E-Document Tracking System

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Abstract:

    Document Tracking System, (DTS for brevity) for Procurement Process is a utility that establishes better transparency, management and tracking of documents of the procurement process. DTS is a system that deals with the process of storing, locating, updating, and sharing data for the purpose of workflow progression and business outcomes. DTS is a tool used to monitor documents at any given time and generate reports informatively. The system is locally interconnected inside the office using local area network. The system provides convenience of easy tracking of documents within the parameters of the office, and supplies information on the progress of the request on process, the archived request, and determines which requests are completed. The DTS is designed primarily for the Department of Science and Technology – X to expedite processing and recording on matters of procurement of the agency and enhance monitoring of documents and generating reports.

Key words: Document Tracking System, Local Area Network

1.0 Introduction

Document Tracking System (DTS) is a system that deals with the process of storing, locating, updating, and sharing data for the purpose of workflow progression and business outcome. Centralized sharing and data storage within specific servers

help organizations access information efficiently and effectively, along with securing protected data. Servers designated to manage documents can also contain built-in workflow applications to maximize task management and assist in overall organizational workflow. DTS helps offices to manage or monitor their documents.

Nowadays, Document Tracking Services (DTS) is used as a web-based application that allows school districts to streamline how they complete and update a wide array of school and district-level reports. Our web-based application completely eliminates faxing documents; provides more flexibility to staff work schedules (clients can access from anywhere) and provides 100% accountability in tracking their documents/reports. DTS is a cost effective web-based application that will guarantee you savings on an on-going basis (Boyd, 2010).

Recently, Electronic Document Tracking System (EDTS) has been developed as a solution system to improve the efficiency of retrieving the document online at any time and tracking the movement of documents in and out of the offices. The role of the EDTS is to logically register, preserve, retrieve and renew documents at high speed while tracing the required documents or files. It is designed to help structure the field by approaching it from three perspectives: (1) technologies that are making EDTS possible, (2) the application areas in which business value is being realized, and (3) the roles and responsibilities of several personnel that will be involved in maintaining EDTS (Demong et al, 2009).

Recently, A Hospital Wireless Local Area Network-Based (WLAN) Tracking System was developed with a personal digital assistant (PDA) having a simple text messaging function and a prototype stand-alone tracking device. Evaluation of the effectiveness of the tracking system was performed in two ways. Twenty-five messages were sent to nurses by direct communication and forty-six messages were sent by the wireless system (Retrieved from

http://europepmc.org/articles/PMC3092989/reload=0;jsessiond=
d6NyMsRK6B5VFTiqT0SU.1).

Statement of the Problem

The DOST Region –X is having hard time in documenting and
tracking each request or transaction. One of the problems that
they often encounter is losing significant documents without a
back-up document. It is time-consuming in finding records or
tracking specific requests.

2.0   Methodology

As shown in Figure 2.1, a user
or an employee will request an
item with all the information
to the administration using
the document tracking system.
The administration will be
notified by the system that
there was a request pending.
Then the administration will
forward the transaction to the
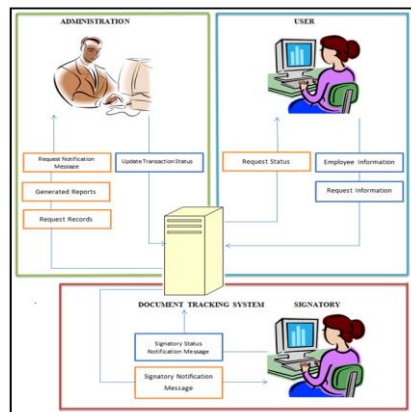signatory for evaluation and
approval of the request.

Figure 2.1 Architectural Design

After the signatory approved the request, the
administration will be notified for next transaction of the
process. At this point the administration will do the
continuation of the process to complete the transaction of that
particular request of the user. Finally, the administration will
save all the transaction happened in that particular request to
the system's database.

2.1 Designing of the Document Tracking System

2.1.1 Analysis

In designing the system, the researchers gathered information and conducted a series of interviews to identify the problems. The researchers interviewed office personnel who were capable of giving information that we needed and who possessed substantial working knowledge and expertise in the flow of their current procurement process. From the various interviews and consultations, the researchers used the data collected as reference in constructing the different diagrams of the proposed system.

The researchers utilized the tools context diagram and use-case diagram to help explain the procedure of our system. The context diagram shows the transaction of the entire system. The use-case diagram enumerates the privileges of every user namely; the administrator, signatory and employee.

2.1.2 Tools

2.1.2.1 Context Diagram

The researchers designed and created a context diagram to visualize and understand the flow of the system. Figure 2.2 context diagram level 0 represents the flow of the document tracking system for procurement process. It shows how the system sends and receives data and generates reports.
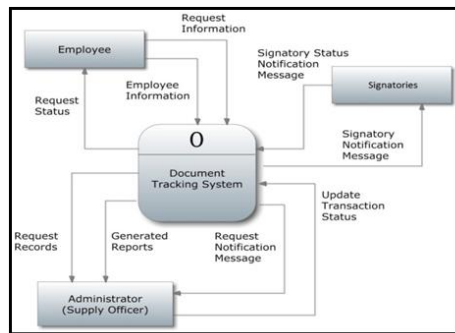

Figure 2.2 Context Diagram Level 0

The administrator, signatory and employee are the end users of the system. The administrator updates the transaction status of the employees/requisitioner. The DTS provides

request records, generates reports and requests notification message. The employee inputs personal information and requests to the system. The system shows the request status of the employee/requisitioner. The signatory notifies the system when they approve a request and the system notifies the signatory when there's a request that needs to be approved.

2.1.2.2 Use Case Diagram

The researchers designed and created a Use Case Diagram to visualize or show different types of users of a system and the various ways on how they interact with the system. It is a graphical representation of what the system can do.
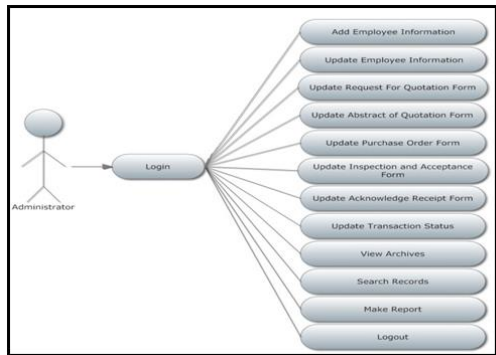

Figure 2.3 Use Case Diagram for Administrator

Figure 2.3 Use Case diagram shows the representation of the administrator's interaction with the system. The administrator has the authority to register an employee. The administrator can edit employee information, add positions for employees, and edit the signatories of each form. The administrator has the authority to forward the request to the signatories. The administrator can hold a request if there are complications affecting the transaction. The administrator can delete requests.

Figure 2.4 use case diagram shows the representation of the employee's interaction with the system. The
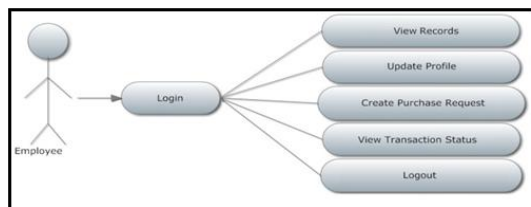

Figure 2.4 Use Case Diagram for Employee

Employee can view his/her requests and the status of requests.

The employee can edit his/her profile. The employee can create and print his/her own purchase request.

Figure 2.5 use case diagram shows the representation of the signatories' interaction with the system. As the signatory, he/she can approve a request.
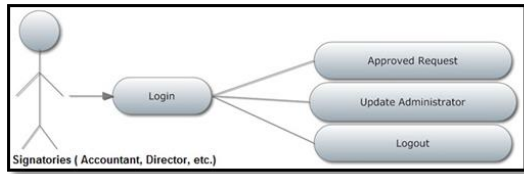

Figure 2.5 Use Case Diagram for Signatories

2.1.2.3 Creation of the Database

A database is a collection of tables containing a list of fields which is used to store data. The researchers designed and created a database of the entire system to show the entities and attributes of each table, connected with the respective relationships. Each table has its unique role, where information is stored such that by connecting them, the task of data retrieval would be easier and faster.

2.2 Developing the Document Tracking System

2.2.1 Softwares used in Developing the System

The softwares used to develop this system are WAMP and Sublime Text. The researchers also used frameworks like Codeigniter and Bootstrap.

CodeIgniter is an Application Development Framework - a toolkit - for people who build web sites using PHP. Its goal is to enable you to develop projects much faster than you could if you were writing code from scratch, by providing a rich set of libraries for commonly needed tasks, as well as a simple interface and logical structure to access these libraries. CodeIgniter lets you creatively focus on your project by minimizing the amount of code needed for a given task.

Bootstrap is one of the most popular front-end frameworks and open source projects in the world. It is a front-end framework for faster and easier web development. The

researchers chose Bootstrap because it is easy to learn and can be easily be manipulated. Since web-based programs and software are easy to access, HTML and PHP are good for developing this kind of programs. HTML and PHP also allows the researcher to do more designs with the help of Bootstrap.

MySQL is a free and open source database program. It can be used to create, modify and manipulate information contained in the database. It is used to add, delete and update information in the database.

Sublime Text is a sophisticated text editor code, markup and prose. It's like Notepad++ but more modern. Sublime contains many features which allow working with multiple open files. Sublime Text is customizable with simple JSON files. This system gives you flexibility as settings can be specified on a per-file type and per-project basis.

In order to achieve the proposed system, the researchers developed functional software that satisfied the system design. The researchers also used some logical procedures in creating and developing the software in order for the system to work efficiently. The researchers chose Hypertext Processor (PHP) and Hypertext Mark-up Language (HTML) for the front-end, PHP/HTML as a front-end for our proposed system because it has the features which suites the needs of our client and we can assure that it is user-friendly.

2.2.2 Creation of database

2.2.2.1 Database design

A database is composed of tables connected with other tables with their respective relationships. Each table contains a list of fields having its unique role, where information is stored so that by connecting them,
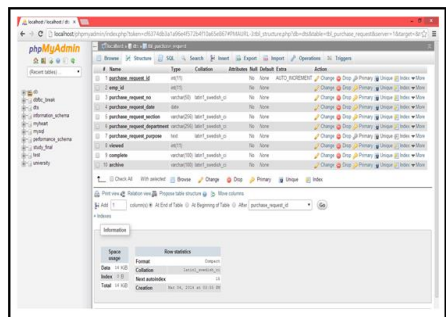

Figure 2.6 Database Design

it will be easy to retrieve data. As shown in Figure 2.6, the database used in this study starts with a tale called "tbl_purchase_request". The "tbl_purchase_ request" table is composed of columns for the text of purchase_request_id, emp_id, purchase_request_no, purchase_request_date, purchase_request_section, purchase_request_department, purchase_request_ purpose, viewed, complete and archive. Information stored in the table is referred to as 'row' in the table.

2.2.2.2 Data Dictionary

After creating the database, next is developing a data dictionary. The data dictionary is important and useful. A data dictionary is a data structure that stores metadata, i.e., (structured) data about data. It contains a list of all files in the database, the number of records in each file, and the names and types of each field. Each data object or item is given a descriptive name and is connected with their respective relationships

2.2.3 Testing and Debugging

After the proposed system was completed, the researchers conducted a trial and error testing for several days to evaluate the system's functionalities and usability. The researchers used a parallel testing to check whether the proposed system performs better than the existing ways. The researchers took down note every operation the system transacts in every departments of the office.

2.3 Evaluation of the system

So as to evaluate of the system's functionality, a demonstration have been conducted at Department of Science and Technology Region-X. There are ten (10) employees from the different department of the office tried the system, but two (2) of them serves as the administrator of the system and the other eight (8) employees serves as a regular user. During the

demonstration of the system, the researchers also discussed about the features of the system as well as the important terms of the system's process. The researchers let the employees to try and test the system. For the regular user of the system, they requested an item to the administrator while the administrator received the request and completed the process of procurement. This transaction was completed in order to assess that the system was good or not. Finally, the researchers distributed a survey questionnaire (see Appendix G) and asked the employee to evaluate the system's functionality as well as the system's interface. At the end, the researchers used descriptive statistics to analyze the data acquired from the result of the survey.

3.0   Results and Discussions

3.1 Analysis

To identify the problem, the researchers conducted a series of interviews of our client and analyzed all the data collected to have the most feasible solution of the problem. The information collected from Mr. Ruel Vincent Banal, Administrative Officer V of Department of Science and Technology, Region X (DOST-X) helped a lot in diagnosing the problem besetting the current system. He provided sample forms like Purchase Request (PR) and Purchase Order (PO) forms produced by the current system using the Excel application. He supplied the researchers with a sample monthly report for procurement monitoring. The researchers used the Gantt chart as our guide in our thesis proposal. Finally, the researchers referred to the objectives as the bases for coming up with the enhanced document tracking system for procurement process.

3.2 Design of the Document Tracking System

In order to come up with an operational and effective document tracking of procurement process, the researchers addressed carefully the tracking of documents particularly a request form

as well as the printing of every form of the whole process of procurement which is the focus of the study.

3.2.1 Transaction Progress Form (Admin)

Figure 3.1 shows the transaction progress interface of the system; where the administrator can see the progress of every transaction as well as the viewing of request and approval status of every form. The administrator can also see the completed transaction of the request in the archive form. All in all, the administrator has the authority to operate the system.
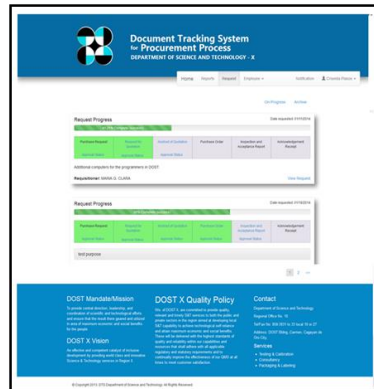
Figure 3.1 Transaction Progress Form

3.2.2 Purchase Request Form (Admin/Signatory)

Figure 3.2 shows the purchase request form which submitted to the administrator by an employee or a regular user of the system. The administrator will received the request form but it can't be alter. The administrator will forward this form to every signatory and let them approve it. Then the request for quotation form will be enable after the signatories will be completed.
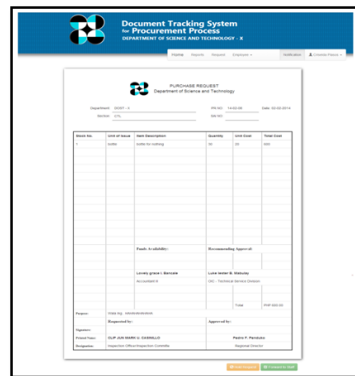
Figure 3.2 Purchase Request Form

3.2.3 Request for Quotation Form

Figure 3.3 shows the request for quotation form. This form is available after the signatories approved the purchase request form. The administrator views the request for quotation, and forwards to the staff responsible for approval. Then the abstract for quotation form will be enable after the signatories will be completed.

Figure 3.3 Request for Quotation Form

3.2.4 Abstract of Quotation Form

Figure 3.4 shows the abstract of quotation form, after the request for quotation is approved by all signatories, the system will then enable the abstract of quotation form. The administrator views abstract of quotation, inputs the supplier and the cost of the products according to the item description, then inputs the choice of supplier, and forwards approval.

Figure 3.4 Abstract of Quotation Form

3.2.5 Purchase Order Form

Figure 3.5 shows the purchase order form, after the abstract of quotation is approved by all signatories, the system will then enable the purchase request form. The administrator can view and edit the contents within Purchase Order, and forwards to the staff/signatories responsible for approval.

Figure 3.5 Purchase Order Form

3.2.6 Inspection and Acceptance Report

Figure 3.6 shows the inspection and acceptance report, after the purchase order is approved by all signatories, the system will then enable the inspection and acceptance report form. The administrator can view and input the condition of Inspection and Acceptance with date of request.

Figure 3.6 Inspection and Acceptance Report

3.2.7 Acknowledgement Receipt Form

Figure 3.7 shows the acknowledgement receipt form, after the inspection and acceptance report is approved by all signatories, the system will then enable the acknowledgement receipt form. In this form the administrator can view the Acknowledgement Receipt, and forwards to the staff/signatory responsible for approval.

Figure 3.7 Acknowledgement Receipt Form

3.2.8 System Reports

Reports are important to the Department of Science and Technology Region-X (DOST-X) for the evaluation of the Commission on Audit (COA). The system has the menu for the reports. The system reports are categorized by supplier, month and year. These reports are based on the format of the old reports of the office and also it was in PDF format. So the administrator can print easily the reports using the document tracking system. The employee or the regular user can also print the purchase request form in the system. This form was also in PDF format. In addition, the administrator can print every form of the system namely; purchase request, request for quotation, abstract for quotation, purchase order, inspection and acceptance report, and acknowledgement receipt form and this was in PDF format also. To sum up, these reports are the product or the output of the system which helps the administrator to make their work easier and faster.

3.3 Evaluation

The researcher's demonstration of the system was successfully conducted at Department of Science and Technology Region-X (DOST-X). The proposed study was all about the tracking of documents of procurement process. This study presented a solution on the unsystematic monitoring of documents which the system can also produce a purchase request form as well as a monthly report.

Survey questionnaires were given to the selected employee of DOST-X after conducting the demonstration of system's functionality. The purpose for this survey was to determine the result of the study either the researcher achieves the objective or not. And also to determine what are the other feature needed of the system and add it to the recommendation for the next researchers to continue this study.

Table 3.1 shows the responses of the DOST-X employee about the aspect of system's functionality and output. This aspect was important to know how the system's functionality works as well as the output produce by the system. In survey's results, most of the employee rated the system as "good" in terms of accuracy of tracking of request and printing output while in completeness of information of request, ease of use the system and timeliness of tracking of request the employee rated the system's functionality as "fair". This percentage of results in system's functionality and output considered an average result.

Table 3.1 Employees' response on the aspect of system's functionality and output

Survey Questions	Results	Poor	Fair	Good
Accuracy of tracking of request	Nine out of ten respondents said that the system is accurate in tracking of request and one out of ten said that the system is less accurate in tracking of request.		1(10%)	9(90%)
Completeness of Information of request	Five out of ten respondents said that the system provides complete information on every request while the other five said that the system lacks information on every request.		5(50%)	5(50%)

Ease of Use the System	Six out of ten respondents said that the system is guaranteed to generate reports and forms (ex. PR, PO, etc.). Four out of ten said that the system can generate reports or forms.		4(40%)	6(60%)
Timeliness of tracking of request	Four out of ten respondents said that the system can track every request on time while the other six said that the system can track every request.		6(60%)	4(40%)
Printing Output	Nine out of ten respondents said that the system provides a good printing output while one out of ten said that the system gives fair printing output.		1(10%)	9(90%)

Table 3.2 shows the responses of the DOST-X employee about the aspect of system's user interface (UI). This aspect was important also in a sense that the user may able to use the system as easy as possible and it has an environment-friendly program. In survey's results, most of the employee rated the system as "fair" in terms of clarity of instructions, appropriateness of options and prevention of input errors while in ease of use the employee rated the system's UI as "good" and the clarity of error messages rated by the employee as "poor". This percentage of results in system's functionality and output considered relatively low.

Table 3.2 Employees' response on the aspect of system's user interface

Survey Questions	Results	Poor	Fair	Good
Clarity of Instructions	Three out of ten respondents said that the system provides clear instructions. Seven out of ten said that the system gives instruction but not so clear.		7(70%)	3(30%)
Ease of Use	Five out of ten respondents said that the system is user-friendly and has good user interface while the other five said that the system needs to enhance its user interface.		5(50%)	5(50%)
Appropriateness of Options	Two out of ten respondents said that the system provides appropriate options on every form. Eight out of ten said that the system somehow needs to improve its appropriateness of options.		8(80%)	2(20%)
Clarity of Error Messages	Three out of ten respondents said that the system provides clear error messages. Five out of ten said that the system needs to improve error messages in order to prompt	2(20%)	5(50%)	3(30%)

	the user about errors and etc. Two out of ten said that the system is poor when it comes to clarity of error messages.			
Prevention of Input Errors	Three out of ten respondents said that the system provides an error trapping in input errors to prompt the user about invalid inputs. Seven out of ten said that system needs to improve its error trapping to prevent invalid inputs.		7(70%)	3(30%)

Based on the overall assessment of the results, it can be seen that the employee as the respondents of the survey find the proposed system to be useful but needs an improvement in terms of system's user interface. Generally the system was operational and it helped them in tracking their request.

4.0   Conclusion and Recommendations

The Document Tracking System is developed to assist the monitoring of documents specifically in the procurement process. Based on the findings of the study, the proponents concluded that adopting the document tracking system enables other offices to track the documents chronologically in a step-by-step manner in the procurement process in a shorter time. The system has the capability to monitor updated documents and generate reports immediately while archiving the completed transactions that can be retrieved anytime. As a security feature, only authorized persons and registered users can access the system.

The following concerns are recommended to enhance the proposed study:

1. Develop the system into a web-based document tracking system to be accessed online.
2. Provide more security features when the system is uploaded online to be accessed only by authorized users.
3. Include the audit or logging to the User Profile to keep track on the persons who has accessed the system and the operations

performed during the period, a vital factor to protect the integrity and confidentiality of the records.

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