METHODS OF IMPROVING INTERNAL DOCUMENT CIRCULATION IN HIGHER EDUCATIONAL INSTITUTIONS USING INFORMATION AND COMMUNICATION TECHNOLOGIES

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Abstract: This in the article supreme education in institutions there is internal document rotation processes analysis Documents with at work there is disadvantages and complications illuminated , they modern information and communication based on information and communication technologies (ICT) improvement scientific basics and practical approaches showing is passed . In the study document templates dynamic to form based electronic document rotation system (EHAT) model offer mature , mathematical expression and practical efficiency is based on .

Keywords: electronic document rotation , higher education institution , ICT, system model , document template , automation .

Introduction

Modern information in society information from resources effective use them fast transmission , reliable storage and digital management current from issues to one Especially the higher education in institutions management and education processes large in size to the information justification this processes high at the level requires automation . In this internal document rotation system (IHAT) central place because it is the organization 's all level divisions between information exchange done increases .

Current to the day come many supreme education in institutions documents with work processes still traditional , that is paper in appearance or only partially digitized without take This is going on . in processes excess time and resources consumption , human to the factor related without errors probability high , documents loss or confused departure such as risks to the surface brings . From this besides , information of the flow consistency of documents status real - time monitoring and security issues enough at the level not provided .

Information and communication rapid development of information and communication technologies (ICT) development and this systems optimization and complete automation opportunity creates . In particular , electronic document rotation through the system (EHAT) documents create , confirm , save and archiving processes integration It is possible . This is not only efficiency increases , maybe management system transparency , speed and information safety provides .

This point of view from the point of view of this article supreme education in institutions there is document rotation processes current status analysis to do them based on modern ICT improvement and this through a new , dynamic , flexible EHAT model working exit with related problems solution to do focused .

1**. Available situation analysis** . Current at the time In universities there is internal document rotation processes following systematic problems with described :

> ➢ **Document of the standards non-standardization** – the same kind of order , letter or
>
>   application different for in appearance from templates usage them in filling subjective

to the approach reason This is a kind kind of in documents content , structure and by format inconsistencies brought releases .

➢ **Many step by step confirmation processes** – each document , especially command orders , 3–5 leaders from the level It will pass . This is document rotation process to the slowdown , some in cases and stop to stay take comes . Processes strict lack of automation because of human factors (for example , a leader's from work empty to be) big role plays .

➢ **Control and observation weakness** – document where who is it by seeing how is it made decision acceptance done a unified monitoring system for there is not being document in the cycle transparency to provide opportunity This is not true . lost or to change encountered documents to determine makes it difficult .

➢ **Archiving and wanted difficulties** – there are in systems documents paper in the form of or simple file in the system This is stored . them from the archive find , historical versions to determine , or statistic analysis to do opportunities limits .

➢ **Statistical analysis of possibilities shortage** – available in case which kind of documents how much at speed who is spinning by more errors happened is being done , the most many appeal being done sections which ones such as important questions unanswered leaves . This reason – information unstructured and to analysis ready it's not .

2. Proposal being done solution

➢ **Internal document** rotation processes optimization and complete automation for the purpose Document Templates Speaker Shaping (HADSH) mechanism based on worker intellectual electronic document rotation system (EHAT) model offer This is solution of the system flexibility , realistic timely management and analysis opportunities to provide service does . Model following main from components consists of :

➢ **Modular user interface** is component through users system with each other to contact It is a web application . in the form of working exited , user work environment intuitive management opportunity Interface documents create them edit , send and observation opportunities presented will reach .

➢ **Speaker template mechanism** – document templates static not a real need and to the context looking at automatic This mechanism is formed . user's position , document type and to the situation looking at suitable fields and structure automatic Also , templates versions management and from them again use opportunities there is .

➢ **Document flow automatic direction algorithm** – this algorithm user authority and organization to the structure based on each document the optimal direction for This defines . Through this confirmation processes automatic in a way necessary person or to the department is transmitted , this and time to save and human of factors to decrease take is coming .

➢ **Versions management and document history storage** – each in the system of the document all changes history as This option is saved . not only audit and inspections for important , maybe mistakes determination and previous to versions return also allows .

➢ **Statistical reports automatic preparation** – system through harvest was information based on automatic accordingly analytical and statistic reports This is for the

management . decision acceptance in doing operative and reasonable information presented will reach .

➢ **Offer being done solution not only technological news** , maybe management culture transformation point of view relevant from the point of view of This model is considered to be a for adapted , intelligent , adaptive and to analysis directed approach in itself embodied will reach .

The EHAT Model main components diagram shown in Figure 1 below . (EDMS Model: Core Components Diagram)

1. Modularized User Interface
➢ **Web application** through intuitive management .
➢ Features : Document create , edit , send , monitor.

2. Dynamic Template Mechanism (HADSH)
➢ **In context suitable** fields (position , document type).
➢ Versions management and again use .

3. Document Orientation Algorithm
➢ **Automatic routing** (authorities + organization structure).
➢ Real at the time confirmation processes .

4. Versions Management
➢ Each change **history** and auditability .
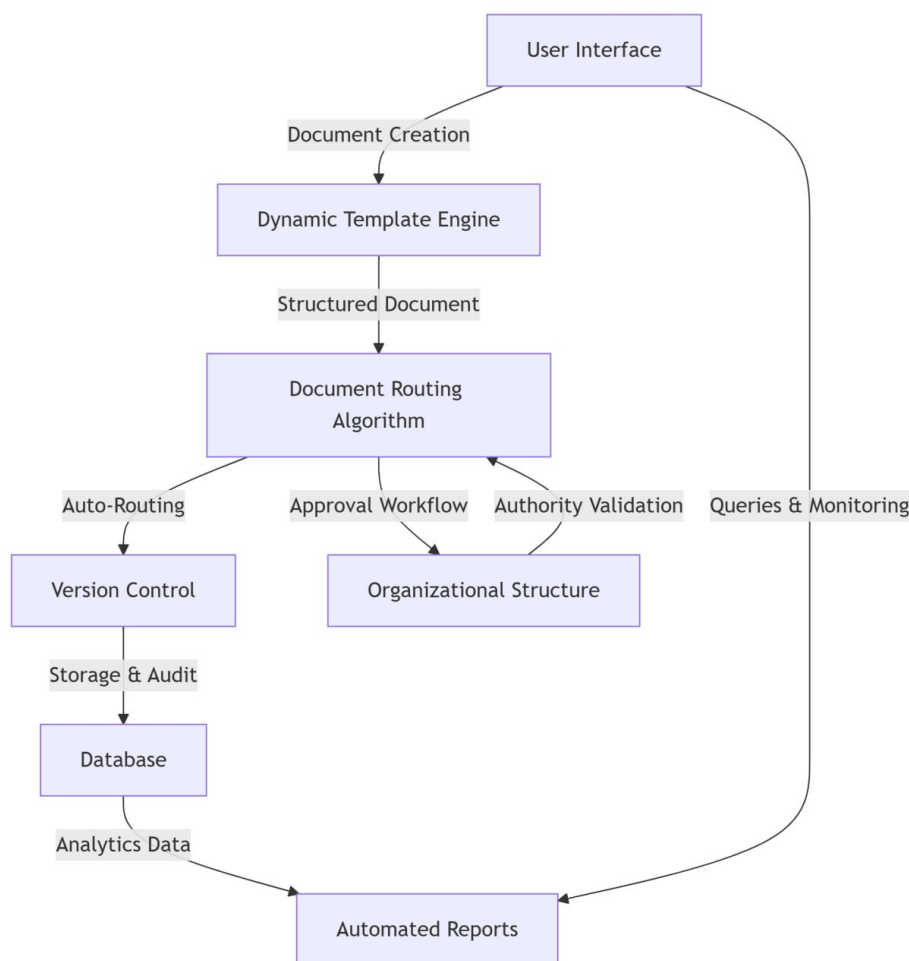➢ Errors correction for previous to versions return

5. Automatic Reports
➢ From the data **statistic analyses .**
➢ Decision acceptance to do for visual dashboards .

6. Integration
➢ Organization structure and information base with continuous communication .

3.Fundamental of mathematical modeling

Electronic document rotation the operation of the system (EHAT) mathematician in terms of modeling for following generalized functional from the expression used :

$$Y=F(X,R ,M,A)$$

This on the ground :

- ➢ **X — incoming document** : user by to the system included document or This component is document form , structure , content and attributes own inside He enters . your information elementary point organization will reach .
- ➢ **R — internal powers package** : system of users roles , rights and powers according to determined rules set . This component user movements limits and document on who how action to do possible defines .
- ➢ **M — external information sources** : system activity for necessary was external information (e.g. , state registers , data bases , other organizations systems and others). This component real time to the system in mode additional context or facts with enriched decision acceptance to do opportunity gives .
- ➢ **A — algorithmic-mathematical** supply database : documents again performance , analysis to make , decide acceptance to do or automated the results harvest to do for used algorithms , rules , mathematics models and car study modules set . This component the " intelligence " part of the system organization will reach .

> **F — information flow manager complicated function** : this component all above incoming parameters combine them designated in order again works and necessary exit document creates a function F deterministic or uncertain (stochastic) nature has to be possible , system inside flows , rules , templates , and logical chains operates on the basis of .

> **Y — exit document** : system by automatic accordingly or user in the presence of working issued consequential document . This document in appearance ready order , decision project , information letter or other official document to be possible .

Model's scientific This model is **informational** . system performance **composition** in a way to modeling opportunity It gives access . from the data starting from , inside and external factors into account received without , final exit until creation was **information flow** clearly This gives approach following scientific to principles is based on :

1.Systematicity : the model is all structural of parts each other dependence and they between information flow represents .

2.Deterministic and uncertainty with performance : algorithmic bases various kind from methods (rules based on systems , neuron networks , statistics analysis) using each kind in complexity situations manages .
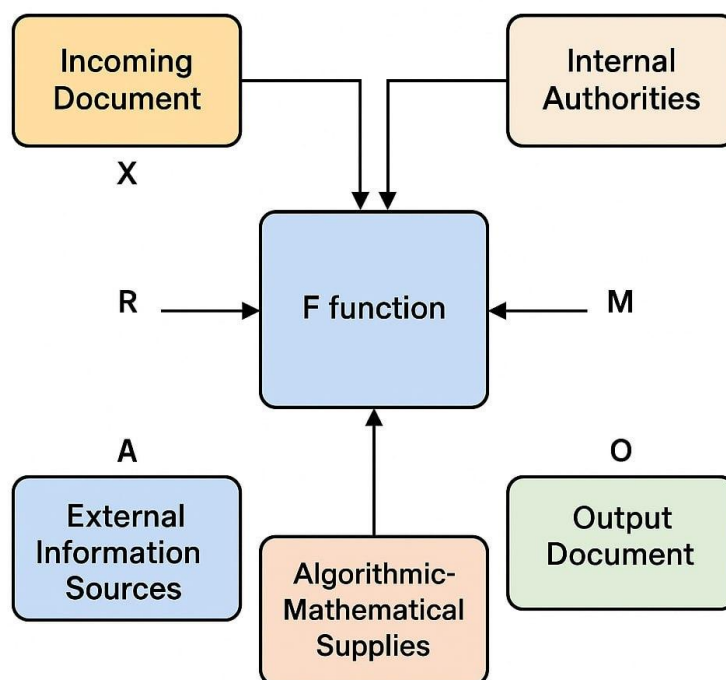
3.Flexibility : external sources and algorithmic base dynamic update of the system modern to the requirements to adapt opportunity creates .

4.Decisions automation : model user without participation decision release or document preparation opportunity gives , this and human from the factor dependency reduces .

$Y = F (X , R , M , A)$ in the form of mathematician model , electronic document rotation systems main functional mechanisms descriptive modern and flexible approach It represents a complex information systems for modeling , analysis and automation opportunities Creates a . Using the model system efficiency increase , security provide and human to the factor connection reduce goals in sight is being held .

This model based system architecture diagram shown in Figure 2 below .

4. Scientific news. Research within working issued method and approaches one how many important scientific the news own inside They will take . modern electronic document rotation systems intellectual and adaptive at the level organization to reach service does :

1. Dynamic template formation idea based on flexible module working Traditional in systems document forms and directions strict static to the standards based if this in approach **flexible template generator** working This module is user context , document type and external conditions into account received without **automatic accordingly new templates creates or existing ones** This **approach** artificial intelligence (e.g. , Bayes classifiers or clustering algorithms) with enriched to be possible .

2. Documents flow powers based on automatic is redirected . In the system users and organizations hierarchy based on **powers model** created . Each user's role , permission level and functional obligations based on of documents automatic in a way necessary to the address orientation This approach is using human to the factor dependency decreases , errors and excess delays eliminate This is function **to the role based routing mechanism** through done is increased .

3. Functional and counts to the theory based develop a mathematical model The EHAT system internal logic **mathematician devices — functional analysis and counts theory** using Modeled . Documents flow , user movements and directions system count in appearance expressed , each node — user or block , each edge — document flow This approach through optimal routes in the system detection , network download evaluation , and stagnation analysis transfer possible will be .

4. Document versions and user of their actions logs based on observation system current Documents and users real- time actions in mode **log files in the form of** This **is stored** . logs based on :

  ➢ Documents versions history recovery ;

  ➢ Of the movements consistency analysis to do ;

  ➢ Unacceptable activity to determine ;

  ➢ Audit and security control done increase possible .

Tracking system modern **log analysis technologies** (ELK stack, event correlation, statistical using regressions) is being built , this and of the system reliability and transparency increases .

Offer done approach via :

➢ EHAT systems **intellectual , flexible and safe** performance provided ;

➢ **Innovative theoretical approaches** (graph theory , functional modeling , powers analysis) into practice implementation is being done ;

➢ This is there is from systems column was new generation document rotation systems to create service does .

5. Practical results . Research within working EHAT prototype test environment released under the circumstances from the test Test was conducted . results of the system efficiency and practical usefulness following in aspects clear showed :

1. Documents seeing exit and confirmation time by 40% has been reduced . In the system of documents automated routing and notification mechanisms current to be as a result :

➢ Document rotation human to the factor less related it has been ;

➢ Decision acceptance to do stages shortened ;

➢ The document confirmatory to the person straight away redirect on the road was put .

As a result , the overall **confirmation cycle by 40% accelerated** , this and important management of decisions own on time acceptance to be done provided .

2. Paperweight usage by 60% decreased . EHAT system all main documents digital in format create , confirm and archiving opportunity gave . This:

➢ Paper consumables , printer, copier , and other to resources was need reduced ;

➢ Ecological to stability contribution added ;

➢ The organization operational expenses noticeable at the level reduced .

Other so to speak , **traditional paper 60% of the turnover digital documents with to replace achieved** .

3. Archiving and search through work load relieved . In the system of documents **electronic indexation and cataloging** functions current done They are :

➢ Necessary the document one how many per second find opportunity gives ;

➢ In the archive saved to materials fast and orderly appeal to do provides ;

➢ Administrative workers and office of employees excess download relieves .

As a result , **the search and again work according to work load much decreased** , this and employees efficiency increased .

4. User mistakes and uncertainties by 36% decreased . System users movements control who :

➢ To the authority based restrictions ;

➢ Automatic shapes filling ;

➢ In context suitable recommendations ;

➢ And errors in real time in mode determiner mechanisms with equipped .

This As a result , the user by :

➢ Wrong information input ;

➢ The document wrong to the address send ;

➢ Or unauthorized entrance cases **By 36% shrunk** .

This is general system safety and accuracy noticeable at the level increased .

Offer The prototype of the EHAT was implemented in real conditions from the test when transferred , the **work efficiency increase , resources economical , and human to the factor related mistakes reduce** regarding high to the results This has been achieved . practical results of the system further wide current to be for reliable basis become service does .

Below offer done **EHAT prototype** according to test results **table in appearance** presented Each table contains measurement according to achieved results clear in percentages shown :

No.	Indicator name	From the test previous situation	From the test next situation	Result (in percent)
1	The document seeing exit and confirmation time	100%	60%	**40% reduction**
2	From paper use level	100%	40%	**60% reduction**
3	Work download (archive / search) in process)	High	Average / low	**Efficiency increased**
4	User mistakes and uncertainties	100%	64%	**36% decrease**

Conclusion

High education in institutions internal document rotation processes **information and communication technologies (ICT)** based on improvement , not only work processes efficiency increases , maybe whole management system **digital ecosystem** requirements suitable to the point to bring service does .

Research within offer done **dynamic template model** in the activities of universities :

➢ **Transparency** — every of the document direction and confirmation clear observed ;

➢ **Speed** — information exchange and decision acceptance to do processes accelerates ;

➢ **Observability** — user movements and document versions complete audit is maintained

This approach his/ her own **scientific based on , technological to solutions reliance and organizational flexibility** with separated The model is **universality** and any of it in the direction supreme education in institutions successful implementation to grow opportunity As a result , education management field modern digital transformation requirements based on quality in terms of new to the stage rises .

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