

E-Filing System for Government Offices

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Abstract-E-Governance is widely thought as ideal approach to establish productive relationship between government and citizens. It is extensively used to bring transparency, accountability and efficiency at all levels of government procedures and operations. E-Governance is divided into three major categories i-e e-Government-to-Citizen (eG2C), e-Government-to-Employees (eG2E) and e-Government-to-Government (eG2G). There are various limitations discussed by researchers regarding implementation of e-services in developing countries including Pakistan. Lower literacy, financial constraints, poor ranking in ICT development index, and resistance to change, are assumed as barriers in implementing such services in developing countries like Pakistan. All these barriers results into poor usability and lower acceptability for such services. Our focus is on one core part of e-G2E, which is to provide e-coverage to manual file system of government offices. The current manual file system incorporates delayed processing, invisibility, low productivity, poor check & balance, lack of timed accountability, inefficiency, prolonged review, entailed corruption and vulnerability to undue interference. Our proposed file system is intended to add transparency, efficiency, time framing and accountability to manual file system and will have also better acceptability and usability.

Keywords-File System, e-file System, Usability, Acceptability, e-government.

I. INTRODUCTION

The incredible growth of information technology since last two decades has changed the shape of information management all over the world. Information flow was never such faster, accurate and meaningful in human history ever before. With efficient use of information technology, countries are resetting their global status. All these become possible when they did stuff of months in days with better check & balance and transparency. Top 50's countries are very close in e-government's score to each other [i]. In case of the developing countries, the e-transformation is quite late and rather slow but there is not complete denial at all [ii].

IT has reached in each and every territory whether it was willingly adopted or enforced as time need. Most of the developing countries are looking busy in one category of e-government [iii] which is e-government-

to-employees (e-G2E). Maturity process of e-G2E is very slow as it is facing hurdles of resistance to change, monopoly of bureaucracy, lower IT literacy, lower acceptability, poor usability and lack of ownership by higher authorities [iv]. Despite all these, developing countries are still moving forward towards e-governance and some e-facilities are provided [v-vi]. E-government-to-employees is the main context this paper.

The manual file work system of Government Offices suffers from poor administration, lower productivity, corruption, undue delay, poor tracking of files, more human efforts required in review, lack of timed accountability, non-visibility, vulnerable to undue interference and poor access etc. There is great need of managing government office files electronically in order to achieve efficiency, better productivity, ensuring proper check and balance, better tracking and visibility. But ICT based governance is assumed as infeasible in developing countries and faces issues of poor usability and lower acceptability [v-vii]. Thus we are facing a two dimensional problem. One dimension is development of an e-file system to address issues associated with manual file system and the other dimension of the problem is to make the system usable and acceptable for users. Our desired system will have high usability & acceptability and will also add transparency, efficiency, time framing of activities & accountability to manual file system.

The rest of the paper is organized as follows. Section II presents a critical analysis of existing state-of-the-arts. Section III covers the proposed methodology in detail. Section IV presents a comprehensive analysis and discussion on the results. Objective and subjective evaluation techniques are used for performance evaluation of the proposed system. Section V presents the conclusion and discusses the possible extensions of the proposed system.

II. LITERATURE REVIEW

In developed countries, e-government was adapted to achieve quick services and visibility of information concerned with public matters. Their manual type governments systems were productive but less visible because of type of information storage and technical limitations in review. Quick and accurate information flow among government bodies helps to

generate decisions and e-government was put into use as a nice tool for efficient and faster flow of information to enrich their governance.

In developing countries, e-governance cannot be co-viewed in this sense. In developing countries, e-government is not merely essential for quick services but it should be used as tool for adding in-time accountability, transparency and efficiency [ii]. Corruption is the biggest issue of these countries [viii] and e-governance is a best tool for controlling corruption and bringing transparency. At the same time, ICT based governance is assumed as infeasible due to low literacy [ix], low per capita income [x], low IT literacy [xi] and financial constraints.

In government offices, all the official work is carried out through files. A manual file is composed of two parts. One part is Content and the other part is Note Sheet. The content is collection of all relevant documents packed together in a single unit (hard form). The Note Sheet which is placed on the top of content shows all the movements of file and comments or note by any official. Each comment or note on note sheet is called a Para which are numbered in ascending order. Separate files are maintained for different tasks e.g. Annual Budget File, Staff File, Machinery and Equipment File, Fuel Consumption File, Student Affairs File, Admission File, Students Scholarship File and Travelling Allowance & Daily Allowance (TA/DA) File etc. The budget file will contain the grants notification from finance department, the audit copy, letter from administrative department or finance department regarding finance or any other document regarding budget. The note sheet of budget file will have all notes and directives of head of institution to budget officer, Finance Superintendent and any other official associated with finance issues of the institution. The Manual File System is discussed below in detail with reference to following points one by one. These points are File Initiation or Start, File Search, File Tentative Completion Cycle, File Review, File Monitoring, Decision Making on Files and Movement of Files.

The occurrence of any official activity which is recorded in written becomes a new file or the part of an existing file. The official activity may be routine scheduled or may be a newly introduced or obligatory activity. In case of routine activity, the file will be already existed and the new activity is added as continuation of the pre-existing file but in case of newly introduced activity, a new file is created which in future will work as source file for similar type activities.

There are two scenarios in searching a file, one in transaction and other a completed or closed file. Usually closed files are found with initiator and the file in transaction is searched through Diary Registers which are maintained at each office or section in offices. Searching a file is very tedious task. In case of lost of any register, it is extremely difficult to search a

file.

The absence and lack of check & balance on tentative completion cycle is the most crucial drawback of manual file system. It is the prime reason of public mistrust in Government Offices. In most cases, the completion cycle is dependent on official concerned. Officials are usually not stayed bound to process a file in a given time. This makes the file system prone to corruption and undue interference.

File review is very complex and time consuming process in manual file system. It may involve a master file with various associated files. Note sheet is used to get insight into file contents. In case note sheet is misplaced, it becomes very confusing and tedious task to review a file.

File monitoring is very poor in case of manual file system. Once file is moved from one office to another, the initiator remains completely unaware of the processing carried out on that file.

Decisions are made by authorized officers on files. Such decisions are recorded on note sheet.

To depict current state-of-art in file tracking and management system, few remarkable systems in Pakistan and India are discussed below.

Pakistan International Airlines have launched a file tracking system in 2010 [xii] for file tracking and efficient processing. It addresses most of the issues associated with manual file system but it is not user friendly. Officials having low e-literacy will be in problem. It is not the exact e-replica or e-shadow of manual system and that is the biggest reason for its low acceptability and usability among wide range of users. The concerned officials (users) will have to raise e-readiness first and then to learn e-system procedures which are different from the old manual system. The usability and acceptability will decrease further in case of remote areas where e-literacy is lower than rural areas.

Federal Government of Pakistan has launched a file tracking system in FATA Secretariat. It is used for administration of file movements between FATA Secretariat based in Peshawar and tribal agencies. However it is primarily used for just tracking of files and the system does not cover the entailed processing and content of the files. It is not helpful for management of content and for follow up of the files.

Information and Data Exchange Advanced System (IDEAS) was implemented by Government of Kerala, India in 2013 [xiii]. It was aimed for the tracking of citizen petition, government orders and other public-related files. It is user friendly both for citizens and officials. IDEAS is accessible over internet and a hi-Speed KSWAN Intranet facility locally developed by the Government of Kerala, India. However it is extensively used for just tracking of files and not helpful in decision making and in ensuring deadlines. Much focus is given to citizen's involvement and less focus is given to content management of the files inside

government offices [xiii]. Haryana State of India has implemented a file tracking system known as “Centralized File Movement and Tracking Information System (CeFMaTIS) [xiv]”. It is implemented in more than 25 departments/offices of Haryana State along with all branches of Haryana Civil Secretariat [x]. It is highly sophisticated and covers most of the issues associated with manual file system, but still it has given less coverage to the content. There will be problems for users while using this system as it entails complex entries and procedures. In case of low IT literacy areas, its usability and acceptability will be very low.

III. REQUIREMENT ELICITATION, ANALYSIS & SPECIFICATION

A. Requirement Elicitation & Analysis

Our target users are limited in number and there is lot of data available regarding filing system already. Basic requirements can be obtained by analyzing manual file work system as the proposed e-file system is intended to be e-replica of the manual system. However a survey has been launched to collect new requirements and to verify the basic requirements obtained from manual file system as below.

TABLE I
REQUIREMENT ELICITATION

Req. ID	Requirement
EFS00	File Initiation/Submission in the institution
EFS01	A name for each file
EFS02	A unique number given to each file
EFS03	Date of creation/issue for each file
EFS04	Due date for completion of each file
EFS05	Priority selection for each file i-e normal, high, critical
EFS06	Writing on note sheet
EFS07	Selecting category of each file
EFS08	Uploading (attaching relevant documents with e-file)
EFS09	Send the e-file
EFS10	Receiving a file:
EFS11	Receiving a file through file number
EFS12	Time of receipt of file to be recorded
EFS20	What can I do with a received file?
EFS21	Opening the e-file
EFS22	Viewing all information about file e.g file number, file name, priority, initiator, due date

EFS23	Viewing note sheet
EFS24	Writing on note sheet in reply
EFS25	Downloading attached document (letter, notification etc.)
EFS26	Uploading (attaching) documents in reply
EFS27	Sending file back to initiator or any other official
EFS30	Forwarding a File
EFS31	Selecting recipient
EFS32	Attaching documents
EFS33	Writing on note sheet
EFS34	Forward the file to selected recipient
EFS40	Closing a file
EFS41	Initiator will only be able to mark file as closed
EFS42	Closed file will be displayed separately
EFS50	Searching a file
EFS51	File search through file number
EFS52	File search through file name
EFS60	Follow up of files through sms
EFS61	SMS generation on issue of file
EFS62	SMS generation on receiving a file
EFS63	SMS generation prior to expiry of due date. Kindly write the days before Due Date
EFS64	SMS generation on expiry of deadline.
EFS65	SMS generation on forwarding a file
EFS70	Security & Privacy of Information and accounts
EFS71	Secured and simple log in and log out
EFS72	File data and content will be readable only for relevant and concerned officials
EFS73	Easy and simplified way of updating profile information like change of user name, password, contact number, email.
EFS80	Better User Experience
EFS81	Same procedures like manual file system
EFS82	Should not involve complex entries and procedures
EFS83	Easy to perform all operations
EFS84	Better response time
EFS85	Simple Graphical User Interfaces

Officials were asked to give importance score ranging from 1 to 5 (5 the most important). Percent scores were obtained for all requirements stated above. Percent score was calculated and most important requirements were highlighted. Most of the requirements got more than 80 percent score.

B. Requirement Specification

Functional requirements are specified for the e-filing system after analysis of the requirements. Few use Cases and Activities are presented as below:

TABLE II
USE CASE FILE CREATION

Use Case Name	File Submission (File Creation)
Trigger	The user clicks on <i>Create File</i>
Precondition	Home page of the e-filing system is displayed with <i>Create File</i> button
Basic Path	1.The user logs in to the system. 2.User selects t <i>Create File</i> button. 3.Write file name 4.Upload attachment 5.Write on note sheet 6.Select a recipient 7.Send the e-file 8.A unique number given to the file 9.Date of creation/issue for the file
Post condition	The file is created and send to the recipient
Exception Paths	The user may abort the file while not send yet by navigating back from the page.
Other	Entries of file name and number will be recorded on hard file.

Use case for receiving a file is also presented below:

TABLE III
USE CASE FILE RECEIPT

Use Case Name	File Submission (File Creation)
Trigger	The user clicks on <i>Receive File</i>
Precondition	Home page of the e-filing system is displayed with <i>Receive File</i> button
Basic Path	1.User selects <i>Receive File</i> . 2.User enter file number 3.User clicks on <i>Receive button</i>
Post condition	The file is received.
Exception Paths	User may abort the receiving by navigating back from the page
Other	When file is received by file number, it displays in his/her <i>Active Files</i>

IV. PROPOSED METHODOLOGY

Agile model is used to develop this system. It is a model of software development in which software system is developed in rapid cycles (iterations). Incremental version is released after each cycle and presented to customer for feedback. It ensures user satisfaction. The reason to choose agile model is to take feedback from user at each incremental release to ensure higher usability and acceptability which is main hurdle in implementing such services in government offices. Our e-Filing system is developed using ASP.Net and C#.Net as background languages. ASP.Net is server-side web application framework designed for web development. It allows programmers to build static as well as dynamic pages.

C#.Net plays a very dynamic role in developing forms and controls. C#.Net support connectivity using ADO.Net and LINQ (Language integrated Query) technology for more easy access and control. In addition to these, C#.Net makes it easy to develop software components through several innovative language constructs, which include encapsulated method signatures called delegates to enable type-safe event notifications, attributes which provide declarative metadata about types at run time and handling of inline XML documentation comments. The back end of the GCT filing system is controlled by SQL server, a very powerful and reliable data base management system that deliver so many features like data protection, data security and data performance. It is user friendly and very feasible for rapid prototyping. Another strategy has been used in designing this system to increase usability and acceptability which is e-replication of the manual system. In the proposed system, e-procedures of the system are kept similar in steps and order like the pre-existing manual system. It will speed up the process of familiarization of officials with the proposed system. We have also included SMS service in the system. It will be used for informing officials about file dispatch, file deadlines, file receipt and file close up. SMS will be triggered automatically upon the completion of various scenarios like deadline near coming, deadline completion and file completion etc. Architecture diagram of the proposed system is shown in figure 1. The first layer includes core business processes of the system. The second layer includes all data and information of the system. It includes business rules catalog also to govern all information and data. The third layer comprehends technology enablers.

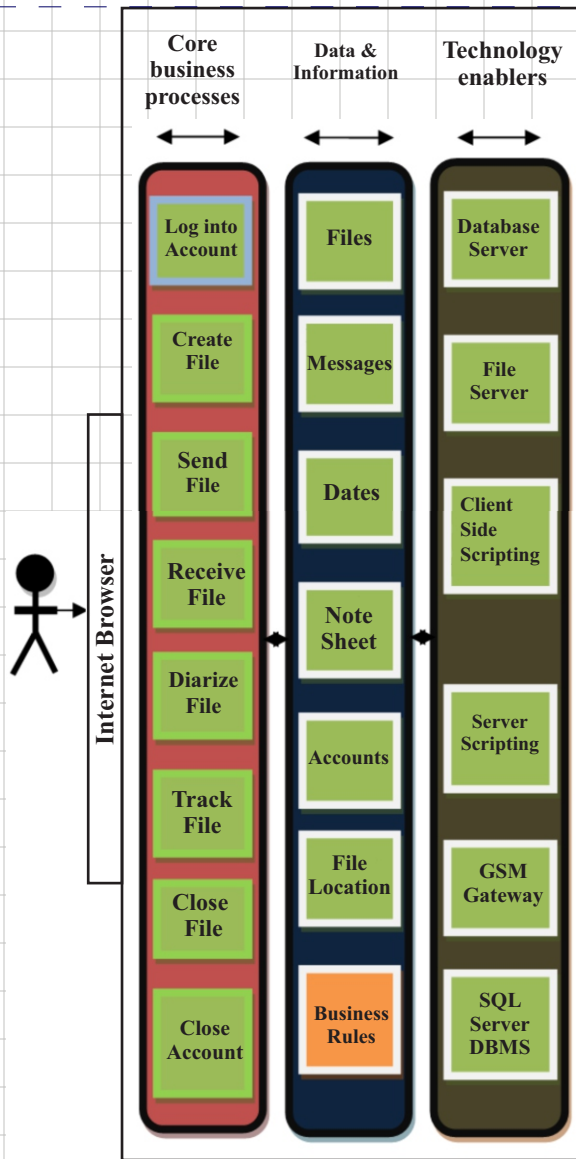


Fig. 1. Architecture Diagram of the Proposed System Use

Unified Modeling Language (UML) is used to visualize software processes and various activities. We have used use case diagrams and sequential diagram to understand the system. Use case diagrams are used to view the system as outsider from user perspective. The use case diagram of the system for Administrator (Principal) is depicted as below.

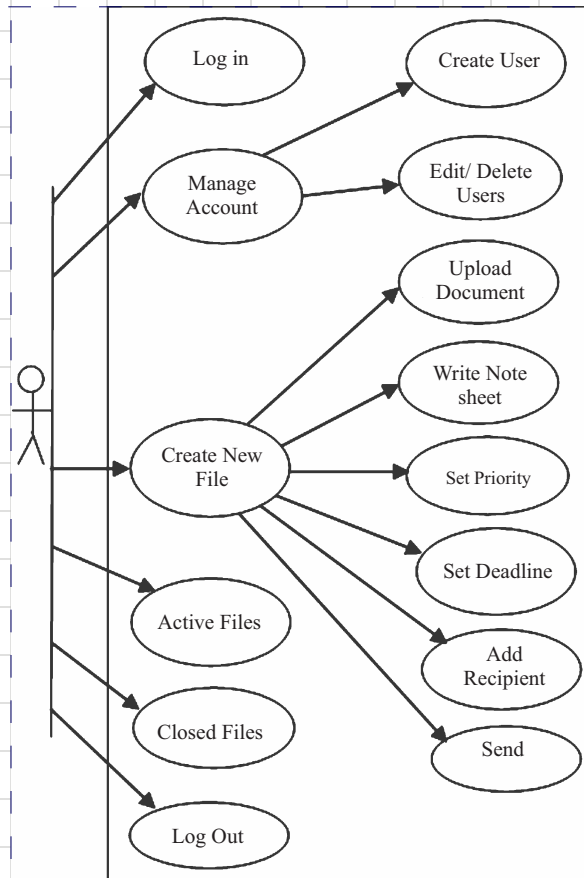


Fig. 2. Use Case Diagram for Administrator

Sequence diagrams are interaction diagrams which are used for showing all messages exchanged in a specific scenario. Here the principal send a file to HOD Mechanical which forward the file to HOD Electrical. After completion of official process, the file is sent back to Admin which marks the file as closed.

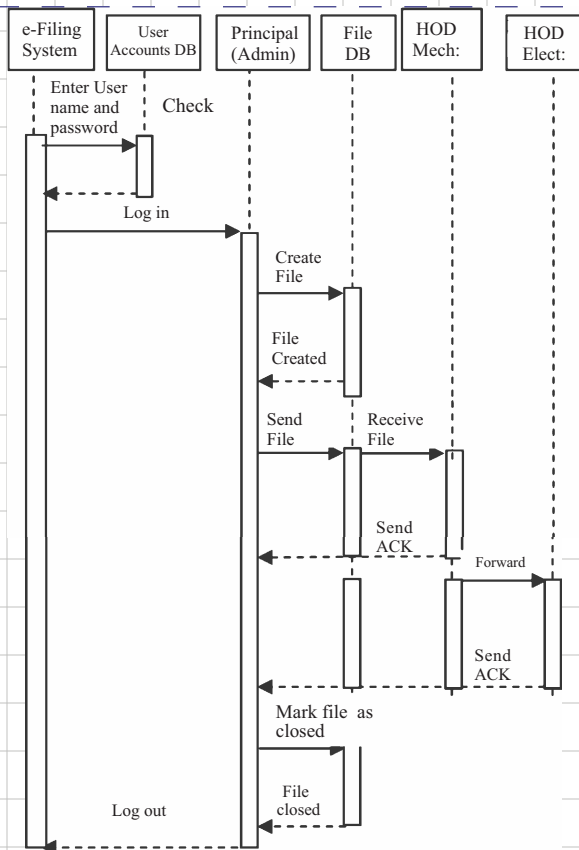


Fig. 3. Sequence Diagram Showing File Movement Process

V. RESULTS

Results are acquired on the basis of experiments and assessments by a group of five users. All are male officials. Their ages are 26, 31, 32, 43 and 47. These users are selected from different offices of different ranks on the basis of their heavy engagement in manual file work. They have performed various functions more than or equal ten times and accuracy was recorded.

A. User Interface of the System

User interfaces of the system are kept simpler and well organized. Below is the login window of the system. User has to enter user name or email address

and password.



Fig. 4. Log in interface of the system

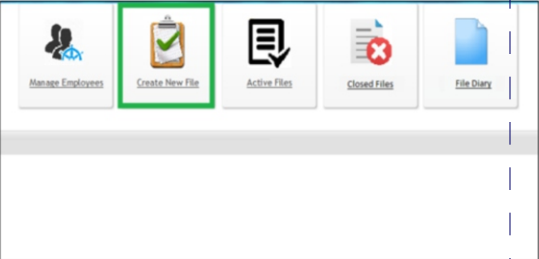
Home screen window for Administrator and all other users is available with buttons of create file, active files, closed files, files diary and log out. Create new file button is used to create new files. Active files include both outgoing and incoming files which are in process of completion. In Create file interface, user can set due date for completion of file, priority, file type, file name, number and can write on note sheet.

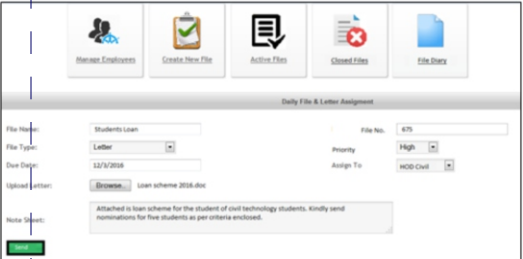
B. Experiments

Experiments were performed to determine accuracy of various functions of the system. The main functions of the system are creating a file, sending a file, forwarding a file, writing on note sheet, setting & observing deadlines, marking file as closed, searching a file and SMS follow up function. Ten attempts were made on performing each function by a group of five users and accuracy was recorded for each attempt. All experiments are described in detail.

Experiment No.1: Creating and sending a file: File is created by clicking on “Create File” button and a window is appeared which requires various field to fill. File number, File Name, Due Date, Priority, and receiver (s) are entered. Document(s) are uploaded as attachment. After filling all these fields, send button is clicked and file is sent. Ten attempts were made on sending a file to various users from different users of the system after creating a file. Snapshots of the steps involved in this experiment are shown here in Fig. 7.

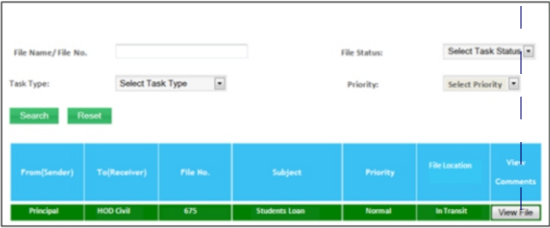
Experiment No.1:
Functions: Creating and Sending a file

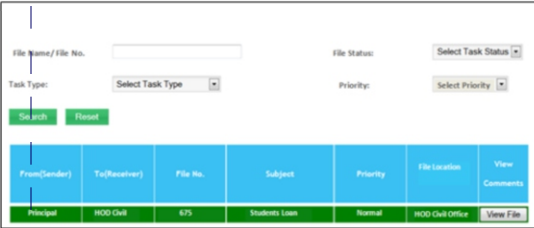




Step 1: This is home screen. Create New File is used to create new file and Active File button is used to view all active files. Closed Files contain all closed files. File Diary is used to verify physical transfer of file from one office to another. In this example case, admin is creating a file.

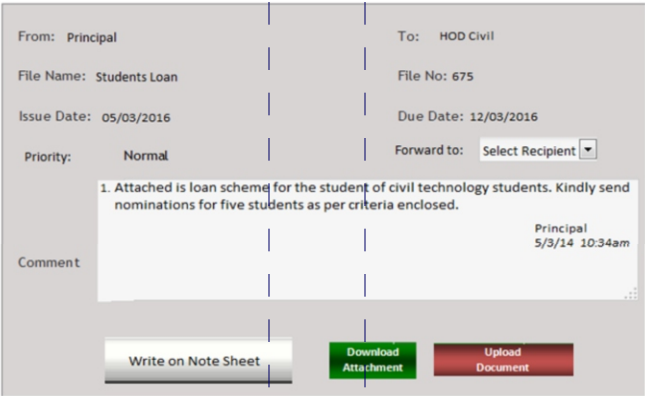
Step 2: Enter file name, select receiver, task type, priority and set deadline. Write on note sheet and click send. Here a file 'student loan' is created by admin and sent to HOD Civil.





Step 3: Click on active files and all send files will be displayed. Here the file 'Students Loan' with F. No. 675 can be seen. It is not received yet by HOD Civil office, hence it's in transit.

Step 4: File is received by HOD Civil office and diarized in file diary. The File Location status now changed to HOD Civil. The file can be viewed by clicking View File button.



Step 5: The receiver will open Active Files and all received files will be displayed. By clicking on View File, this window will appear. Attached document can be downloaded. After nomination of students, the HOD Civil (a user who received the file in example case) can upload the list of students, can write on note sheet and forward the file to principal. If the admin (principal) is satisfied with the information, he will mark the file as closed. In case of incomplete information, the admin will forward the file again to HOD civil.

Fig. 5. Example case of performing functions of creating & sending files

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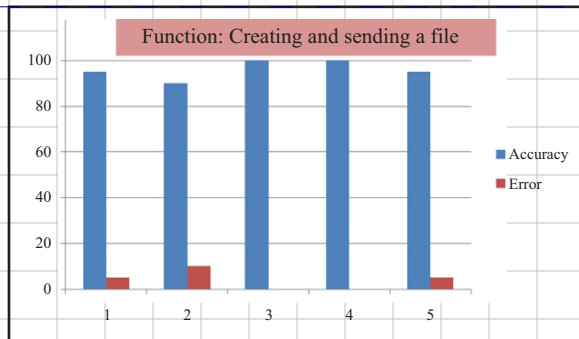


Fig. 6. Accuracy graph for creating and sending files

Experiment No.2: Forwarding a file:Ten attempts were made by each user on forwarding a file to other users. Three of them performed the function correctly. Detail results of the function are shown in below figure.

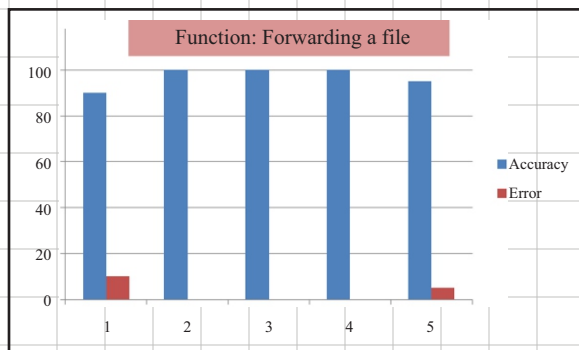


Fig. 7. Accuracy graph for forwarding function

Experiment No.3: Observing deadlines: Short duration deadlines were set for various files and were observed. Color bars were changed as programmed. 100% accuracy was observed for all deadlines.



Fig. 8. Observing deadlines accuracy graph

Same experiments were performed for file search; SMS follow up and close up of a file. 100% accuracy was observed for each function. Cumulative graph for all functions is drawn to show accuracy percentage.

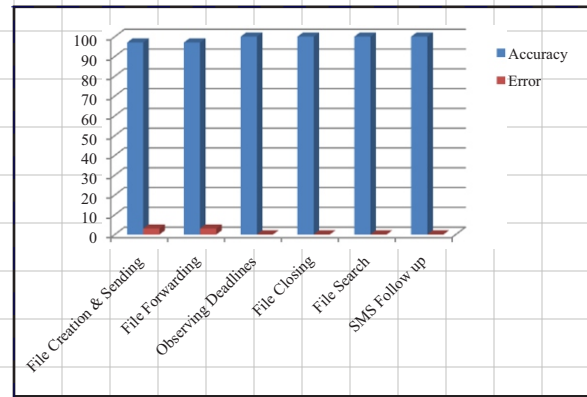


Fig. 9. Commulative accuracy graph for all functions

C. Survey for determining Usability and acceptability

A survey was launched to determine usability and acceptability. The survey consisted of two parts. One part for determining usability and the second part is for determining acceptability. The survey questions are shown below:

1. I think that I would like to use e-filing system frequently.
2. I found that the e-filing system is not unnecessarily complex.
3. I thought the system much easier to use.
4. I think that I would not need the support of a technical person to be able to use this system.
5. I found the various functions in this system were well integrated
6. The system was consistent in functionality.
7. I would imagine that most people would learn to use this system very quickly
8. I found the system procedures like manual file system and it made the system very quicker to understand.
9. I felt very confident using this system
10. I didn't needed to learn a lot of things before I could get going with e-filing system
11. I am able to perform all the operations with ease and convenience.

For all of the questions the following response scale was used.

- a. Strongly Agree
- b. Agree
- c. Neither agree nor disagree
- d. Disagree
- e. Strongly Disagree

The following results were collected through the survey:

TABLE IV
SURVEY RESULTS FOR USABILITY

Q#	Response Scale					Top Box (%)	Top 2 Box (%)	Agree (%)	CV
	SA	A	N	DA	SDA				
1.	2	12	4	2		10	70	70	22%
2.	3	12	3	2		15	75	75	22%
3.	4	11	3	2		20	75	75	23%
4.	4	10	2	4		20	70	70	28%
5.	4	11	5			20	75	75	17%
6.	4	12	4			20	80	80	16%
7.	5	13	1	1		25	90	90	18%
8.	6	11	2	1		30	85	85	19%
9.	5	9	4	2		25	70	70	24%
10.	5	10	2	3		25	75	75	26%
11.	4	10	3	3		20	70	70	26%
Cumulative Results						21	76	76	

SURVEY RESULTS FOR USABILITY

It is concluded that the system has higher usability. The agree percentage is higher than 75 for most of the questions. Commutative agree percentage is 76%. It can be seen that standard deviation is fair and users responses lies around mean which shows that questions were valid and understood by most of the users. The coefficient of various shows the likeliness of responses also.

Below are the questions for determining acceptability of the system.

1. The e-filing system is highly required for adding transparency, visibility and check & balance.
2. The e-filing system is not an extra burden over employees and neither it will be taken as wastage of time.
3. The e-filing system will improve the output of my work and will facilitate me in performing routine file work.
4. With the help of this system, I have greater control over my file work.
5. This product covers all critical aspects of file system
6. The results of the e-filing system would have to be tangible in order for you to view the system as a success.
7. This system will be not problematic in future for officials in any way
8. This product allows me to accomplish more work than would otherwise be possible.

9. All the checks & balance put on files for follow up of files are fair.

10. The overall impact of this system will be significant in improving the file work in the institution and will help officials in quick disposal of various tasks.

TABLE V
SURVEY RESULTS FOR ACCEPTABILITY

Q#	Response Scale					Top Box (%)	Top 2 Box (%)	Agree (%)	CV
	SA	A	N	DA	SDA				
1.	2	15	2	1		10	85	85	16%
2.	3	13	3	1		15	80	80	18%
3.	2	14	4			10	80	80	14%
4.	3	12	4	1		15	75	75	19%
5.	4	11	5			20	75	75	17%
6.	3	13	3	1		15	80	80	18%
7.	3	12	3	2		15	75	75	22%
8.	3	13	3	1		15	80	80	18%
9.	2	14	3	1		10	80	80	17%
10.	3	14	2	1		15	85	85	17%
Cumulative Results						14	80	80	

The survey results fairly indicate that e-filing system is highly acceptable. Agree percentage is higher than 80% for most of the questions.

Now comparative analysis of the proposed system with existing file management and tracking system is drawn in context of acceptability, usability, simplicity, enjoyability and some other functionality.

TABLE VI
COMPARATIVE ANALYSIS

Systems Factors	PIA System [12]	IDEAS [13]	CEFMA TIS [14]	Proposed System
Acceptability	Low	Medium	Low	High
Usability	Low	Medium	Low	High
Deadline Based	Yes	Yes	Yes	Yes
Follow up through SMS	No	No	Yes	Yes
Processing Recording through note sheet	No	No	No	Yes
Simplicity	No	No	No	Yes
Enjoyability	Low	Lower	Lower	High

V. CONCLUSIONS

In the proposed system, we have little more than just file tracking unlike other file systems discussed. Note Sheet of the proposed system records the processing of file as the file moves from one official to another. Deadline based file processing is included in the system. Follow up of files is carried out with automatic sms generation. Previous file tracking systems are complex in use. They are not usable in low digital literacy environment. The proposed system is intended to be e-replica of the manual system and processes are kept like manual of which the officials have better understanding. It makes the proposed system easier to use and highly acceptable.

The proposed system if implemented in government offices, will add transparency, visibility, in-time check & balance and proper follow up procedures to official work carried out on daily basis. As a result, public trust in government offices will be rebuilt.

VI. FUTURE WORK

The automation of Government Offices is of high importance for developing countries to enrich their governance. It is very important for developing countries to seek trust of their citizens into government institutions. This research has focused on highlighting the importance of this topic and finding ways of achieving an acceptable and usable system. There is great scope of further research in this area.

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