

Towards a Bespoke Document Tracking System for Philippine Higher Educational Institutions



Sheila R. Lingaya

Abstract: *This study on the development and validation of a document tracking model for utilization of Philippine Higher Education Institutions was undertaken to produce a system that would facilitate the management of documents in state universities or colleges by providing a way to monitor, record and track the location of in-process documents to support an academic organization. The Software Development Process was used as basis for the development of the software involving phases such as user requirements specification, design and implementation, validation and evolution (i.e. the process of changing or modifying the system once it has gone validation and yielded feedbacks for further modification). The acceptability of the software as evaluated by forty (40) office personnel representing every units of the Tarlac Agricultural University – the sample locale of the study, was confirmed in terms of user interface and functionality. These evaluators judged the software based on their skills and ability to use the software while carrying out their job functions. Five (5) IT experts also judged the software in terms of user interface, functionality, database design and security. Based on the results of the study, findings indicate that the document tracking system is excellent for the evaluators as process owners with a grand mean of 4.54 with its ease of use because of the simplicity of operations and the design itself with the reliability and usability or fitness for purpose as to tracking in-process documents and generating reports. The experts also evaluated the system as excellent with a grand mean of 4.58 – hence, the system’s visual, functional and navigational elements and the manner it requests information helps the user operate the document tracker. Security was also judged as excellent because the system can control users and produce integral records.*

Index Terms: *document tracking, information system, transaction processing system*

I. INTRODUCTION

Bureaucracy is expected in most countries and most often than not, it had caused much effect in anyone’s perspective of efficiency and effectiveness. In the Philippines, government agencies now are always under the watchful eye of the discerning public. They are always trying to become more efficient and effective in their delivery of services, primarily because they owe the public.

The Republic Act 9465 or the Anti Red-tape Act has been issued which states that government transaction such as applications or renewal of permits, licenses and other documentation should be completed in five working days especially for simple cases and 10 working days for more complex transactions or requests.

It said that each agency is also required to reply to the client, whether requests are rejected or couldn’t be processed with the explanations why it was rejected and what could be done to re-file their requests. Signatories in each document, the law states, must be limited to a maximum of five persons to reduce time and simplify procedures. As such, many perceive information and communications technology as a cost effective and convenient means to promote openness and comprehensive transparency efforts in most countries [1]. Information Systems are being employed and implemented to reflect improvement and efficiency as well as becoming at pace with the influx of technology. The trend nowadays is to include less paper and manpower in the organization’s or institution’s operation. Yet, although computer generated electronic records have been around, the phenomenon of a paperless office is still remote although paper consumption puts substantial pressure on today’s world forest ecosystem where it seems on the face of it that emergence of computer and capacity of storage of documents in electronic form may lead to decrease in consuming such – hence, emergence of the paperless office [2] Apparently, any business organization or even an education institution still relies on standard operating procedures which primarily include pertinent documents and communications which do need to be managed efficiently and effectively in a manner that they can be tracked down or monitored. Even academic institutions such as the Tarlac Agricultural University boast their transparency of rendering services to their clientele, employees, office units and external community. It caters to the needs of its stakeholders via standard procedures which include or involve processing or pertinent documents. Management of ‘in-process’ documents would serve as a breakthrough in the manual operation of managing document’s passing through the offices to minimize the problems encountered in following-up, tracking down and monitoring documents throughout the University – thus, a Document Tracking System. A document tracking assumes that knowing the movement of a document would enable a decision-maker to pinpoint where it is and in what state – thus, receiving, immediate feedback to make timely and rational decisions.

Revised Manuscript Received on 30 July 2019.

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It is a means for monitoring a document’s movement from “birth” to “growth” to “death” and in some cases, to “rebirth.” In relation to proper management process, this concept of record lifecycle sees records as passing through various stages: creation, active use, inactive use and then onward to either destruction or rebirth in the form of archives.

Another variation of document tracking is video based where the tracking of paper documents is on the desk over time and automatically linking them to the corresponding electronic documents using an overhead camera [3].

As such, DTS is a type of information system that handles the task of recording and monitoring in-process documents. Concerned with ‘moving’ documents, attributes of the document are captured into the system and not the document itself – profile of the object [4]. Having, this, a document tracking system when being developed needs to be in accordance with the type of business or organization or for this case, educational institution for which it is being developed for.

This is because of their uniqueness in business processes or the ways documents are handled or passed through.

The university observes manual taking note or records of documents and communications via “the logbook” monitoring or the “received by” and “released by” on a certain date system. Since computerized systems are necessities in an organization’s way of accomplishing transactions and processes, the rate of adoption of electronic alternative over the past years and the dominance of paper over digitized records also justify the conduct of this work to facilitate the in-process documents’ management of TAU as a Philippine Higher Education Institution.

This study aimed to develop and validate a Document Tracking System (DTS) for the University which will facilitate the movement of documents from one unit or office to another in the University and keep track of the whereabouts of these documents in process.

This paper is organized as follows. Section II presents the review of related literature. Section III focuses on the work’s methodology followed by the presentation, analysis and interpretation of results of the study in Section IV. The Section V summarizes and concludes the paper and some future works.

II. METHODOLOGY

A document is an identifiable recording of information and any recording medium can be used as long as it persists over time. Information is more than the data. So a document includes some elements of contextualization, organization and analysis and even if one’s job is just the management of documents for some specific corporate purpose, it is a professional responsibility to know the relationship of those documents to the society [5].

The most important factor for the success of this project was how closely the particular plan was defined and followed. In order to at least be as close to achieving such, this study was defined with a schedule to follow for its development from its birth and eventually to full development, towards the in-depth analysis of the possible processes that it could offer as features to solve the problems encountered in the current ‘in-process’ document management of the University. The development was guided by the Concept of Software

Development Process with fundamental activities, namely: Specification, Design and Implementation, Validation and finally, Evolution. The “evolution” in this study was the idea of correcting the errors based on feedbacks of the validation phase.

A. Data Gathering Procedure

In order to analyze the performance of the proposed Document Tracking System, there is a need for appropriate materials or instruments to collect pertinent data. Observations, interviews and questionnaires are the most appropriate for this purpose in this study. During this study, the observation took charge on investigating the available facts and data to obtain specific objectives. The researcher eyed the process or tasks involved in university’s document management.

Interviews were also employed to facilitate the acquiring of the pertinent and supplementary data that may not have been gathered during the observation. These data primarily were specific on the parts of a Document Tracking System namely: the people (operator, management), equipment (computer, printer, barcode readers), data (from the documents), tools, space (office units), and procedures. The questionnaire was used to gather information and opinions from the end-users of the proposed-systems. The respondents of this questionnaire were given a background of the proposed system or actually were allowed to experience the proposed system’s design.

B. Development Tools

The system was developed utilizing MySQL, an open source Database server and a relational database management system that works in client/server or embedded systems. MySQL, the most popular Open Source SQL database management system, is developed, distributed, and supported by MySQLAB. The choice was for its main features of including portability, security, and scalability. PHP was used as the Web Development language - a server-side scripting language, which can be embedded in HTML or used as a standalone binary. This scripting language includes features such as it is free, easy to use, HTML-embedded, none-tag based, stability, speed, extension to other programs and protocols, fast feature development, popularity and non-proprietary. With these, the system was made more stable as it was developed as a web-based system.

C. Software Validation

To determine the efficiency of the developed software, the following scale was used by the IT experts and users in rating the system. To determine the adequacy of scope and user-friendliness of the developed software, the users used the scale presented in Table 1. This ensured that the true requirements of the system were yielded by exposing it to potential end-users.

Table 1. Scale used in Evaluating the System

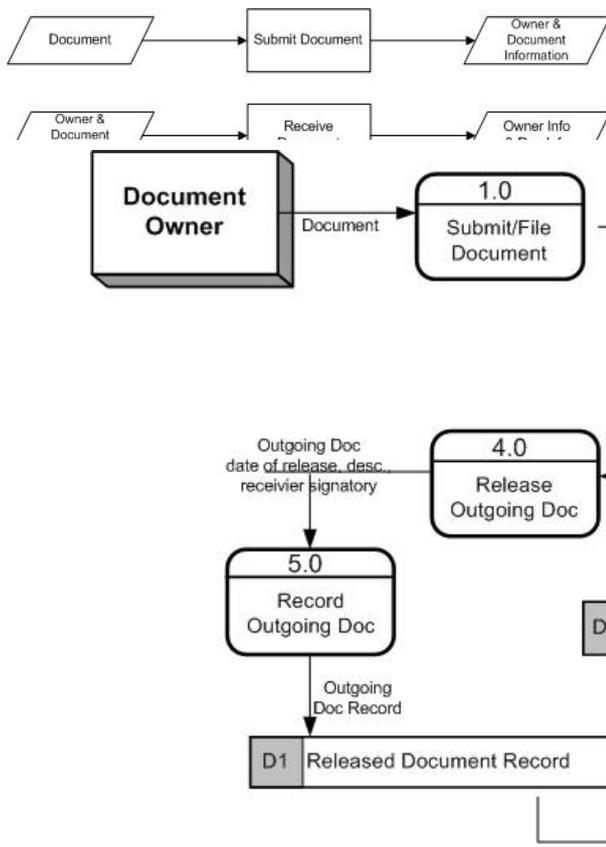
Units of Indexes	Adjective Description
4.50 – 5.00	Excellent
3.50 – 4.49	Very Satisfactory
2.50 – 3.49	Satisfactory

1.50 – 2.49	Poor
0 – 1.49	Very Poor

III. RESULTS AND DISCUSSION

A. The Existing System

The flow of operations of the existing system of managing in-process document in the university is depicted in the Figure 1. It clearly depicts that some activities in the process of recording the in-process documents are repetitive in a way that clerks who are in-charged as receiving and releasing officers repetitively record or note about their incoming and outgoing documents. The dataflow diagram of the existing system in Figure 1 indicates that documents do not have in any Figure 1. Dataflow Diagram of Existing Document Management of In-Process Documents



way a unique identification of itself in the process which may be used in tracking it. This is because the same single document can be recorded differently by the different releasing and receiving officers with the aforementioned procedure.

There is no definite way to track or search the document or worse, to know the document's location. To hunt the document through the log books is a complex process since one would have to look into receiving and/or releasing logbooks of every office where the document may have passed. Added to the burden would be on searching more specifically for a document on the notes recorded on the logbook. The process boils down to looking onto logbooks after logbooks and records after records.

The process of generating a barcode plays a significant role in the tracking or searching of the document. It is the unique identity to be used by the document owner, releasing and receiving officers in recording, noting and searching for the

Figure 2. Input-Process-Output of Document Tracking

The releasing and receiving officers in an office in the units are not always the clerk. The existing process does not have means to record who may have released or received the document so that when time comes that a document being searched or tracked down is identified to be last received in an office, another question would be who received it.

B. Design and Implementation

After careful analysis of the existing system based on gathered facts, the researcher was able to develop the following one or more different system models and prototypes to depict the proposed system's flow of operations.

Figure 2 shows the process involved in the proposed system which actually depicts the flow of operations of the document tracking process using the proposed system.

The creation of an office account and generation of barcode is the definite difference of the existing system and the proposed Document Tracking System.

document's current location.

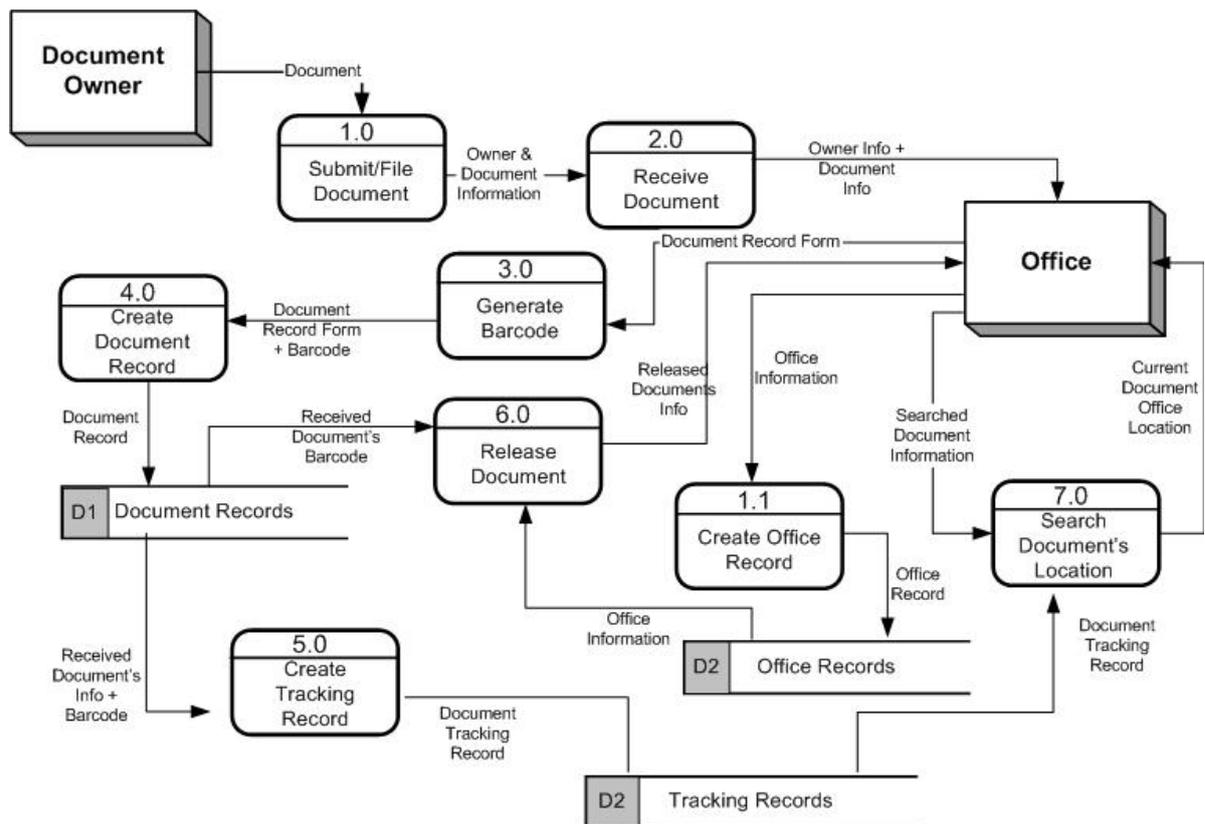


Figure 3. Dataflow Diagram of Document Tracking System for In-Process Documents

Once a document is received by an office, the document's record is created to note its owner and to generate a barcode image which will serve as its identification. This process only happens once for a document and only at the first receiving office. Using the document's id, the receiving office shall then be tagged – using the barcode reader to recognize the printed barcode id – to signify that the document was received by the office. This replaces the process of having to record an

incoming document over and over again from one office to another. The barcode id shall also be used to tag the release of the document by the office.

The dataflow diagram in Figure 3 depicts the flow of data from one process towards the next. It also emphasizes the destination and origin of services and information during the document tracking process. As an information system being defined by a well-organized database structure that will

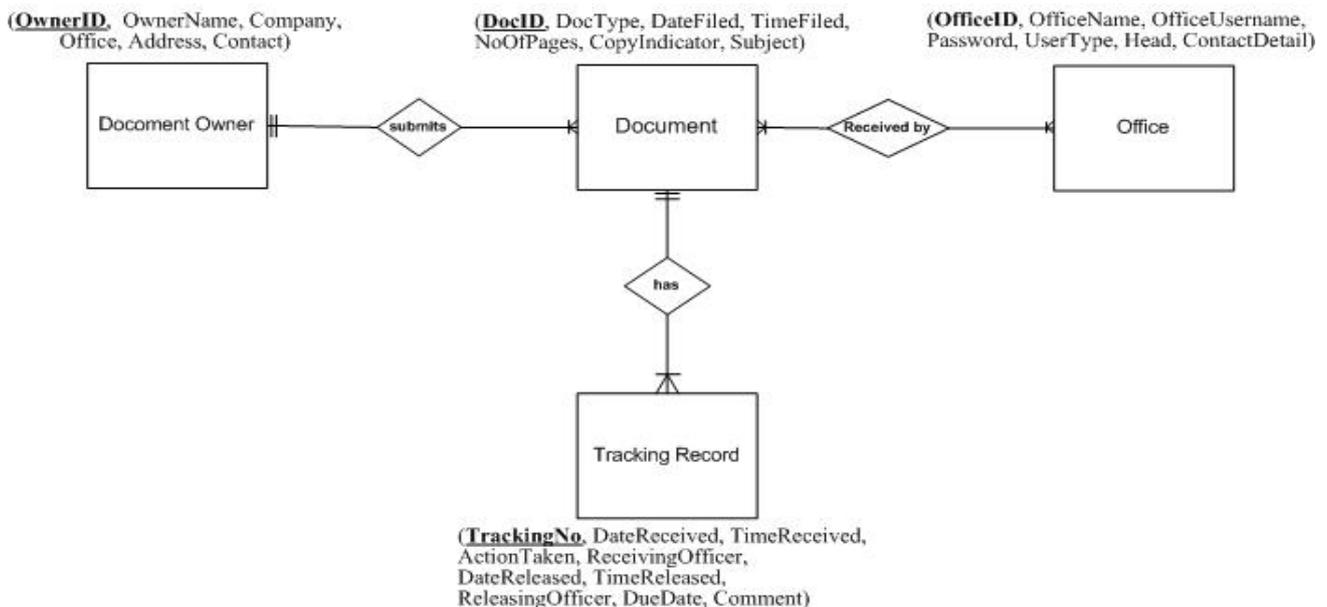


Figure 4. Entity Relationship Diagram of the Document Tracking System.

handle the entry of data into the system and how it will generate necessary reports, the entity relationship diagram in Figure 3 displays how the back-end of the proposed system was designed to hold the information that shall enter the system.

The database was designed to be centralized mainly for the database’s maintainability. Since the document tracking system emphasizes on how timely records or information are synchronized for them to be available to user, the database was designed to a centralized database as back-end. Figure 4 displays the Entity Relationship Diagram of the Document Tracking System.

The synchronization of records or information is critical in the tracking feature of the online document tracking system since an update in records in one office should be immediately recognized by another by any chance of dealing with same document that is being processed or reports being produced.

A tracking record is created once a document is received by an office either from another office or from the owner himself. The tracking records table is the main table of the database for it is from which that the current location or the last receiver can be identified. The fields with which the tracking record contains no DateReleased, TimeReleased and ReleasingOfficer clearly indicates that the office to which this document’s tracking records was created is the document’s current location.

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Figure 5. Barcode of a Document

As seen in Figure 5, a user can print a document’s barcode ID in the physical document itself or on a sticker and recognize it also to produce reports out of said information primarily to track the document itself.

C. Validation Results

Five Information Technology experts of proven expertise in web applications development and management were tapped to judge the Document Tracking System. Their comments and suggestions were considered in the improvement of the system.

The experts were composed of one net administrator, two web developers and one systems administrator from government institutions namely: Central Luzon State University (CLSU), and the target itself, TAU. One web developer coming from the Manila-based Global Property Guide, a private company, also evaluated the system. All of them are highly qualified in evaluating the system because of their familiarity with web applications and administration. The questionnaire for the evaluation was based on the criteria specified in the statement of objective of this study. Table 2 indicates the experts’ evaluation on the user interface.

Table 2. Experts Evaluation of User Interface

Software Evaluation Criteria		Average	Descriptive Rating
A. User Interface (Composite Mean : 4.52)			
A.1	Visual Appearance	4.40	Very Satisfactory
A.2	Appropriateness of design	4.40	Very Satisfactory
A.3	Navigational elements	4.60	Excellent
A.4	Request for information	4.60	Excellent
A.5	Functionality of barcode reader	4.60	Excellent

The IT experts came up with the aforementioned rating by assessing the Document Tracking Systems interfaces, online. The system was accessed on http://doctrack.tca.edu.ph on a terminal owned by the IT expert evaluator as assisted by the researcher or the web administrator of the College.

Table 3. Experts Evaluation of Database Design

Software Evaluation Criteria		Average	Descriptive Rating
B. Database Design (Composite Mean : 4.60)			
B.1	Arrangement of data	4.60	Excellent
B.2	Synchronization of database	4.60	Excellent
B.3	Logical Design	4.60	Excellent

The tracking records generated by the Track Document feature of the system indicate how the data were arranged in the system and how they are presented as evaluated by the IT experts with which result of evaluation is indicated in Table 3.

Table 4. Experts Evaluation of Security

Software Evaluation Criteria		Average	Descriptive Rating
C. Security (Composite Mean : 4.60)			
C.1	Authorization of User	4.60	Excellent
C.2	Implementation of user permissions	4.60	Excellent
C.3	Integrity of records	4.60	Excellent

An indication of security noted by the IT experts as indicated in Table 4, during the evaluation was the difference on the permissions of a regular office account and that of an administrator account.

The results of the IT expert’s evaluation came up with an over-all mean of 4.58, interpreted *Excellent* based on the scale used. It consists of the composite means of 4.52 for user interface, 4.60 for functionality, 4.60 for database design and 4.60 for security. Meanwhile, the researcher submitted the system for evaluation to end-users such as clerks, office personnel, as well as on-the-job trainees and student assistants in the office/units since they also take charge in recording the incoming and outgoing documents of their offices. One representative from the forty offices in the university was tapped to evaluate the system purposively including students who also submit reports/documents to the offices as part of student organizations such as student publications and student councils.



The result on their evaluation on the ease of using the system is indicated in Table 5.

Table 5. Users Evaluation on Ease of Use

Software Evaluation Criteria		Average	Descriptive Rating
A. Ease of Use (Composite Mean: 4.54)			
A.1	Simplicity of Design	4.55	Excellent
A.2	Simplicity of Operation	4.53	Excellent

Some of user evaluators also gave their comments which were considered by the researcher in further improving the design in order to meet the end-users' requirement to the system. The Record's Office head was made to evaluate the system using the Administrator account while the rest of the offices were given their own individual office accounts with username and password. The Document Tracking System was uploaded online for this purpose. The users were provided their own accounts per office and oriented on how to use the system. The questionnaires were handed on them and was made to reply on their own initiative on whether their experience of the system is already enough to give it their ratings. Table 6 also shows the users evaluation on Usability.

Table 6. Users Evaluation on Usability

Software Evaluation Criteria		Average	Descriptive Rating
B. Usability (Composite Mean: 4.58)			
B.1	Keeping track of incoming documents	4.70	Excellent
B.2	Keeping track of outgoing documents	4.65	Excellent
B.3	Tracking in-process documents	4.65	Excellent
B.4	Generating reports	4.65	Excellent

The use of the barcode scanner to read the barcode document ID was demonstrated to the user evaluator when tracking the document, receiving the document and also in releasing the document. Users gave positive feedback on said process because it eliminated the tedious repetition of recording the incoming and outgoing documents from office to office and from logbooks to logbooks.

The *receive document* feature of the Document Tracking System affirms the elimination of repeatedly recording received documents in all offices. The idea of a document being recorded as received on all offices and traveled is replaced by the action of just tagging the document through scanning the barcode document ID.

Table 7. Users' Evaluation on Reliability

Software Evaluation Criteria		Average	Descriptive Rating
C. Reliability (Composite Mean: 4.51)			
C.1	Response to user actions	4.48	Very Satisfactory
C.2	Message Prompts	4.48	Very Satisfactory
C.3	Reports Generation	4.58	Excellent
C.4	Management/presentation of outputs or reports	4.50	Excellent

Reliability of the system as evaluated by the users which results are indicated in Table 7 and the IT experts connotes similar idea. It defines whether the users are being presented with reports that can be used officially by the system.

Reliability was also interpreted by the users whether it prompts messages or gave appropriate response to their actions as well as how the outputs or reports are presented. The results of the users' evaluation were a composite mean of 4.54 for ease of use, 4.58 for usability, and 4.51 for reliability. Over-all, the system obtained a mean of 4.54.

IV. CONCLUSION

The Document Tracking System developed as a bespoke model for Philippine State Universities and Colleges was developed based on the Software Development Process activities. The IT experts gave a positive feedback on the user interface, functionality, database design and security with a grand mean of 4.58 or excellent. The acceptability of the software was evaluated by end-users as to ease of use, usability and reliability and a positive response based on the aforementioned criteria was derived with a grand mean of 4.54 – hence, excellent. The range of values of the results of evaluation of the system shows that the evaluators judged the system highly acceptable in the provisions for enough dry run, in the statement of the desired validation outcomes, and in the usefulness and performance of Document Tracking System. This turns out to agree with the result of the studies cited in the related studies, specifically [4] which highlighted the underlying factors in the development and employment of a document tracking system which helped out in the development of the Document Tracking System.

For future work, the document records will be studied for purpose of data mining to optimize the features of tracking in-process documents. Also, the system is planned to be integrated on the University-wide document management system which also needs to be integrated with the information systems which depend on document and information retrieval.

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