represents a short abstract about the contents of a product. This field is filled regardless of whether a product is accepted or rejected.
Promo	This field represents a promotional writeup of the items that has been accepted. This is used by NSFC and NDWC publications to promote the products.
Taxonomy	This field represents the taxonomy codes NSFC and NDWC uses to search for products.
Keywords	This field represents the keywords that are related to a product. This field helps to search for products.

Target audience	This field lists the audiences that the product is expected to serve.
US States	This field records all the U.S. States and countries referenced within the product.
Program	This field refers to the program under which the product was reviewed.
Category	This field represents the type under which the products' content falls.
NETCSC Promo	This field is used by NETCSC for writing their promotions so that they can use it in their publications.
FIRST	The first record of the database sorted by the product number is pulled up when the button is pushed.
LAST	The last record of the database sorted by the product number is pulled up.
PREV	The record previous to the current one is pulled up.
NEXT	The record next to the current one is pulled up.
Home Window	This button resets the database to the first record. This is used after a query has been executed.
Quick Browser	This feature allows one to go to the product number typed in the text box.
UPDATE	This updates the changes made to the current record. A confirmation dialog appears to make sure that changes are to be made to the record. This button would be available only to those employees who have permission to write to the database.

Query This button opens up the query window, which allows elaborate searches on the database.

Print Current Record This command button opens the print dialog and helps to print the currently displayed record.

4.4 Editing (Add/Delete) Keywords, Taxonomies, U.S. States and Countries, Categories, and Target Audience

In order to edit the keywords or taxonomies choose edit on the corresponding button. For example to edit the list of keywords, the user must click the button as shown in Figure 4.9.

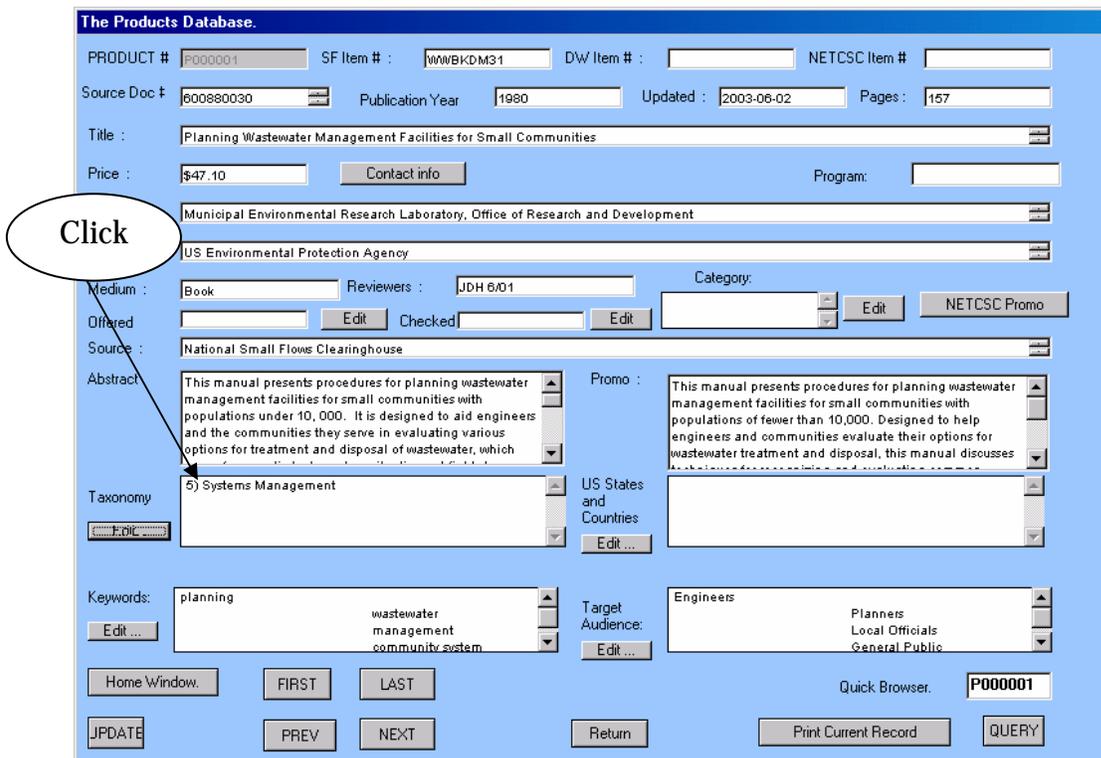


Figure 4.9: The Browse window (How to Update Keywords)

This opens up the keyword edit window (Figure 4.10) as shown below.

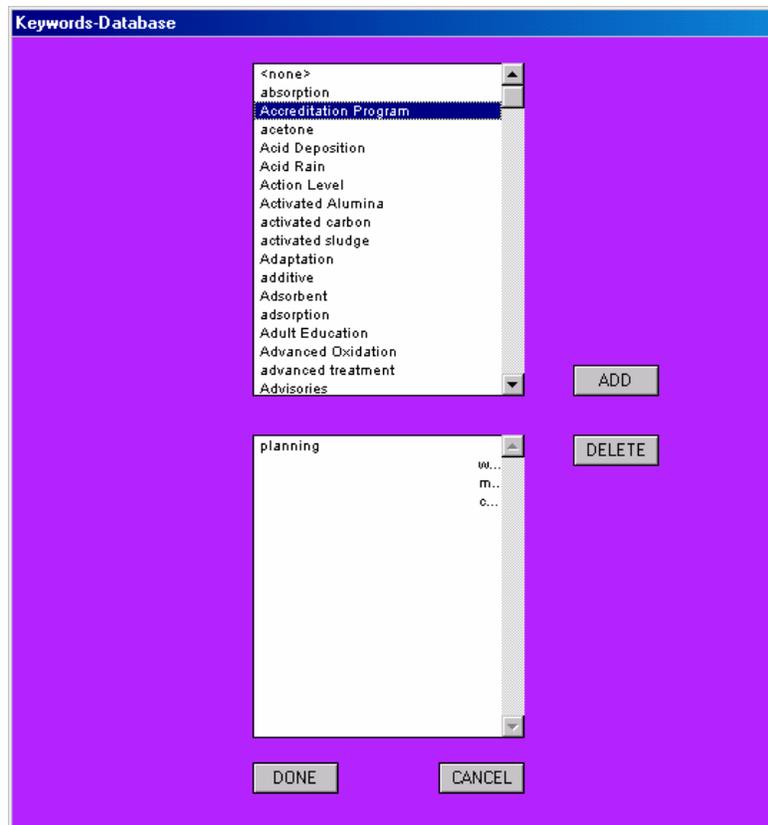


Figure 4.10: The Keyword Edit Window

To add Keywords, choose words from the top list box and click “*ADD*”. To delete keywords added to the list choose the keywords to delete and click “*DELETE*”. Finally after finishing adding/deleting keywords click “*DONE*”.

Note:

The list box is designed in such a way so that the user can use the keyboard to accelerate the search. For example if the user wants to search for a keyword that starts with “*k*”, just typing “*k*” would take the user to the list that starts with ”*k*.”

4.5 The Quick Browser

This feature allows quick retrieval of records if the user knows the product number. For example, if one wants to go to the record which has a product number of “P000009”, the user can type it in the text box indicated in Figure 4.11, and it would take the user to the record.

The screenshot displays a web-based interface titled "The Products Database". It features a form with various fields for product information. At the bottom right, a "Quick Browser" field contains the product number "P000009". A callout bubble labeled "Quick Brows" points to this field.

PRODUCT #	P000009	SF Item #	NLA	DW Item #		NETCSC Item #	
Source Doc #		Publication Year	1997	Updated	2001-05-24	Pages	75
Title	Water Conservation Effects on Onsite Wastewater Treatment Technology Package						
Price	\$15.00	Contact info			Program		
Author	J. Makuch, W Sharpe, A Jarrett, AR Rubin, CG Cogger, W Sharpe, C Cole, D Fritton, N Fulton, DL Anderson, DM Friel, WL Nero						
Affiliation	Various						
Medium	Package	Reviewers	E4 8/97	Category	General Information		
Offered		Edit	Checked	Edit	NETCSC Promo		
Source	National Small Flows Clearinghouse						
Abstract	Water conservation is a growing interest in many parts of the U. S. Conservation saves money by reducing the amount of water to be treated and transported for usage as well as the amount of wastewater requiring treatment. Common water conservation practices include			Promo			
Taxonomy	1.1) Waste Flow Reduction 1.2) Waste Segregation 3.1.1) Conventional Soil Absorption System (ST-SAS) 3.1.7.1) Septic Tanks		Edit...	US States and Countries	Florida Illinois North Carolina		
Keywords	water conservation septic tank flow control effluent		Edit...	Target Audience	General Public Contractors/Developers Local Officials Managers		
Home Window		FIRST	LAST	Quick Browser		P000009	
JUPDATE	PREV	NEXT	Return	Print Current Record	QUERY		

Figure 4.11: The Quick Browser

4.6 The Query Engine

This section helps explain the powerful query engine this system has. To get to the query engine choose “Query,” as shown in the Figure 4.12

The screenshot shows a web-based interface for a product database. The title is "The Products Database." The main content area displays details for a product with ID "P000009". Fields include: PRODUCT #, SF Item # (NLA), DW Item #, NETCSC Item #, Source Doc #, Publication Year (1997), Updated (2001-05-24), Pages (75), Title, Price (\$15.00), Author (J. Makuch, W Sharpe, A Jarrett, AR Rubin, CG Cogger, W Sharpe, C Cole, D Fritton, N Fulton, DL Anderson, DM Friel, WL Nero), Affiliation (Various), Medium (Package), Reviewers (Ed 8/97), Category (General Information), Differed (Checked), Source (National Small Flow Clearinghouse), Abstract, Taxonomy (1.1) Waste Flow Reduction, 1.2) Waste Segregation, 3.1.1) Conventional Soil Absorption System (ST-SAS), 3.1.7.1) Septic Tanks, Keywords (water conservation, septic tank, flow control, effluent), Target Audience (General Public, Contractors/Developers, Local Officials, Managers), and a Quick Browser showing "P000009". At the bottom, there are navigation buttons: Home Window, FIRST, LAST, JUPDATE, PREV, NEXT, Return, Print Current Record, and a "QUERY" button which is circled with an arrow and the word "Click".

Figure 4.12: Browse window (How to get to the Query Engine)

This would take the user to the query engine, as shown in the Figure 4.13

The screenshot shows a query engine interface with a grid of search criteria. Each row contains a checkbox, a dropdown menu, a radio button, and another dropdown menu. The radio buttons are labeled "And" and "Or". At the bottom, there are "Search", "Return", and "View" buttons. Four numbered circles (1, 2, 3, 4) are placed around the grid, with arrows pointing to specific fields: circle 1 points to the first dropdown, circle 2 points to the second dropdown, circle 3 points to the third dropdown, and circle 4 points to the fourth dropdown.

Figure 4.13: The Query Engine

- 1 This checkbox helps to include multiple query statements.
- 2 This pop-up menu has a list of fields on which a query can be done.
- 3 This pop-up menu has a list of constraints on which the query can be done on the field. This keeps changing depending upon the field chosen. This helps the user to make a valid search.
- 4 This text box helps to type the limiting value on which the search is to be made.

For example, to search for records where the product number is greater than 'P000056' and the title contains 'management'; make the necessary selections, as shown in Figure 4.14, and click "Search."

The screenshot shows a query window with a light blue background. It contains several rows of search criteria. Each row starts with a checkbox, followed by a dropdown menu for the field name, a dropdown menu for the constraint, a text input field for the value, and a numerical count. The first row is checked and shows 'Productno' with the constraint 'Greater than' and the value 'P000056', resulting in 2226 records. The second row is also checked and shows 'Title' with the constraint 'Contains' and the value 'management', resulting in 100 records. The remaining three rows are unchecked and show empty fields, each resulting in 0 records. Between the rows are radio buttons for 'And' and 'Or' logic. At the bottom, it says '91 records found' and has three buttons: 'Search', 'Return', and 'View'.

Checkbox	Field	Constraint	Value	Count
<input checked="" type="checkbox"/>	Productno	Greater than	P000056	2226
<input checked="" type="checkbox"/>	Title	Contains	management	100
<input type="checkbox"/>		Equal to		0
<input type="checkbox"/>		Equal to		0
<input type="checkbox"/>		Equal to		0
<input type="checkbox"/>		Equal to		0

91 records found

Search Return View

Figure 4.14: The Query Window (Example on how to search)

The numbers on the left denote the number of matching records found for the individual queries. The result on the bottom represents the number of matching records found for the logical query executed.

There are 2226 records with product number greater than P000056.

There are 100 records that contain management in the title.

There are 91 records that satisfy both of the conditions.

Click on view as in Figure 4.14 to browse the records that match the search conditions.

Figure 4.15 explains this.

The screenshot shows a web-based interface for a product database. The title is "The Products Database." The main content area displays details for a specific product:

- PRODUCT #:** P000056
- SF Item #:** WWBLDM08
- D/W Item #:** (empty)
- NETCSC Item #:** (empty)
- Source Doc #:** (empty)
- Publication Year:** 1993
- Updated:** 2002-08-21
- Pages:** 21
- Title:** Management Plans and Implementation Issues: Small Alternative Wastewater Systems Workshops
- Price:** \$9.30
- Author:** Lombardo & Associates, Inc.
- Affiliation:** Lombardo & Associates, Inc.
- Medium:** Booklet
- Reviewers:** JWH 05/01
- Category:** Design
- Offered:** (empty)
- Source:** National Small Flow Clearinghouse
- Abstract:** The functions and implementation of an on-site management program as well as the key elements of a management plan is outlined.
- Promo:** This semi-technical design module addresses how to implement an onsite management program and the key elements in a management plan.
- Taxonomy:** 5-4) Central Management of Non-central Systems
- Keywords:** management, onsite alternative, planning, design
- Target Audience:** Engineers, Planners, Managers, Public Health Officials

At the bottom of the window, there are several navigation buttons: "Home Window", "FIRST", "LAST", "UPDATE", "NEXT", "Return", "Print Current Record", "Quick Browser", and "QUERY". The "Quick Browser" field contains the product number "P000056".

Figure 4.15: Query Results Window

The FIRST, NEXT, and LAST buttons help to browse between records. Once the necessary search has been completed, the home window” button helps to reset the database back to the first record.

4.1.6 Problems with the Query Window

If a message box, as shown in Figure 4.16 appears, it means that either one of the pull-downs menus were not selected properly. Check the query and search again.

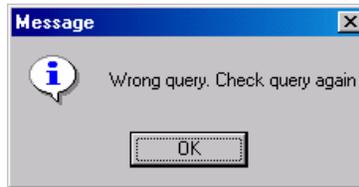


Figure 4.16: Wrong Query Window Alert

4.7 Handling Pending Jobs

This section describes how to handle the jobs assigned to a user. The main window (Figure 4.17) shows the number of pending jobs corresponding to the user name.

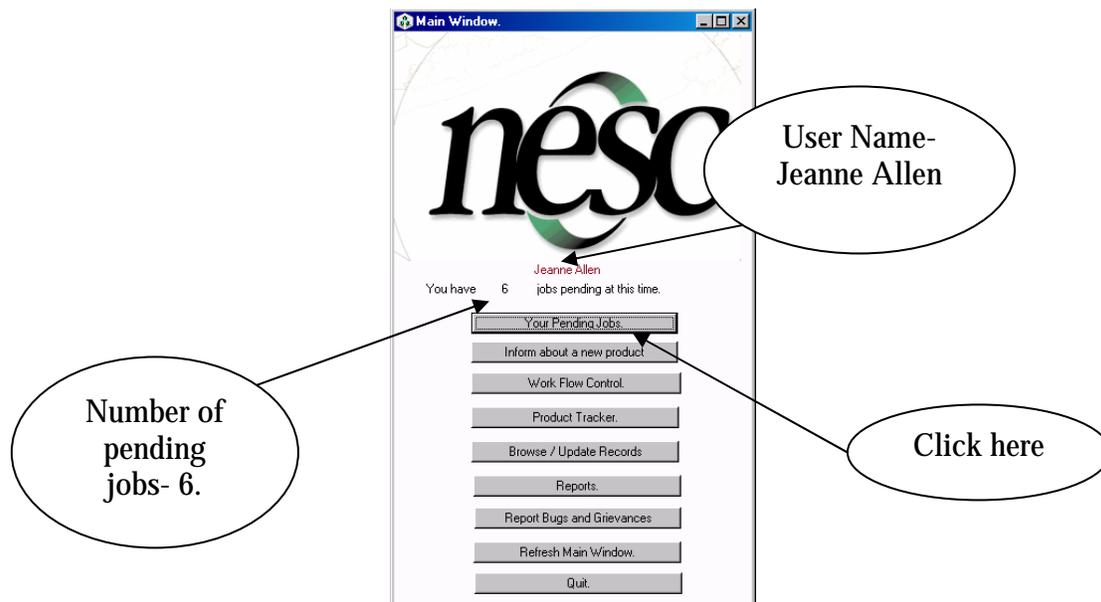


Figure 4.17: Main Window (How to Handle Pending Jobs)

To view the pending jobs click on the “*Your Pending Jobs*” button on the main window. This takes the user to the window, as shown in Figure 4.18.

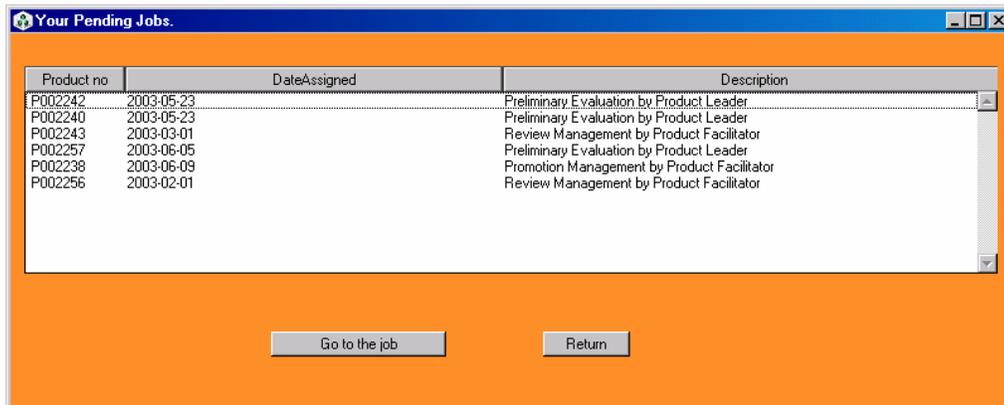


Figure 4.18: Pending Jobs Window

This window shows the various jobs currently pending. It has details on the product number, the date assigned, and the description of the job. To view the details, choose one of the jobs and then click “*Go to the job.*” If the button is pushed without choosing a job on the list box, a message box, as shown in Figure 4.19, is displayed.



Figure 4.19: Make a Selection Alert Window

4.7.1 Jobs Types

There can be any one of the following job types.

1. Preliminary evaluation by the product facilitator
2. Preliminary evaluation by the technical supervisor
3. Abstract management by the technical supervisor
4. Abstract
5. Review management by the technical supervisor
6. Review
7. Review management by the product facilitator

The following section helps to understand on how to effectively handle the assigned jobs.

4.7.2 Preliminary Evaluation by the Product Facilitator

This job has several stages. The first step done by the facilitator is to check if the product has already been put through a review process. The facilitator does a preliminary evaluation to check if the product is within the business goals. This stage is shown in Figure 4.20.



Figure 4.20: Preliminary Evaluation by the Product Facilitator (step1)

The screen has information on who provided the product information and the date on which it was provided. The “*Details*” command button takes the user to the screen that has information about the product. If the facilitator finds that the product already has been reviewed by using the searching techniques discussed previously, he checks the “*Product not in line*” option and clicks “*Submit.*” This would take him/her to the confirmation window, as shown in Figure 4.21



Figure 4.21: Deletion Confirmation Window

If confirmed the system automatically deletes the product from the system and deletes the pending job for the facilitator. If the product has not been reviewed and if the facilitator thinks that it is good to put the product through the system, he selects the “*Possible Product*” check box and clicks “*Submit.*” This would take him/her to the confirmation window, as shown in Figure 4.22.



Figure 4.22: Confirmation Window (Inline)

If confirmed, the system automatically logs the date of confirmation and the activity. The system then guides the user to the second stage of the job, as shown in Figure 4.23.

Figure 4.23: Preliminary Evaluation by the Product Facilitator (Step2)

This is important because the product is taken to the next stage only if at least three copies have been procured. This would help to validate the availability of the product for distribution later. If the facilitator is not able to reach the source or if the organization is not willing to get involved, the facilitator chooses the “*Reject due to lack of copies*” and chooses submit. The system deletes the product from the system and also removes the job for the facilitator. If the facilitator procures more copies, he or she enters the number of copies and also enters the cost if there is one and checks the “*Product Arrived*” option and clicks “*Submit.*” The system confirms this action through the window, as shown in Figure 4.24.



Figure 4.24: Confirmation of Product Arrival

Once the system confirms the product arrival, it takes the facilitator to the next stage of the job as shown in the following figure. Here the system allows the user to verify the details about the product, and it is in this stage that the system automatically assigns a product number to the product, as shown in Figure 4.25.



Figure 4.25: Preliminary Evaluation by the Product Facilitator (Step3)

The “*Details*” command button takes the facilitator to the screen, as shown in Figure 4.26. This window allows checking the details on the product and adding it to the review process.

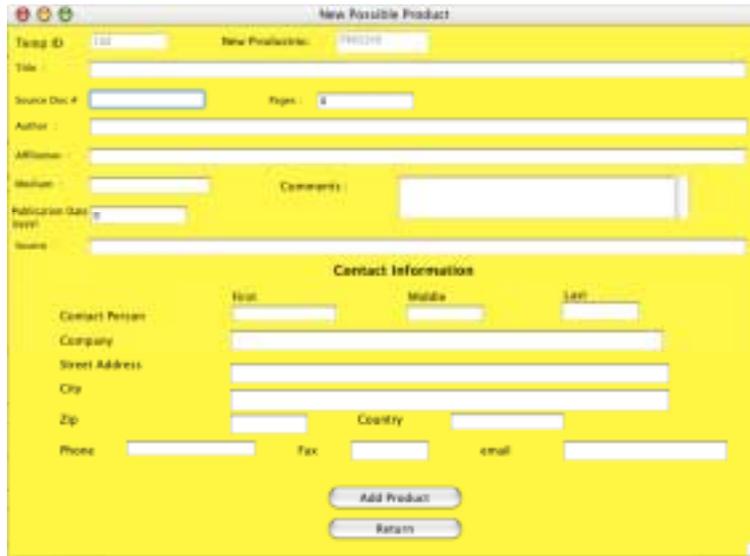


Figure 4.26: Add New Product Window

Once the facilitator selects “*Add Product*,” the system confirms the activity by the window, as shown in Figure 4.27.



Figure 4.27: Confirmation Window (New Product)

Once confirmed the system guides the user to the next stage where the facilitator can print and file information on the product. This stage is shown by Figure 4.28.



Figure 4.28: Preliminary Evaluation by the Product Facilitator (Step5)

The screen shows that a product number has been assigned and then reminds the user to print and file the information. Once finished the facilitator chooses the “ *Print and file information*”. The system then confirms this action through the window, as shown in Figure 4.29.



Figure 4.29: Confirmation Window

Once confirmed, the system allows the user to assign the product to a specific program for the second round of preliminary evaluation. When the user chooses the program, the adjacent list box shows the various technical supervisors available and the number of jobs associated with them. This helps to assign supervisors depending on their workload. If the facilitator has some additional notes, he uses the comments section to send them to the technical supervisor. The window in Figure 4.30 explains the above.

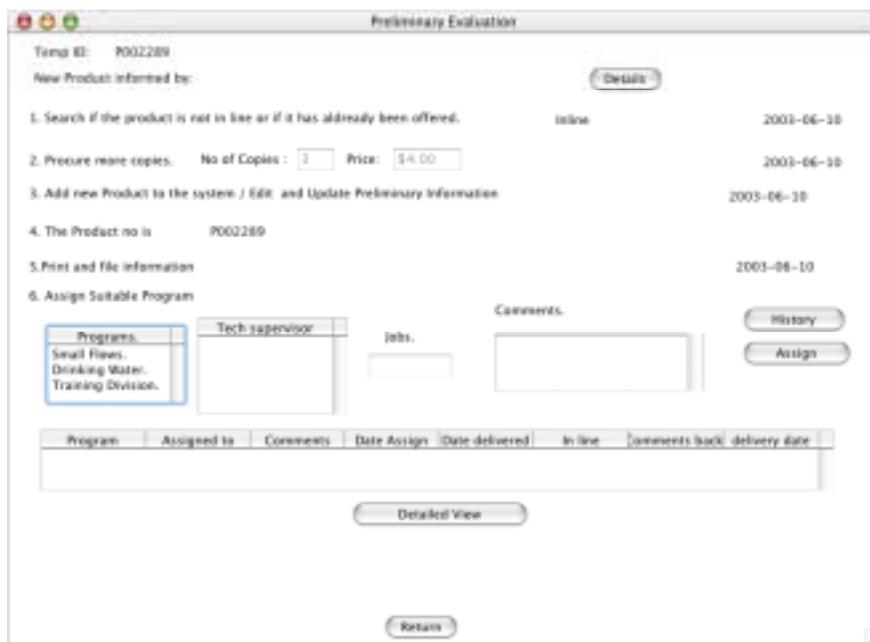


Figure 4.30: Preliminary Evaluation by the Product Facilitator (Step6)

After making the necessary selections the facilitator chooses “Assign.” On choosing “Assign,” the system confirms through the window shown in Figure 4.31.



Figure 4.31: Confirmation Window (Assign)

Once confirmed, the communications window gets populated with the details of the activity. The communications window is a feature, that aids in communication between the people involved. It tells the date on which the job was assigned, the date on which the product was physically delivered, and the date on which the job was completed.

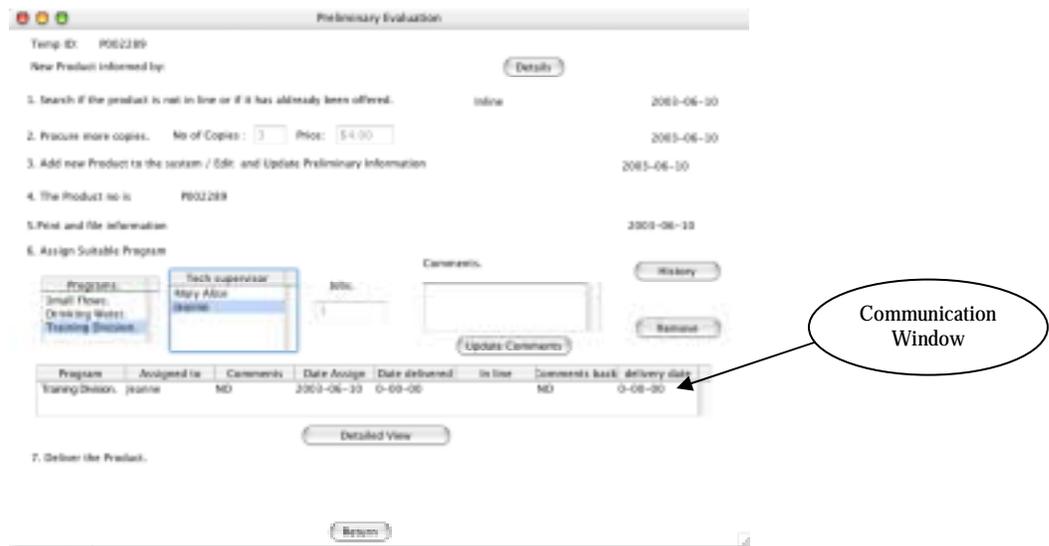


Figure 4.32: Preliminary Evaluation by the Product Facilitator (Step7)

Once assigned, the system automatically gives the new job to the technical supervisor. This job of “*Preliminary Evaluation by the Technical Supervisor*” would be explained in the following section. There is a handshaking mechanism the system follows to ensure that the product is not lost during this process. Figure 4.32 shows step 7, which is to “*Deliver the Product.*” This remains visible until the technical supervisor to whom the job was assigned completes his task of confirming the product arrival. The handshaking mechanism is as follows:

The product facilitator waits for the decision by the technical supervisor. If the technical supervisor accepts that the product is in their program line, the system automatically removes this job from the product facilitator. If rejected, the communications window shows a “*Not Inline*” note on the Inline tab. This gives the facilitator the option to view the reasons and to decide on whether to assign it to a different program or to a different supervisor. If the facilitator decides to assign it to a different supervisor, the following two steps must be followed. First, the facilitator removes the person assigned by choosing the row and clicking the “*Remove*” command button. Next, once the person has been removed, the “*Assign*” option becomes available so that a different supervisor can be assigned.

Note:

Any time during the wait for a decision from the technical supervisor the facilitator can send additional comments by using the “*Update Comments*” option. If the technical supervisor makes a decision that the product is not in line, then the facilitator, apart from the option of assigning it to a different program, also has the option of rejecting it.

4.7.3 Preliminary Evaluation by the Technical Supervisor

In this section the technical supervisor is given the product for preliminary evaluation. Here the supervisor checks to see if the product that was delivered is in line with the program objectives.

The first screen that appears is shown in Figure 4.33. Here the supervisor confirms the delivery of the product. Once the product is delivered the user chooses “Yes” and clicks the “Submit” button.

Assigned by	Comments	Date Assign	Date delivered	In line	Comments back	Delivery date
Jeanne Allen	NO	2003-06-18	0-00-00	NO		0-00-00

Figure 4.33: Preliminary Evaluation by the Technical Supervisor (Step 1)

On confirmation, the system guides the user to the next stage as shown in the Figure 4.34.

Preliminary Evaluation By Technical Supervisor

Productno: P002289 Details

Communications Window

Assigned by	Comments	Date Assign	Date delivered	In line	Comments back	delivery date
Jeanne Allen	NO	2003-06-10	2003-06-10		NO	0-00-00

Detailed View

1. Product Received 2003-06-10

2. Do a preliminary Evaluation-if the product is in line with the program.

In line Not in line

Submit

Return

Figure 4.34: Preliminary Evaluation by the Technical Supervisor (Step2)

Now the technical supervisor checks to see if the product is in line with the organization. If so the supervisor selects “*In line*” and clicks submit, otherwise the supervisor selects “*Not in-line*” and clicks “*Submit.*” The system then notifies the product facilitator of the decision. If *In line*, the system then moves the product to the next phase by assigning the supervisor with an “*Abstracting Management job.*” If “*Not In line*” the system then shows an option such as in Figure 4.35, to comment on the reason.



Figure 4.35: Preliminary Evaluation by the Technical Supervisor (Step 2 If Not Inline)

It then reminds the technical supervisor to return the product to the product facilitator, as shown in Figure 4.36.



Figure 4.36: Preliminary Evaluation by the Technical Supervisor (Step 3)

Once the product facilitator confirms the delivery of the product, the technical supervisor is relieved of his job.

4.7.4 Abstract Management by the Technical Supervisor

In this stage, the technical supervisor assigns the product to an abstracter depending on their work load. The supervisor then checks and perfects the abstract. Figure 4.37 shows the window, which the abstracter will see.

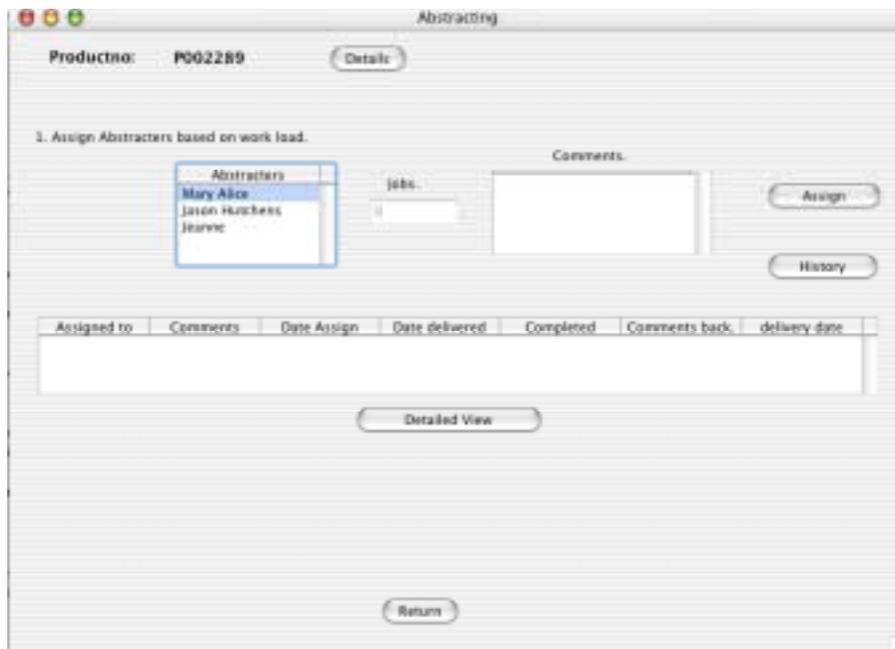


Figure 4.37: Abstract Management by the Technical Supervisor (Step 1)

The “Details” command button gives details on the product and allows updating and editing the abstract.

The list box shows a list of abstracters that the supervisor can assign. After choosing the abstracter, the textbox on the left side shows the number of jobs each person has. This helps to assign abstracters depending on the workload. The comments section allows the supervisor to send comments to the abstracter. Once the supervisor has made the necessary selections he chooses “Assign.” The system then informs the abstracter of a pending job. The communications window also reflects the activities. The system then reminds the supervisor to deliver the job, as shown in the Figure 4.38.

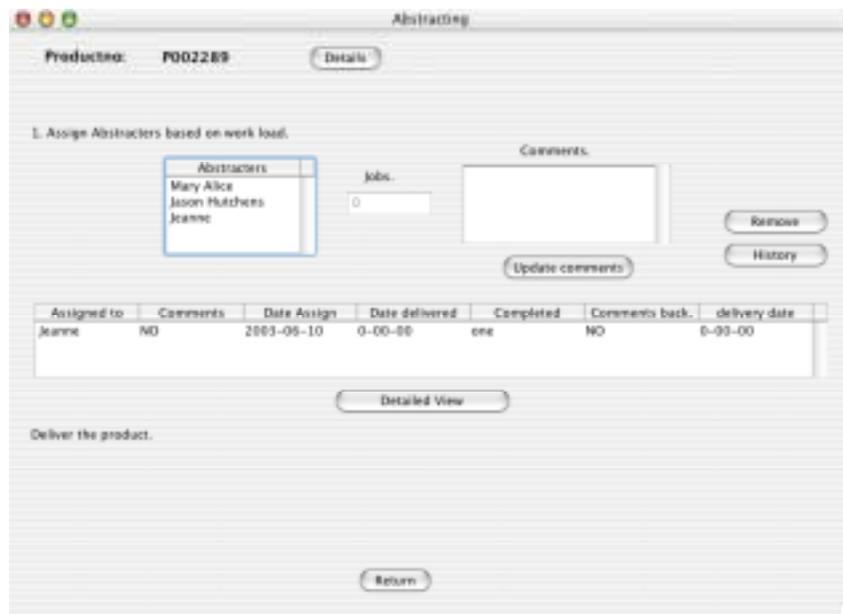


Figure 4.38: Abstract Management by the Technical Supervisor (Step 2)

The system waits for the abstracter to acknowledge the delivery of the product. Once the product has been abstracted, the communications window reflects the completion of the task and the window changes, as shown in Figure 4.39.

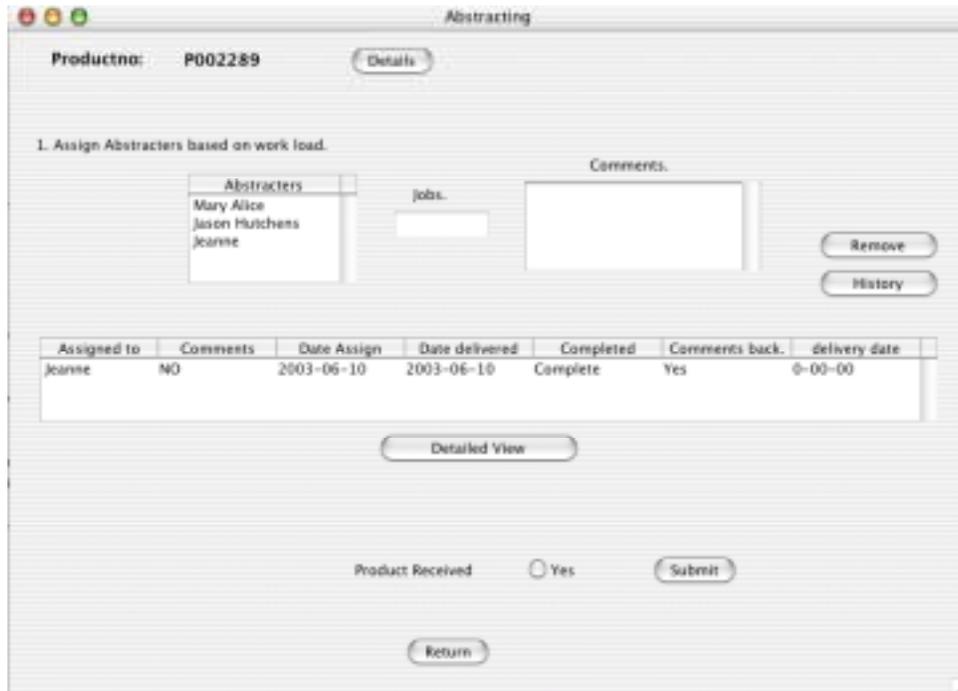


Figure 4.39: Abstract Management by the Technical Supervisor (Step 3)

After the abstracter has completed the job, the system requires that the supervisor confirm the delivery of the product.

When delivery of the product is confirmed, the system guides the supervisor to check the abstract. The “*Details*” button in the window takes the supervisor to the window that would allow updating the abstract and other related fields. After the supervisor has checked the abstract, he or she chooses “*Complete*” and clicks “*Submit*,” as shown in Figure 4.40.



Figure 4.40: Abstract Management by the Technical Supervisor (Step 4)

On choosing “Submit” the system confirms the action using the window shown in Figure 4.41.



Figure 4.41: Confirmation window (Abstract Completion.)

After confirming, the system relieves the supervisor of the abstract management job.

4.7.5 Abstracting

This section helps the user to understand how to update abstracts. First, the abstracter is required to confirm the delivery of the product, the Figure 4.42 explains this.

Productno: P002289 Details

Communications Window

Assigned by	Comments	Date Assign	Date delivered	Completed	Comments back.	delivery date
Jeanne	NO	2003-06-10	0-00-00	one	NO	0-00-00

Detailed View

1. Product Received Yes Submit

Return

Figure 4.42: Abstracting (Step 1)

Once the product is received the abstracter chooses “Yes” and clicks “Submit.” The system then confirms and logs the activity. The system then guides the user to the next stage, as shown in Figure 4.43.

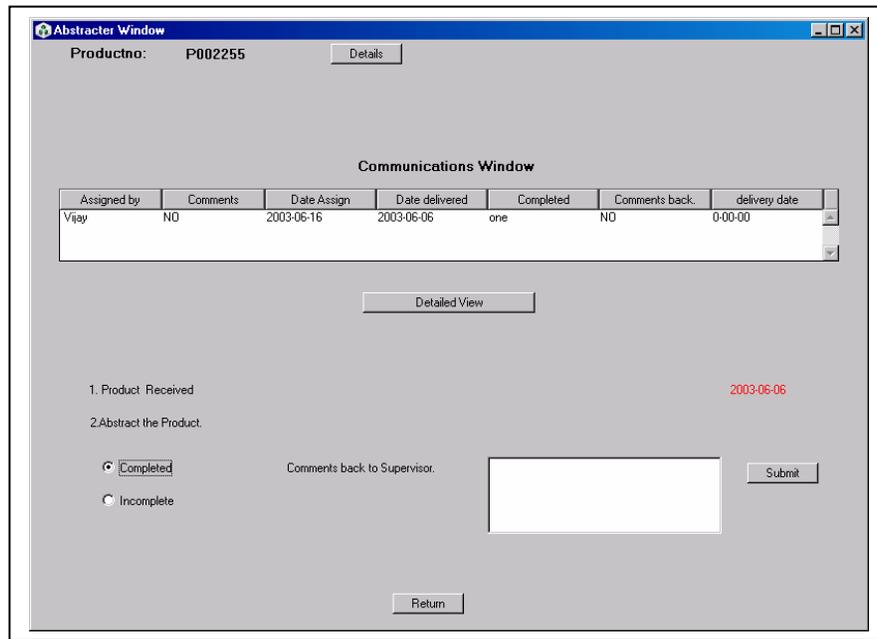


Figure 4.43: Abstracting (Step 2)

The “Details” button on the screen helps to update and assign the various associated fields. Once completed, the abstracter selects “Completed” and clicks “Submit.” The system will then inform the supervisor about the completion of the job. If the abstracter wants to submit comments without having finished the abstracting, the abstracter can choose “Incomplete” and submit the comments. Once abstracted, the system then reminds the user to deliver the product back to the technical supervisor, as shown in the Figure 4.44.



Figure 4.44: Abstracting (Step 3)

The technical supervisor confirms delivery of the product and the system automatically removes this job from the abstracter.

4.7.6 Review Management by the Technical Supervisor

The supervisor assigns a reviewer for the abstract depending on the expertise required. The supervisor delivers the product to the reviewer, who then reviews it and completes the review questionnaire. Depending on the review, the supervisor decides to accept or reject the product. The supervisor then provides the decision to the product facilitator. This section explains these stages.

The supervisor assigns the reviewers to evaluate the product. The list box, as shown in Figure 4.45 names the available reviewers. The comments section sends any notes the

supervisor wants to send the reviewer. After making the necessary selections, the supervisor selects “Assign.” The system automatically informs the reviewer about the new job and reminds the supervisor to deliver the product.

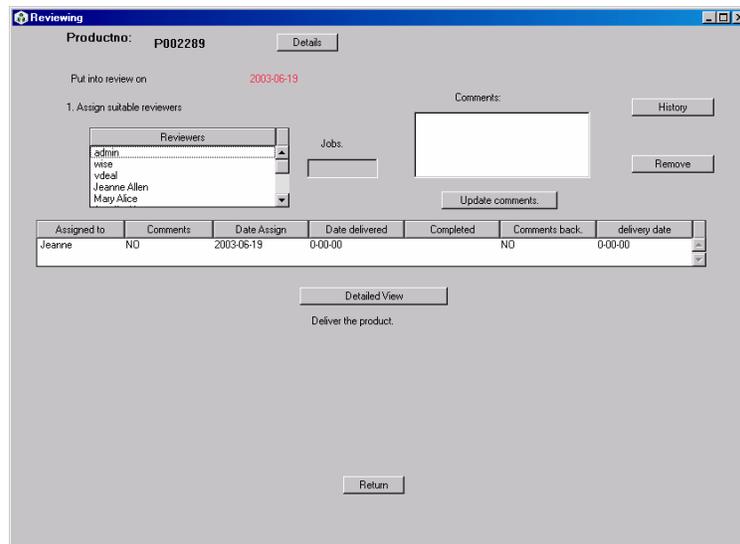


Figure 4.45: Review Management by the Technical Supervisor (Step 1)

The supervisor waits for the reviewer to finish and, during this stage he or she can send comments to the reviewer using the “Update comments.” If the supervisor decides to remove the reviewer so that he can assign the job to somebody else, the supervisor selects the row and hits “Remove.” This would relieve the reviewer of the job.

When the reviewer finishes the job, he or she returns the product to the supervisor. The supervisor then acknowledges the product by choosing “Yes” in the window, as shown in Figure 4.46, and clicking “Submit.”

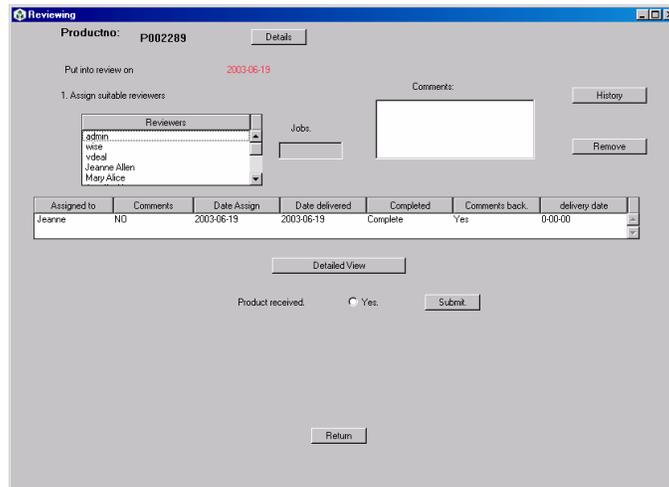


Figure 4.46: Review Management by the Technical Supervisor (Step 2)

The history button helps the supervisor to see the ratings of the reviewer for the product and comments for accepting or rejecting the product. The supervisor can assign the job to a different reviewer for a second opinion. To do this, the supervisor must first remove the assigned reviewer by choosing the row and clicking “Remove.” The “Assign” command button gets enabled and visible so that the supervisor can assign.

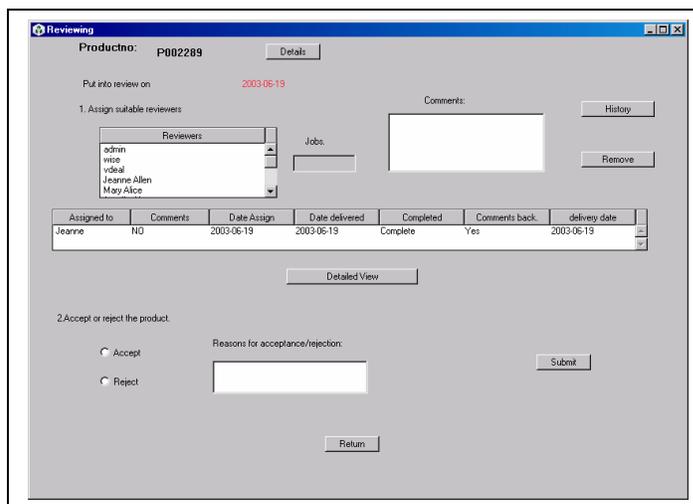


Figure 4.47: Review Management by the Technical Supervisor (Step 3)

When the supervisor has reviewed and has made a decision, he or she either chooses the “Accept” or “Reject” radio button as shown in Figure 4.47. If accepted, the product shelf life text box becomes visible, as shown in Figure 4.48. This helps the user to enter the shelf life. The textbox next to the radio buttons also helps to send some comments to the facilitator on why the product was accepted or rejected. Once the necessary selections are made, the supervisor submits the changes. The system then automatically informs the facilitator about the decision and guides the supervisor to the next step.

The screenshot shows a window titled "Reviewing" with the following elements:

- Productno:** P002289 (with a "Details" button)
- Put into review on:** 2003-06-19
- 1. Assign suitable reviewers:**
 - Reviewers:** A list box containing "admin", "wise", "vdeal", "Jeanne Allen", and "Maty Alice".
 - Jobs:** An empty text box.
 - Comments:** A large empty text area.
 - Buttons:** "History" and "Remove".
- Table:**

Assigned to	Comments	Date Assign	Date delivered	Completed	Comments back.	delivery date
Jeanne	NO	2003-06-19	2003-06-19	Complete	Yes	2003-06-19
- 2. Accept or reject the product:**
 - Radio buttons:** "Accept" (selected) and "Reject".
 - Reasons for acceptance/rejection:** A text box.
 - Product shelf life:** A text box with a placeholder "yyyy/mm/dd".
 - Buttons:** "Submit" and "Return".

Figure 4.48: Review Management by the Technical Supervisor (Step 3 –Accept)

The system reminds the supervisor to return the product to the product facilitator, as shown in Figure 4.49.

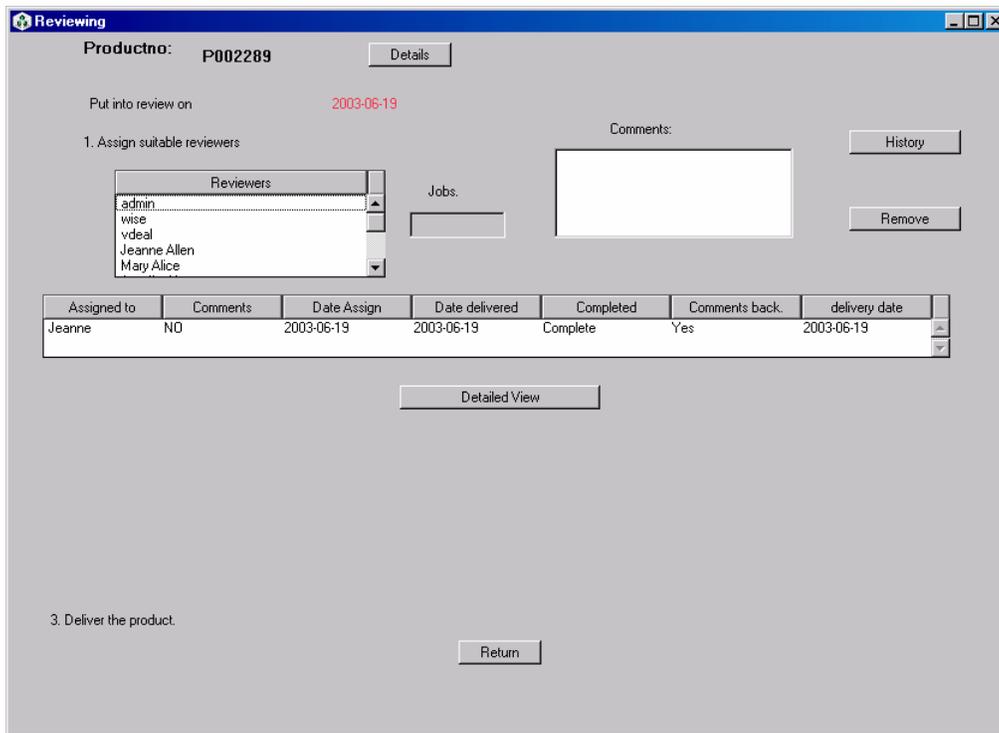


Figure 4.49: Review Management by the Technical Supervisor (Step 4)

4.7.7 Review

During this stage, the person assigned reviews the product for its technical content and rates the product depending on the questionnaire suitable to the program. He or she also explains the decision for accepting or rejecting the product. If accepted the reviewer suggests a shelf life for the product. This section explains how the software guides the reviewer through these stages. First, the reviewer confirms the delivery of the product by choosing “Yes” and clicking “Submit,” as shown in Figure 4.50.

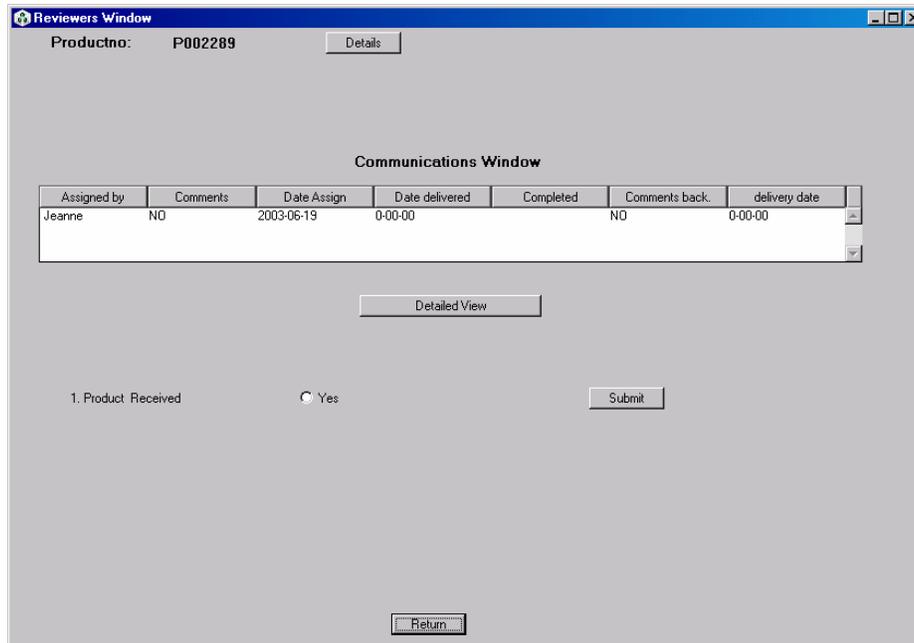


Figure 4.50: Review (Step 1)

Then the reviewer chooses the “Review” command button, as shown in Figure 4.51.

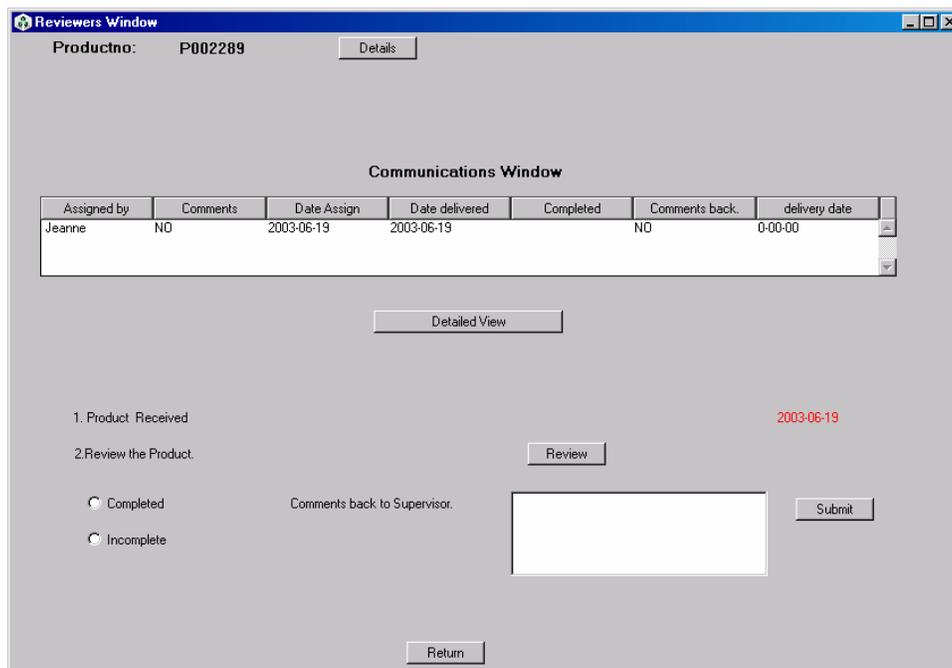


Figure 4.51: Review (Step 2)

On choosing “Review” the window, as shown in Figure 4.52 opens. It allows the user to rate the product on the questionnaire. This questionnaire is different for the various NESC programs. It also has a text box that allows the user to type in the product’s shelf life. Provisions are made for the reviewer to type reasons for accepting or rejecting the product.

The screenshot shows a window titled "Questionnaire." with a blue background. At the top left, it says "Productno:". Below that, it asks the user to "Please rate the attached product on the criteria below based on a scale of 1 - 10". There are eight numbered questions, each followed by a small white text box for the rating:

1. Does this product fall within the parameters of NETCSC's mission?
2. The product is technically accurate.
3. This product is up to date and will be good a year from now?
4. It is appropriate for small communities or relevant for groups working with small communities ?
5. The product is user friendly and is of acceptable quantity.
6. This product relates to wastewater, drinking water, solid waste, environmental management or training.
7. This product can be used in a training setting / for training purposes.
8. Enter the shelf life for the product.

Below the questions, there are three text boxes: "Promo" (a large empty box), "Reason for Rejection" (a large empty box), and "mm/dd/yyyy" (a small empty box). At the bottom, there are two buttons: "SUBMIT" and "Return".

Figure 4.52: The Review Window

Once the review questionnaire is completed, the reviewer selects the “complete” radio button and clicks submit. He can also send in comments to the supervisor using the text box shown. If the reviewer wants to send comments before the review is complete he or she chooses “Incomplete” and clicks “Submit” as shown in the Figure 4.53.

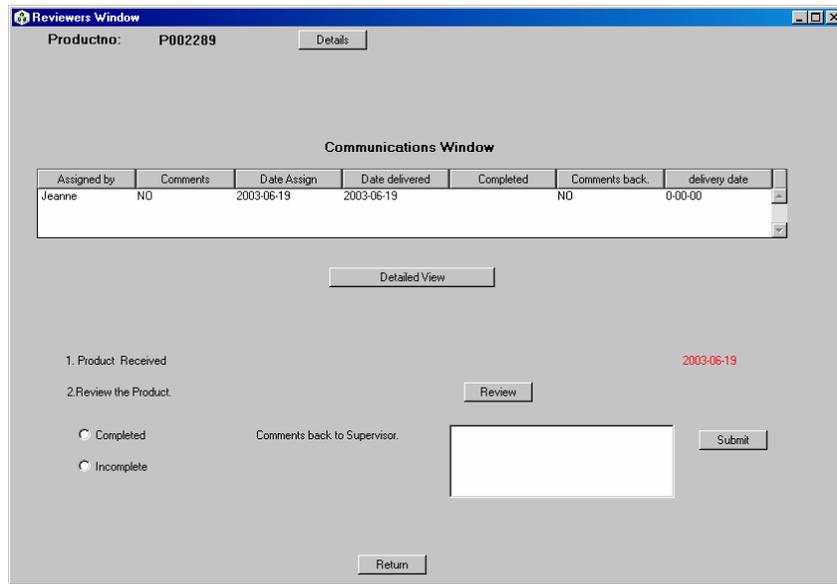


Figure 4.53: Review (Sending Comments)

The system then reminds the reviewer to deliver the product back to the supervisor as shown in Figure 4.54. This notice remains until the supervisor has confirmed delivery of the product.

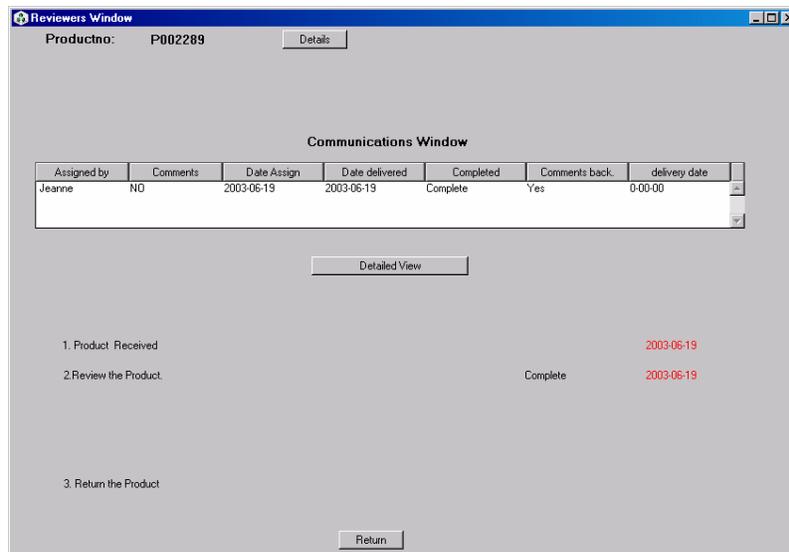


Figure 4.54: Review (Step 3)

4.7.8 Review Management by the Product Facilitator

During this stage the product facilitator orders more copies if the product is accepted. Once the product has arrived the facilitator assigns an item number to the product and confirms the delivery of the product from the supervisor as shown in Figure 4.55.

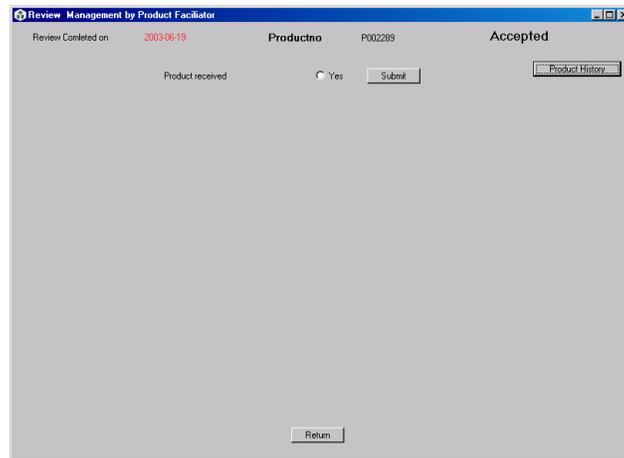


Figure 4.55: Review Management by the Product Facilitator (Step 1)

In the second stage, the facilitator orders more copies. The “*Contact info*” command button gives the contact address for the product. Here the facilitator enters the number of copies ordered and also the cost per copy, as shown in Figure 4.56.

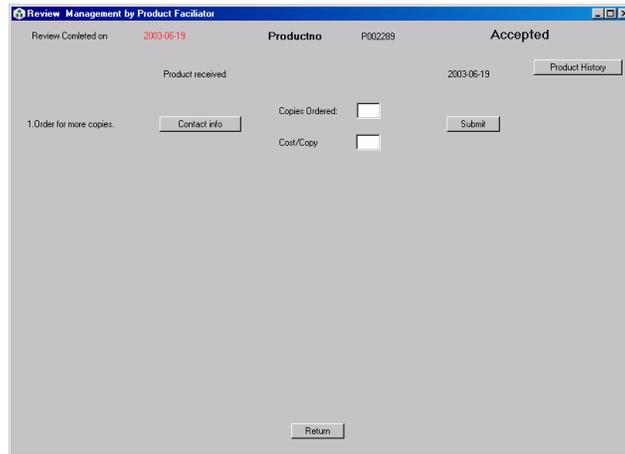


Figure 4.56: Review Management by the Product Facilitator (Step 2)

Once the product has arrived the facilitator confirms the arrival and assigns a price to the product for distribution. On conforming the arrival, the facilitator clicks “*Submit,*” as shown in Figure 4.57.

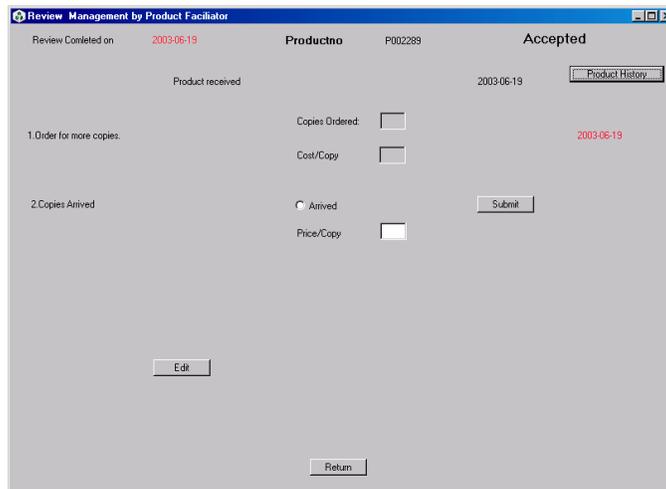


Figure 4.57: Review Management by the Product Facilitator (Step 3)

The facilitator chooses the category to which the product belongs, as shown in Figure 4.58. Once this is done, the system then automatically deletes this job from the facilitator and takes the product to the next phase of promotion management.

Review Management by Product Facilitator

Review Completed on: 2003-06-19 Productno: P002269 Accepted

Product received: 2003-06-19 Product History

1. Order for more copies: Copies Ordered:

Cost/Copy:

2. Copies Arrived: Price/Copy:

3. Assign Item number

Category: Item no: Assign

Edit

Return

Figure 4.58: Review Management by the Product Facilitator (Step 4)

4.8 Managing the Tracking System

This section deals with the various tools available to manage the tracking system. They are

1. The product tracker.
2. The work flow control and the product history viewer.
3. Reports.
4. Bugs and feedback reporting system.

4.8.1 The Product Tracker

The product tracker helps to find the current status of a product under review. The user chooses the “*Product tracker*” option from the main window, as shown in Figure 4.59.

This would open the product tracker window.

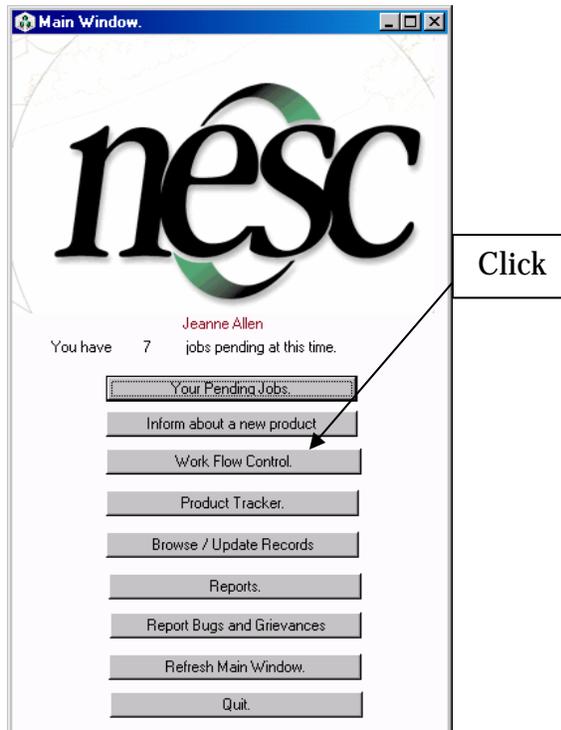


Figure 4.59: The Main Window (How to Get to the Product Tracker)

The user then chooses “*populate*” option from the window shown in Figure 4.60. This populates the list box with all the product numbers in ascending order.

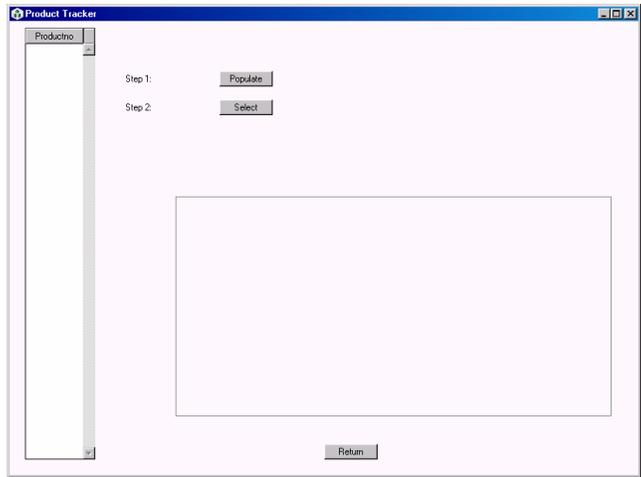


Figure 4.60: The Product Tracker Window (Step 1)

He or she chooses the product number in question and clicks select. This enables the system to show the current status of the product. Figure 4.61 explains this feature.

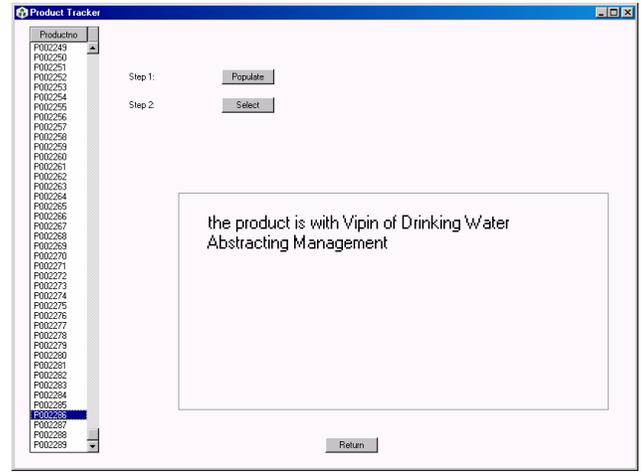


Figure 4.61: The Product Tracker Window (Step 2)

4.8.2 The Workflow Control and The Product History Viewer

This control tool provides an overview of all the products currently in the system giving an idea of the number of jobs pending with employees in the system. It also gives an idea of the number of products under review per program. The workflow control window can be accessed by choosing the button on the main window, as shown in Figure 4.62.

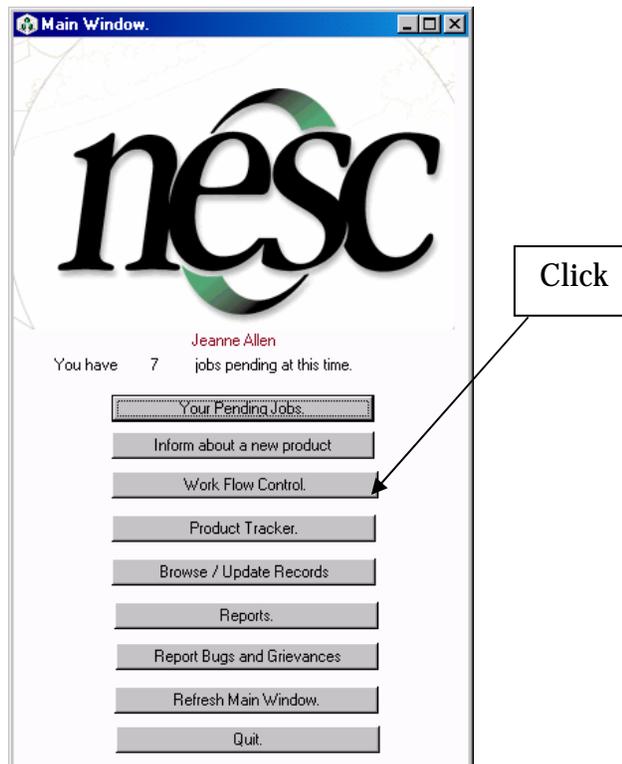


Figure 4.62: The Main Window (How to Get to the Work Flow Control)

By choosing the user name on the popup menus, the “Jobs” command button next to it shows the number of jobs that person has pending as shown in Figure 4.63.

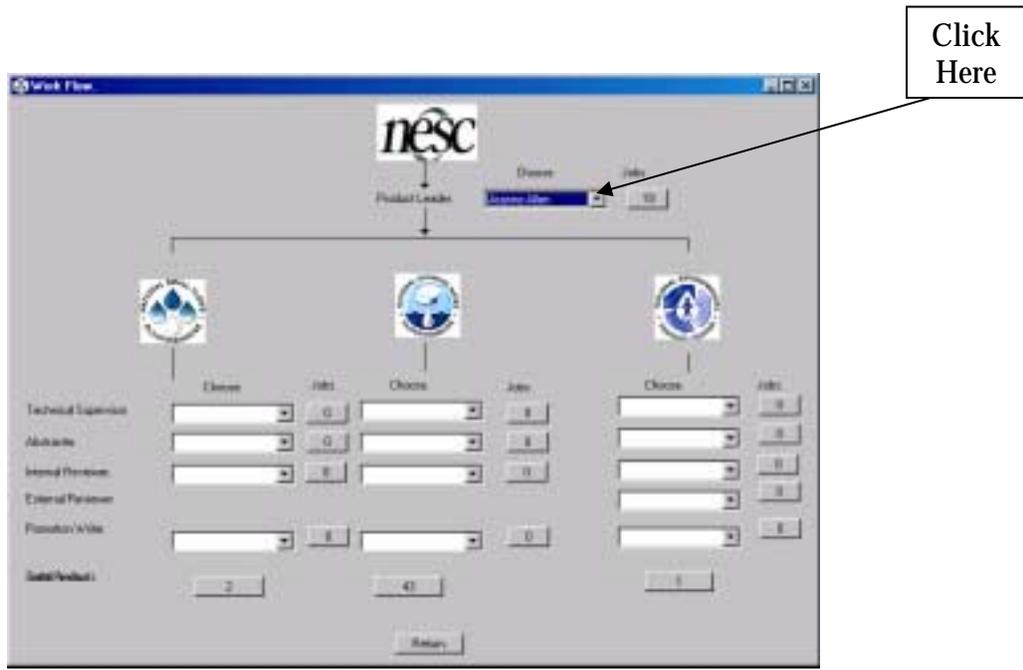


Figure 4.63: The Workflow Control Window

The number of jobs is displayed as shown in the Figure 4.64, as well as the date the jobs were assigned and the job type.

Productno	Job type	Date Assigned yyyy/mm/dd
P002252	Review Management by Product Facilitator	2003-06-25
P002238	Promotion Management by Product Facilitator	2003-06-09
P002256	Review Management by Product Facilitator	2003-02-01
P002243	Promotion Management by Product Facilitator	2003-06-16
P002239	Review Management by Product Facilitator	2003-06-17
P002244	Review Management by Product Facilitator	2003-06-17
P002245	Review Management by Product Facilitator	2003-06-17
P002249	Review Management by Product Facilitator	2003-06-17
P002237	Review Management by Product Facilitator	2003-06-17
P002257	Review Management by Product Facilitator	2003-06-17
P002247	Review Management by Product Facilitator	2003-06-17
P002248	Review Management by Product Facilitator	2003-06-17
P002242	Review Management by Product Facilitator	2003-06-18

Figure 4.64: The Jobs Summary Window

The command buttons on the bottom of the window as shown in Figure 4.63, represents the total number of products under review in the program. Clicking on those buttons takes the user to the window, as shown in Figure 4.65.

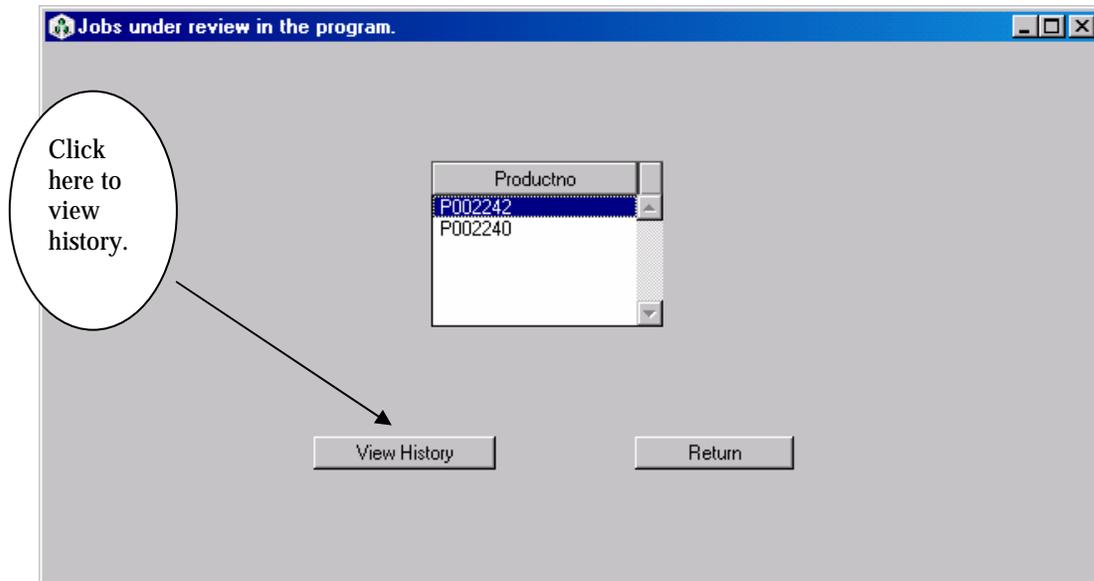


Figure 4.65: Jobs Under the Program

This window gives an idea of the number of products in the program under review. Clicking on the “*View History*” button takes you to the window called the “*History Window*” as shown in Figure 4.66.

This window provides information on the various stages through which the product was taken and the dates on which these activities were carried out.

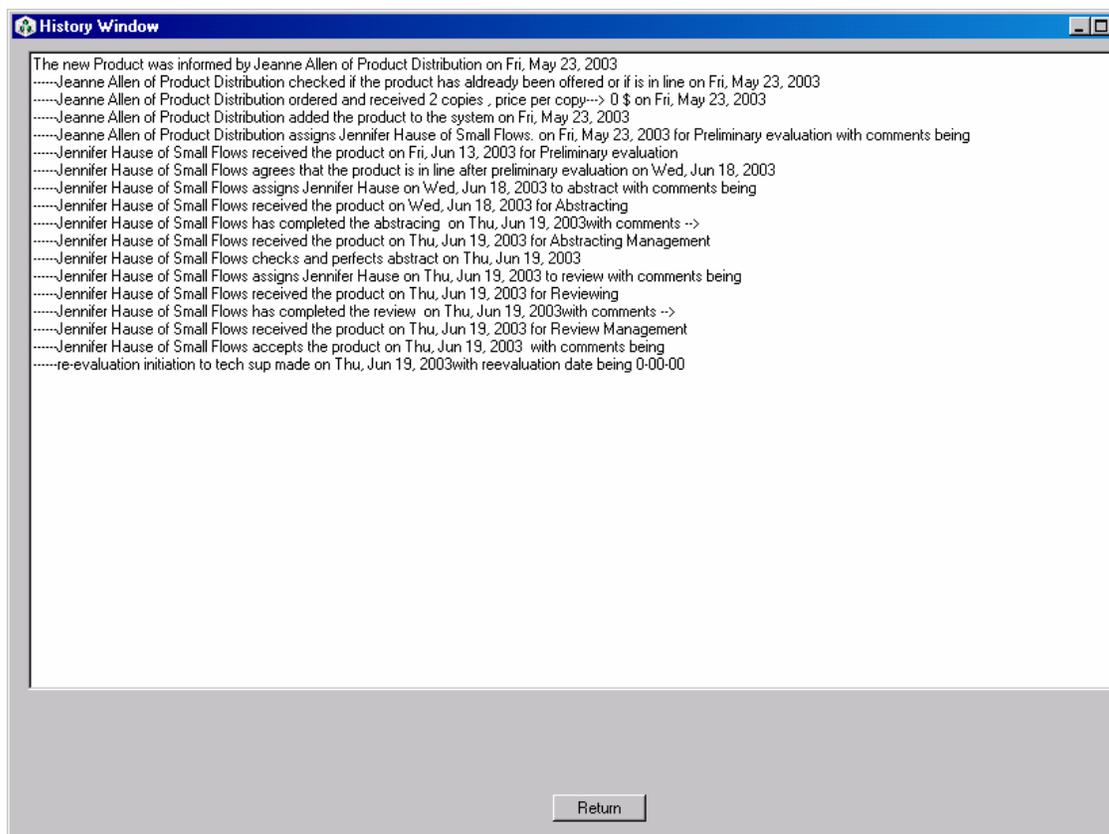


Figure 4.66: The History Window

This window can also be accessed at any stage of the process by clicking the “*History*” command button.

4.8.3 Graphical Reports Generation

This section illustrates how the information about the process is represented graphically. The user chooses the “*Reports*” option on the main window, taking him or her to the reports window as shown in Figure 4.67.



Figure 4.67: Reports Window

To view a report the user chooses a time frame on the pull down menu and then chooses one or more of the various options shown in the window. For example, to view the number of products that were put in review, and to have a measure of the number of products that were accepted or rejected in the first quarter of 2002, the user makes the necessary selections and then clicks “*Review Analysis*”. This opens the window as shown in Figure 4.68. The user has the option of viewing the results in the form of a bar, pie or a line graph. He or she can copy the graph or chart and paste it to a word document for printing.



Figure 4.68: Chart Window

4.8.4 Errors and Feedback Reporting System

This feature helps to log on to the system department’s helpdesk so that bugs and other suggestions can be posted. It can be reached by choosing the “*Report suggestions and errors*” command button on the main window, opening the window shown in Figure 4.69.



Figure 4.69: Error Reporting Window

The hyperlink on the window helps to reach to the system department's helpdesk system.

This helpdesk system allows users to submit the problem to the systems department.

CHAPTER 5: CONCLUSION

5.1 Summary

The product review process of the National Environmental Service Center (NESC) was studied and analyzed. The process was flowcharted and the bottlenecks identified and removed. A supporting organizational structure was designed. Process improvement sessions were conducted to involve the employees. The process was mapped and ownership of tasks and sub-processes were established. A database-powered software system (CAMP) was developed. This software helps to facilitate, track and control workflow. The newly improved process was documented. The employees were then trained in groups on the new process. Feedback systems were included in the software to allow employees to offer feedback and suggestions. This ensures that the process is continually improving.

5.2 Change Management

Implementing the improved process and the developed software was a very significant challenge. The data from the old products database had to be transferred to the new database system. During this period, care was taken to make sure that the normal activities were not shut down. Since this data migration involved transfer of data across two different database platforms, care was taken to prevent any loss of data.

The most important feature in any process improvement plan is to systematically educate the staff about the new process. This includes overcoming resistance and barriers for change. This was achieved by having the staff participate in the process improvement

sessions. After the process was improved, user manuals were developed and employees were trained in groups on both the software and the new process. After the training sessions the software was installed in all of the employees' computers and several test runs were made. This helped employees review the software and send suggestions through the feedback mechanism included in the software.

5.3 Advantages of the CAMP Software Over the Old Process

Previously, the product review process was not defined or outlined. This project defined, flowcharted and mapped the process. The new software helps facilitate workflow. In the old system, the workflow was mainly paper-based with hand delivery of instructions. Now, the software on every employee's desktop helps the facilitator to assign tasks right from his or her cubicle. Prior to using this software it was not possible to track the exact location of a product in the process. CAMP allows product tracking giving details of each phase and the staff member associated with the task.

Previously, the database was accessible only on Macintosh machines. Now the database can be accessed from both windows and Macintosh computers. Moreover, every employee in the organization has access to the database. This ensures that the database is updated at various phases in the review cycle rather than one person keying in all the information. This reduces the product review cycle time.

There are tools in the new software that allow a manager to know the number of jobs pending with each employee. This helps in determining the employee's workload. The

software automatically documents all activities associated with the review of a product. The new software is user-friendly and has a powerful query engine. This helps users to search the database on multiple criteria and logical (and/or) combinations. Finally, the software allows developing graphical charts on process performance.

In the past, roughly 150 products were reviewed each year. Under the new system the number of products reviewed increased to 350 per year. Thus, the new system has led to an approximate 125% increase in the number of products being reviewed.

5.4 Applications and Future Work

Any business operation has processes and these processes change with time due to several variables inside and outside the organization. Reasons could include external competition, poor financial performance, emerging market opportunities, or erosion of market share. This double-edged tool of process improvement and CAMP can bring about revolutionary changes in business operations.

The product review process can be combined with customer service and technical advisory databases to bring about a revolutionary change in the business operation. The customer service database has information on various customers who have ordered products offered by NESC. The technical advisory database has information on all the inquiries by customers through email or phone regarding the services and products offered by NESC. This integration of different databases would remove several bottle

necks and unnecessary paperwork and delay. This would help in fastering an excellent customer relationship and would also help in marketing and furthering the business.

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APPENDIX A

CAMP DATABASE TABLES

Table name: Main

Purpose: To store the information about the product.

Field Name	Field Type	Length	Description
Abstract	Char	4096	A short abstract on the product
Affiliation	Char	200	This field represents a listing of the organization to which the product is affiliated.
Author	Char	200	Author of the document
Category	Char	25	The category to which the product belongs
Checked	Char	1023	To help in the data transfer, to verify if the data was transferred proper.
Cost	Money		The cost associated with the product
Datestart	Date		The date the review process started
Dwno	Char	20	NDWC programs item number
Epadocno	Char	20	The EPA document number
Keyword	Char	1023	The keywords associated with the product.
Medium	Char	200	The medium of the product
Netcpromo	Char	4096	The promotion of the NETC products.
Netcsno	Char	20	The NETC item number.
Offered	Char	1023	States if a product is offered or not
Pages	Long		The number of pages in the product.
Price	Money		The price of the product. Cost+ Mark-up.
Productno	Char	20	The product number
Program	Char	25	The program which reviewed the product
Promo	Char	4096	The promotion of the product
Reviewers	Char	200	The persons who review ed the product
Sfno	Char	20	NSFC item number
Source	Char	200	The source of the product
Stage	Char	75	The stage the product review is in
State	Char	1023	The states associated with the product
Targetaud	Char	1023	The audience the product aims at.
Taxonomy	Char	1023	The taxonomy codes associated with the product.
Title	Char	1023	The title of the product
Updated	Date		The date the record was updated
Year	Integer		The year the book was published

Table name: States

Purpose: This table is used to store the list of states available to be referenced with the product.

Field Name	Field Type	Length	Description
State	Char	30	The state

Table name: Target

Purpose: This table is used to store the list of target audience available to be referenced with the product.

Field Name	Field Type	Length	Description
targetaud	Char	30	The target audience.

Table name: Taxonomy

Purpose: This table is used to store the list of taxonomy codes available to be referenced with the product.

Field Name	Field Type	Length	Description
Taxonomy	Char	30	The taxonomy code

Table name: Keyword

Purpose: This table is used to store the list of keywords available to be referenced with the product.

Field Name	Field Type	Length	Description
Key	Char	30	The keyword

Table name: NewProd

Purpose: A temporary table, which stores information about the product when it was first informed. It also has information about the person who informed the product.

Field Name	Field Type	Length	Description
Affiliation	Char	200	This field represents a listing of the organization to which the product is affiliated.
Author	Char	200	Author of the document
Comments	Char	2046	The comments sent to the product facilitator
Date	Date		The date when the product was informed
Informed by	Char	30	The name of person who informed the product
Medium	Char	200	The medium of the product
Pages	Long		The number of pages in the product.
Program	Char	10	The program to which the person who informed belongs
Source	Char	200	The source of the product
Title	Char	1023	The source of the product
Year	Integer		The source of the product
Epadocno	Char	20	The EPA document number

Table name: Contact

Purpose: This table stores information about the contact address of the products source.

Field Name	Field Type	Length	Description
City	Char	1023	The city
Company	Char	1023	The company
Country	Char	1023	The country
Email	Char	1023	The email address
Fax	Integer		The fax number
First	Char	1023	The first name
Last	Char	1023	The last name
Middle	Char	1023	The middle name
Phone	Integer		The phone number
Productno	Char	20	The product number
Street	Char	1023	The street name
Zip	Integer		The Zip code

Table name: Jobspending

Purpose: This table stores all the information regarding the jobs in progress.

Field Name	Field Type	Length	Description
dateassigned	Date		The date on which the job was assigned
Jobtype	Char	65	The type of job assigned.
Productno	Char	20	Product number
username	Char	30	The user name to whom the job is assigned

Table name: Prelim

Purpose: This table helps to log activities on the stage of Preliminary Evaluation by a product facilitator.

Field Name	Field Type	Length	Description
Productno	Char	20	The product number
Inline	Char	2	Flag if the inline stage was completed
Inlinedate	Date		Date when the product was confirmed inline/not inline
Noofcopies	Integer		Number of copies procured preliminarily
Price	Money		The price on the product
Arrived	Char	2	Flag if the product arrived
Arriveddate	Date		The date when the product s arrived
Rejectreasons	Char	3000	The reasons for rejection.
Assignprodno	Char	2	Flag if the product was assigned a product number.
Assign	Date	2	Flag if the product was assigned to a supervisor
Print	Char	2	Flag if the product information was printed
Printdate	Char		The date when the preliminary information was printed and filed
Reject	char	2	Flag if the product was rejected.

Table name PrelimProg

Purpose: This table helps to log activities on the stage of preliminary evaluation by a Technical supervisor.

Field Name	Field Type	Length	Description
Productno	Char	20	The product number
Program	Char	20	The program to which the product was assigned
Assignedto	Char	45	The supervisor to whom the product was assigned
Comments	Char	3000	Comments sent to the supervisor by the product facilitator
Datedelivered	Date		The date on which the product was delivered
Inline	Char	2	Flag if the product is inline/not inline
Commentsback	Char	3000	Comments sent back to the product facilitator
Deliverydate	Date		The date on which the product was delivered back to the facilitator
Assignedby	Char	45	The name of the facilitator who assigned the job to the supervisor
Prodreceived	Char	2	Flag if the supervisor received the product
Inlineflag	Char	2	Flag if the product is declared inline by the supervisor
Prodreturned	Char	2	Flag if the product facilitator received the product.
Desdate	Date		The date on which the inline/not inline decision was made

Table name: Abstracting

Purpose: This table helps to log activities on the stage of abstracting.

Field Name	Field Type	Length	Description
Productno	Char	25	The product number
Program	Char	30	The program to which the abstracter belongs
Assignedto	Char	35	The name of the abstracter
Dateassign	Date		The date the job was assigned.
Comments	Char	1023	The comments send to the abstracter by the supervisor
Datedelivered	Date		The date the product was delivered
Completed	Char	20	Flag if the abstracter completed abstracting
Commentsback	Char	1023	The comments send back to the supervisor by the abstracter
Deliverydate	Date		The date the product was delivered to the abstracter
Assignedby	Char	35	The name of the supervisor who assigned the abstracter.
Prodrecived	Char	2	Flag if the product was received by the abstracter
Prodreturned	Char	2	Flag if the product was received by the supervisor
Desdate	Date		The date the abstracting was completed.
Perfected	Char	2	Flag if the abstracted was corrected and perfected by the supervisor
Perfecteddate	date		The date the abstract was corrected by the supervisor

Table name: Review

Purpose: This table helps to log the activities on the Review phase.

Field Name	Field Type	Length	Description
Productno	Char	35	The product number
Assignedto	Char	35	The name of the reviewer
Dateassign	Date		The date the job was assigned
Comments	Char	1023	The comments send to the reviewer b y the technical supervisor
Datedelivered	Date		The date the product was delivered to the reviewer
Completed	Char	20	Flag if the review was completed.
Commentsback	Char	1023	Comments send back to the supervisor by the reviewer
Deliverydate	Date		The date the product was delivered to the supervisor
Assignedby	Char	35	The name of the supervisor who assigned the job
Prodreceived	Char	2	Flag if the reviewer received the product
Prodreturned	Char	2	Flag if the supervisor received the product from the reviewer
Desdate	Date		The date when the supervisor makes a decision on the review.

Table name: Promotion

Purpose: This table helps to log the activities of the promotion-writing phase.

Field Name	Field Type	Length	Description
Productno	Char	25	The product number
Program	Char	30	The program to which the promotion writer belongs
Assignedto	Char	35	The name of the writer to whom the job is assigned
Dateassign	Date		The date the job was assigned
Comments	Char	1023	The comments send to the promotion writer by the product facilitator.
Datedelivered	Date		The date the product was delivered to the promotion writer
Completed	Char	15	Flag that the promotion writing was completed.
Commentsback	Char	1023	Comments sent to the product facilitator
Deliverydate	Date	35	The date the product was returned to the product facilitator
Assignedby	Char	35	The name of the facilitator who assigned the job
Prodreceived	Char	2	Flag if the facilitator received the job
Prodreturned	Char	2	Flag if the facilitator received the job
Desdate	Date		The date the promotion was completed
Perfected	Char	15	Flag if the promotion was corrected by the facilitator
Perfecteddate	Date		The date the promotion was completed by the product facilitator.

Table name: reviewdw

Purpose: This table maintains information on the review done on the product.

Field Name	Field Type	Length	Description
Productno	Char	25	The Product number
Reviewedby	Char	35	The name of the reviewer
Q1	Char	4	Rating for the first question
Q2	Char	4	Rating for the second question
Q3	Char	4	Rating for the third question
Q4	Char	4	Rating for the fourth question
Q5	Char	4	Rating for the fifth question
Reject	Char	1023	Reasons for rejection
Promo	char	1023	Reasons for accepting the product

Table name: Prodhis

Purpose: This table documents all the activities on the product.

Field Name	Field Type	Length	Description
Productno	Char	25	The product number
Event	Char	object	The log of all the events in the process.

Table name: Inventory

Purpose: This table maintains information on the inventory of a product that has been accepted.

Field Name	Field Type	Length	Description
Productno	Char	25	The product number
noofcopiesordered	integer		The no of copies ordered for inventory
Arrived	Char	2	Flag if the product has arrived
Pricepercopy	Money		Price per copy.
Costpercopy	Money		Cost per copy
Dateofarrival	Date		Date of arrival of the product
Dateoforder	Date		Date of order of the product
Itemnoassigndate	Date		The date the item number was assigned.

Table name: Tracker

Purpose: This table helps to provide information on the current status of a product on review.

Field Name	Field Type	Length	Description
Productno	Char	20	The product number
Status	Char	1023	The current status of the product under review.

Table name: Life

Purpose: This table is used to help in the re-evaluation process.

Field Name	Field Type	Length	Description
Productno	Char	25	The product number
Reevaldate	Date		The re-evaluation date
Flag	Char	2	Flag if it has to re evaluated
User	char	1023	The name of the supervisor who dealt with the product before.

Table name: TechReview

Purpose: This table helps to log information on the review decision made by the technical supervisor.

Field Name	Field Type	Length	Description
Productno	Char	25	The product number
Supervisor	Char	35	The name of the supervisor
Decision	Char	20	The decision made by the supervisor
Reasons	Char	1023	The reasons for the decision made.
Desdate	Date		The date the decision was made.