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SCIENTIFIC ARTICLE (SPANISH)

TOPIC:

COMPARATIVE STUDY OF FREE SOFTWARE TOOLS FOR DOCUMENT
MANAGEMENT IN ADMINISTRATIVE DEPARTMENT OF MUNICIPAL
GOVERNMENT OF PEDRO MONCAYO (TABACUNDO).

AUTHOR:

STALIN MARCELO SALGADO GARCÍA

HEAD TEACHER:

Ing. Marcelo Jurado

Ibarra – Ecuador

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Comparative Study of Free Software Tools for Document Management in the Administrative Department of the Municipal Government of Pedro Moncayo (Tabacundo).

Author-Stalin Marcelo, SALGADO GARCÍA

Municipal Government of Pedro Moncayo May 24 and Jerusalem, Malchinguí, Tabacundo, Pichincha

munipm@pedromoncayo.gob.ec

Summary. The Municipal Government of Pedro Moncayo is a public institution dedicated to providing services to benefit the people of Tabacundo, ensure the welfare and by development each of its people for the benefit of the institution and of the other. In the Systems Department has implemented a document management system to automate the documentation process in the Administrative Department thus achieving handle properly the workflow of documentation within the same; and also optimize resources and time when accessing to documents.

Keywords

Automation, Processes, Documentation

Resumen. El Gobierno Municipal de Pedro Moncayo es una institución pública dedicada a prestar sus servicios en beneficio del pueblo de Tabacundo, velar por el bienestar y por el desarrollo de cada uno de sus habitantes para beneficio de la institución y de los demás. En el Departamento de Sistemas se ha implantado un sistema de gestión documental para automatizar el proceso documental en el Departamento Administrativo logrando de esta manera manejar adecuadamente el flujo de documentación dentro del mismo; así como también optimizar recursos y tiempo al momento de acceder a los documentos.

Palabras clave

Automatización, Procesos, Documentación

1. Introduction

Currently in the Municipal Government of Pedro Moncayo; especially in the Administrative

Department documentation in a disorderly and especially without out the administration documentation properly and timely. In view of this situation, the implementation of a documentation system is required that automates the process of managing documents quickly and efficiently; so the user to optimize time and resources in managing information.

Currently the municipality of Pedro Moncayo has a system follow up which is implemented in the Systems Department of the institution for use by the various departments.

Is important to mention that the municipality has large volumes of documentation; same can be lost or altered but handled in an organized and timely. for this reason it is important to use a tool to manage documentation quickly and efficiently.

As mentioned above the problems caused evidenced by the excessive use of paper in the administrative department and lack of control in the flow of documents in the same; which makes a lot of time and resources is lost when accessing documentation seriously affecting the normal development of the users in the practice of their daily functions.

This project is intended automate document management processes in the Administrative Department of the Municipal Government of Pedro Moncayo through a comparative study of free software tools that enable managing documents and successfully adapt to current flows of information in it.

The direct beneficiaries of the implementation of the documentary system are the users responsible for managing all information concerning the administrative department as well as users who are part of the departments dependent; optimize time allowing access to documents, paper saving and environmental conservation; and especially the automation of processes and document workflows.

It is also important to note that by automating document processes Administrative Department effectively improve service document management and especially to optimize the access time to documents ; thus achieving occupy time in other departmental functions each of the more productive users.

For the implementation of the document management system will use the following tools:

- JDK
- PostgreSQL Database
- Nuxeo Document Management
- Application server Tomcat 7

2. Materials and Methods

The project was carried out by a comparative study of document management tools for free use; analyzing certain parameters and indicators to access each. The document managers under study are KnowledgeTree, Alfresco, Nuxeo and LetoDMS.

Parameters: These numbers are considered indispensable and guidance to achieve evaluate or assess a situation.

Indicators: Signals are used to provide data or information about a given situation.

The parameters and indicators considered for the comparison and evaluation of each documentary tools are listed below:

Parameter:

Usability

The documentary tool should be easy to use and meet the needs of the user.

Indicator:

Usability

The main interface and menus, submenus, and other components determine the ease or difficulty of the tool.

Interface Design

The tool should ergonomics and chords colors chords the user need.

Parameter:

Managing Users and Groups

The tool must have assurances to assign to each of the users access permissions depending on the rol with the use of the same to access the information.

Indicator:

Easy management of users, groups and workspaces

The tool should allow create, modify, delete users, groups and workspaces.

Easy Management of permissions

Tool capacity assigning permissions each of the members user groups well as independent users to allow or restrict access to information.

Parameter:

Customizing

The document management tool can be adapted and customized according to the requirements of the institution.

Indicator:

Easy adaptation of main interface

How the tool allows adapting the main interface according requirements of the institution.

Easy to edit themes or colors

Determines the range of colors or themes you have the tool to modify according to the requirements and needs of the institution and may be configurable.

Parameter:

Life cycle management of documents

The tool should allow to determine the time at which the documents should remain in the system and when it should be disposed of after completing their management process.

Indicator**Conservation**

The tool establishes standards for the conservation of the document to finish the process.

Elimination

The tool allows to determine the time at which a document must remain in the system or be displayed until the next automatic deletion.

Record

The tool must provide reports or records of the process that has had a document.

Parameter:**Creating Workflows**

The tool must allow workflows to create documents for different users of the system.

Indicator**Simple Workflow**

The tool allows to create workflows for documents.

Advanced Workflows

The tool should allow creating shared workflows.

Parameter:**Content Management**

The administration tool that provides in the management of content stored in the repository.

Indicator**Create Content**

Capacity of the tool creating content for: Manual, Automatic and Drag & Drop.

Content Flow

Keep track of the history and the different versions of the content.

Editing Content

Edit content and modify either offline or Internet connection.

Parameter:**Search**

Quick search and view documents offered by the tool.

Indicator**Search Navigation**

Allowing search through the navigation area.

Search for Content

Allow search by title, date and within the body or content of the document.

Advanced Search or metadata

Allow search by means of fields, values, or metadata that is part of the document content.

Parameter:**Repository**

The configuration of the database used by the document management tool.

Indicator**Types of Repositories**

Supporting RDBMS (Relational DataBase Management System) and integrated production.

Configuration

Capacity use tool required RDBMS.

Parameter:**Portability – Scalability**

Evaluate whether the tool is adaptable to different platforms and architectures.

Indicator**Platform**

Allow to perform installation on any platform or operating system.

Plugins

Add new functionality or architecture programs.

Parameter:**License**

Assess how the management tool was acquired.

Indicator**License**

Determines the license or use of the document management tool.

Distribution Form

Represents distribution forms or versions in which the document management tool is presented.

Parameter:**Support**

The tool should allow support through wikis, forums, communities, and other documentation.

Indicator**Community**

It refers to the support that each community document management tools offered to users.

General Documentation

It refers to the various means that each tool to provide documentation, tutorials, user manuals, videos, users practical examples.

Once discussed each comparison parameters and indicators to assess; is important to analyze each document to select the tool that best suits the needs of the Administrative Department of the Municipal Government of Pedro Moncayo.

Each of them is assigned a percentage according to the importance of each of these parameters should be for a document management solution meets the main requirements for its good performance. The totalized percentage is taken from 1 to 100% according to the most important parameter in a document management system.

Then each of the parameters and the percentages allocated according to the level of significance is shown:

Parameter	Concept	Percentage (%)
Usability	The document management tool is easy to use for the user.	10 %
Managing Users and Groups	The security provided by the tool to assign permissions to users and groups, allowing each of them is assigned interface and workspace to access information.	15 %
Customize	The document management tool can be adapted and customized according to the requirements of the institution.	5 %
Life Cycle Management of Documents	The tool should allow to determine the time at which the documents should remain in the system and	10%

	when it should be disposed of after completing their management process.	
Creating workflows	The tool must allow workflows to create documents for different users of the system.	15%
Content Management	The administration tool that provides in the management of content stored in the repository.	10%
Search	Quick search and view documents offered by the tool.	15%
Repository	The configuration of the database used by the document management tool.	5%
Portability Scalability	Evaluate whether the tool is adaptable to different platforms and architectures.	5%
License	Evaluará la forma en que la herramienta de gestión documental fue adquirida.	5%
Support	The tool should allow support through wikis, forums, communities, and other documentation.	5%
TOTAL:		100%

Table 1. Parameters Assessment Document Management Tools

Source: Author

To evaluate the indicators that are part of the comparison of each of the parameters discussed above; each indicator according to their level of acceptance will have a numerical value ranging from 0-4 points as shown in the following table:

Characteristics	Points
Deficient	0
Inefficient	1
Limited	2
Efficient	3
Very efficient	4

Table 2. Scores for indicators established

Source: Author

Once raised the scoreboard is important to analyze each of the indicators based on the parameters taken into account to evaluate each of the tools.

Indicator Analysis

Ease of Use Parameter

Indicators	KnowledgeTree	LetoDMS	Nuxeo	Alfresco
Ease of Use	2	4	4	3
Interface Design	2	4	4	3
TOTAL:	4	8	8	6

Table 3. Parameters Ease of Use

Source: Author

Parameter Managing Users and Groups

Indicators	KnowledgeTree	LetoDMS	Nuxeo	Alfresco
Easy management of users, groups and workspaces.	2	3	4	3
Easy Permissions Management	3	3	4	2
TOTAL:	5	6	8	5

Table 4. Parameter Managing Users and Groups

Source: Author

Parameter Customization

Indicators	KnowledgeTree	LetoDMS	Nuxeo	Alfresco
Easy adaptation of main interface	2	3	4	3
Easy to edit themes or colors	2	3	4	3
TOTAL:	4	6	8	6

Table 5. Parameter Customization

Source: Author

Parameter Lifecycle Management Documents

Indicators	KnowledgeTree	LetoDMS	Nuxeo	Alfresco
Conservación	3	3	4	4
Eliminación	4	4	4	4
Historial	4	4	4	4
TOTAL:	11	11	12	12

Table 6. Parameter Lifecycle Management Papers

Source: Author

Parameter WorkFlow Creating

Indicators	KnowledgeTree	LetoDMS	Nuxeo	Alfresco
Simple Workflow	3	3	4	3
Advanced Workflow	2	2	3	3
TOTAL:	5	5	7	6

Table 7. Parameter Creating WorkFlows

Source: Author

Parameter Content Management

Indicators	KnowledgeTree	LetoDMS	Nuxeo	Alfresco
Create content	2	2	4	3
Content stream	3	3	4	3
Edit content	2	2	4	3
TOTAL:	7	7	12	9

Table 8. Parameter Content Management

Source: Author

Parámetro Búsqueda

Indicators	KnowledgeTree	LetoDMS	Nuxeo	Alfresco
Search Navigation	0	4	4	4
Search for content	4	4	4	4
Advanced Search or metadata	4	0	4	4
TOTAL:	8	8	12	12

Table 9. Parameter Search

Source: Author

Parameter Repository

Indicators	KnowledgeTree	LetoDMS	Nuxeo	Alfresco
Types of repositories	1	1	3	3
Configuración	2	2	4	3
TOTAL:	3	3	7	6

Table 10. Parameter Repository

Source: Author

Parameter Portability – Scalability

Indicators	KnowledgeTree	LetoDMS	Nuxeo	Alfresco
Platform	4	4	4	4
Plugins	2	0	4	3
TOTAL:	6	4	8	7

Table 11. Parameter Portability – Scalability

Source: Author

Parameter License

Indicators	KnowledgeTree	LetoDMS	Nuxeo	Alfresco
License	4	4	4	4
Distribution Form	4	4	4	4
TOTAL:	8	8	8	8

Table 12. Parameter License

Source: Author

Parameter Support

Indicators	KnowledgeTree	LetoDMS	Nuxeo	Alfresco
Community	3	3	4	3
Documentation	3	1	4	4
TOTAL:	6	4	8	7

Table 13. Parameter Support

Source: Author

Based on the scores above has been determined results for each of the benchmarks that have been analyzed to determine the best document solution and it can be adapted to the needs of the administrative department to proceed with its implementation .

According to the parameters analyzed to compare document management tools proposed above has identified the following results summarized in the following table:

Parameter	Knowledge Tree	Leto DMS	Nuxeo	Alfresco	Puntajes Máximos
Usability	6,25%	10%	10%	7,5%	10%
User and Group Management	9,375%	11,25%	15%	9,375%	15%
Customization	2,5%	7,75%	5%	5,75%	5%
Life Management of Documents	9,17%	9,17%	10%	10%	10%
Creating Workflows	9,375%	9,375%	13,125%	11,25%	15%
Content Management	5,83%	5,83%	10%	7,5%	10%
Search	10%	10%	15%	15%	15%
Repositories	1,875%	1,875%	4,375%	3,75%	5%
Portability / Scalability	3,75%	2,5%	5%	4,375%	5%
License	5%	5%	5%	5%	5%
Support	3,75%	2,5%	5%	4,375%	5%
TOTAL:	66,89%	75,28%	97,51%	81,883%	100%

Table 14. Test Results percentage Parameters Document Management Tools

Source: Author

Document Management Tool				
Parameter Evaluation	KnowledgeTree	LetoDMS	Nuxeo	Alfresco
Usability	2	4	4	3
User and Groups Management	3	3	4	3
Customization	2	3	4	3
Lifecycle management of documents	4	4	4	4
Creating Workflows	3	3	4	3
Content Management	2	2	4	3
Search	3	3	4	4
Repository	2	2	4	3
Portability / Scalability	3	2	4	3
License	4	4	4	4
Support	3	2	4	3
Total:	31	32	44	36

Table 15. General Table of Results Document Management Tools

Source: Author

As can be seen from the above table has been determined that the best document management solution that meets all requirements is Nuxeo. All

parameters that have been proposed have been analyzed for each of the tools and Nuxeo is the tool that covers all needs and evaluation parameters for this reason it is an effective solution that will generate a good result the use of it in the administrative department of the municipal government of Pedro Moncayo.

For a more enlightened appreciation of the above table before then a statistical graph in which the above data are briefly detailed.

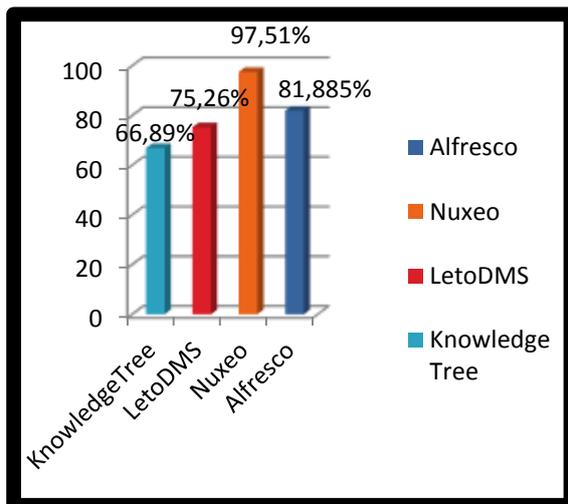


Figure 1. Statistical Analysis Results Chart de Document Management Tools

Source: Author

2.1 Tools

Once it has been determined that the best tool that fits the needs of the administrative department of the municipal government of Pedro Moncayo is Nuxeo; is important to know the requirements and tools needed for proper installation and operation.

The application server that will be used to proceed with the installation of Nuxeo document system is Apache Tomcat 7 is a web server that is built into the tool itself.

One of the essential requirements to proceed with the installation of Nuxeo Document Management is have installed JDK (Java Development Kit) which is a java development kit consisting of a set of tools (programs and libraries) that develop (compile, run, create documentation) program in java language; and

one of them is that Nuxeo is a free software tool for document management.

Nuxeo requires a database to store the information in the tool. This requires installing the manager PostgreSQL database that is freely usable software which is perfectly compatible with the document manager as it adapts to all its features and functionalities.

The document management system is implemented on Linux Centos 6 operating system; which is a system that works as a server. In addition to the proper functioning of the system is necessary to install openoffice to view documents on the web and for office documents.

One of the main functionalities required by users are able to view PDF documents; for this you need to install Pdfohtml. The use, display and rotate images on the web is achieved by installing ImageMagick software is free to use.

For editing and customizing Nuxeo is advisable to install Mercurial which allows to download the source code of the tool from its repository. Maven recommended for creating .jar files that can be added to perform customization on the server. Subversion to access a sample package of Nuxeo remotely; and finally Eclipse Helios which is a development IDE for testing and debugging via text editing task development.

All this integrated software allows the system to operate properly and smoothly, giving users a quick and timely access to gaining access to the documents.

3. Results

In a study of each document managers based on the comparison of parameters and indicators, selects a quality tool that meets all the functional requirements of the department to efficiently manage all documents and information in the same.

Nuxeo with 97.51% is the tool with better features and facilities to implement and ensure efficiency in the administrative department of the municipal government of Pedro Moncayo.

Considering that KnowledgeTree, and Alfresco LetoDMS handles a good user management and working groups; Nuxeo makes management of users, groups and work spaces easy to use and very customizable; thus achieving better access and restricted work spaces.

Based the content management can say that Nuxeo is done in an easy and orderly manner; You can also say that Nuxeo has important features such as Drag & Drop in version of the community; while in the other tools this feature is only available in the Enterprise version.

Although KnowledgeTree,LetoDMS and Alfresco performed optimal control of flow of documents ; Nuxeo makes flow control easier to use and in an orderly and intuitively achieving a proper use by the user documents.

Nuxeo and Alfresco have excellent search document implementation whether simple, advanced and in the content of the document. While LetoDMS does not allow metadata search; KnowledgeTree likewise does not allow the content search in the document; thus hindering the advanced search for a document.

Nuxeo, Alfresco and KnowledgeTree offer embedded database; plus you can choose a suitable manager Relational Data Base for operation in mass production and storage. While LetoDMS use MySQL as it is developed under the LAMP applications (Linux Apache MySQL and PHP). In Nuxeo just simply edit the nuxeo.conf file for configuration.

Nuxeo regarding the parameter of usability is very intuitive and easy to use as it has a clear user interface and easy; thus achieving a better result when handling this tool.

All studied document management tools can be installed on different platforms like Windows, Linux and MacOS; but taking into account scalability you can say that Nuxeo has an installation support and development of new plugins that will allow scalar and increase functionality to the tool. This is accomplished through a participation architecture(OSGI-based system Plugins); This means that the source code does not need to be altered as it works through extensions that can be added to the configuration and offer new features to the tool.

All tools are free software that is can be used with a license GPL (General Public License) does not represent any license cost for the institution. Likewise can be downloaded from each of the officials websites of document management tools where you can find documentation, manuals, resources, and others.

All tools that will have studied a community of users engaged in support, attention to questions

and solve technical problems. Also have manuals for both users and administrators to facilitate and enhance your use.

For access at system is necessary a computer and web browser Firefox preferably in higher versions at 5 ; in this way access to the system and the operation thereof for the user is not hindered.

The architecture of the application that shows each of integrated components and functionalities are presented diagrammed in the following figure:

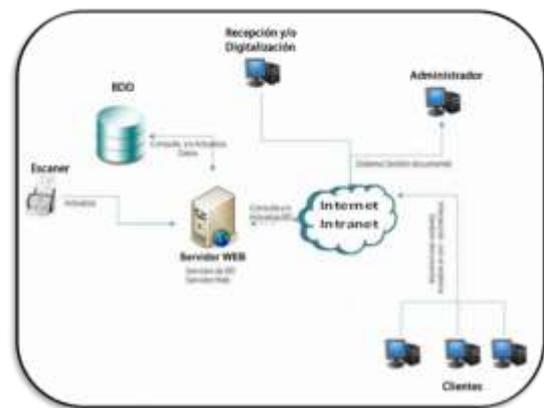


Figure 2. Application Architecture

Source: Author

The Documents are prepared and selected to scanning and digitizing; so is updated daily documents so digital; as well as they can be both physically and digitally back through the system.

Once digitized metadata are added to locate on the system later. Metadata are properties or characteristics assigned to documents so you can access them easily.

Documents are stored in the database which is updated dynamically if the user has made a change in the documents or in the information contained.

The application has a administrator user which is responsible for providing overall system configuration; ie have full control of it so that you can create groups, new users and assign permissions based on roles that each of them has.

All users can access the application with a user name and password which is provided by the documental system administrator. So the user can access the functionalities of the tool according to

the assigned role and the space through which it works.

In The following graph shows the distribution of departments dependent on Administrative Direction and as the network in this sector; get an idea of performance document management tool and the departments that will use the same.

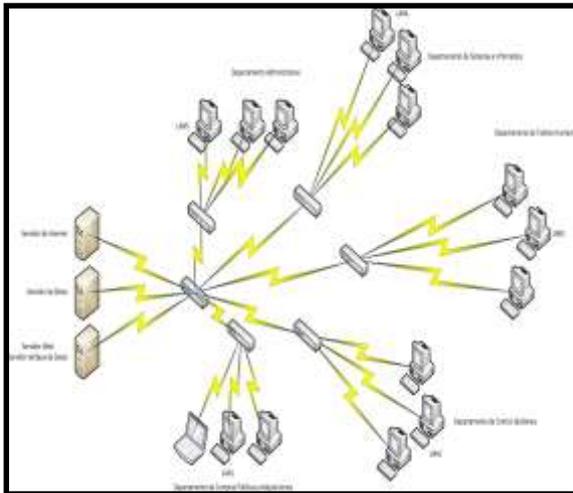


Figure 3. Network Infrastructure Administrative Department of the Municipal Government of Pedro Moncayo.

Source: Author

With regard to impacts and advantages of the documental system the following are presented:

Impact	Advantage
Social	Thanks to the implementation of the document management system has improved optimizing resources and improving the flow of documentation in the department and their dependents. User satisfaction by making use of the tool is very evident as the service is fast and efficient when accessing documents through the system. Users are more productive because they take their time in

	other institutional activities given that the system has improved document processes in the department.
Environmental	No pollution to the environment.
Economic	Optimization of resources in the purchase of physical filing cabinets and paper use in the administrative department. Saving time and improving document processes in the administrative department of the municipal government of Pedro Moncayo.
Technological	Improving the quality of software in the Municipal Government of Pedro Moncayo.
Educational	Increasing the capacity of teaching - learning through technology free software tools.

Table 16. Project Impacts and Benefits

Source: Author

4. Findings

Based on a comparative study of document management tools and a set of indicators is determined that the tool that best fits the needs of the Administrative Department of the Municipal Government of Pedro Moncayo is Nuxeo with 97.51%.

Nuxeo has an optimal search management as it has the ability to search the documents by fast search or advanced through metadata assigned to documents.

Workflows in Nuxeo is easy managed because makes treatment the documents neat and organized according to the activities that are part of the working group.

The tool used to implement the document management system is Nuxeo due to its great functionality and requirements Administrative Department for workflows management and documents

Through the tool Nuxeo Document Management it was possible to automate document processes the administrative department of the municipal government of Pedro Moncayo.

Thanks the documentation system Nuxeo was achieved automate the processes and improve the response times handling of documents in the Administrative Department.

The Deploying Nuxeo was performed on a Linux Centos operating system in the computer department of the municipal government of Pedro Moncayo.

For use proper and correct of the application, the tool was socialized to all users that will use it.

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I have been part of a project in my life who has successfully completed, thanks to those who were part of one work equipment that with the confidence and perseverance was carried out.

The Municipal Government of Pedro Moncayo, an institution that has supported IN the development of such projects that help improve and solve community problems with new alternatives and technology. An institution that has enabled me to finish my project with great openness and friendliness of all who make part this prestigious municipality.

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5. Recommendations

It is recommended to read the manual to make changes to the application if required.

It is recommended to make backups on external directories database application to counteract problems that may arise in the future.

Make use of free software tools as this avoids the cost of licensing and legal issues with the use of pirated software.

Maintain neat and undamaged the fourth server with adequate ventilation and temperature for the same.

Bibliography

Document Management

MediaWiki, *Gestión Documental*, 06 de Febrero del 2010, http://es.wikipedia.org/wiki/Gesti%C3%B3n_documental
Fundación Wikipedia, Inc. (2012). *Gestión Documental*. Wikipedia La Enciclopedia Libre, Licencia Creative Commons Atribución Compartir Igual 3.0. Recuperado de http://es.wikipedia.org/wiki/Gesti%C3%B3n_documental.

El Profesional de la Información (2006). *LA GESTIÓN DOCUMENTAL. Aspectos Previos a su Implementación, Volumen 3*. Recuperado de: <http://www.elprofesionaldelainformacion.com/contenidos/2006/mayo/8.pdf>

Bustelo Ruesta, C. (2007). *Gestión de Documentos. Enfoque en las Organizaciones*. En: *Anuario ThinkEPI 1*, 141-145. Recuperado de <http://www.thinkepi.net/gestion-de-documentos-enfoque-en-las-organizaciones>.

Document management systems in the Corporate Scope

MARTÍNEZ SÁNCHEZ, José M. y HILERA GONZÁLEZ, José R., *Los Sistemas de Gestión Documental en el Ámbito Corporativo*, España, 2003, pág. 238.

Casanovas, I. *Gestión de archivos electrónicos*; 2da ed.; Buenos Aires- Argentina; Alfagrama; 2008; Pag. 978-987.

Enterprise Content Management

Tecnología y Conocimiento (2011). Recuperado de <http://www.ibermatica.com/ibermatica/gestioncontenidos>.

Gestión Documental Inteligente (2013). Recuperado de <http://www.athento.com/gestion-documental-inteligente/>
Ossim (2008). Qué es la Gestión Documental. Recuperado de <http://www.tecnologiapyme.com/software/que-es-la-gestion-documental>

Nuxeo

Nuxeo Open Source Enterprise Content Management (2013). Administración de Contenido y Plataforma de Desarrollo. Recuperado de <http://www.nuxeo.com/es>

Document Management Nuxeo Platform (2013). Recuperado de <http://www.nuxeo.com/en/products/document-management>

Yerbabuena Software (2012). Manual de Usuario de Nuxeo 5 v1. Recuperado de <http://es.scribd.com/doc/91074458/Manual-Usuario-Nuxeo-v1>

Alfresco

Alfresco, Inc. (2013). Gestión Documental con Alfresco. Recuperado de <http://www.alfresco.com/es>

Fundación Wikipedia, Inc. (2012). Gestión Documental. Wikipedia La Enciclopedia Libre, Licencia Creative Commons Atribución Compartir Igual 3.0. Recuperado de <http://es.wikipedia.org/wiki/Alfresco>

Comparativa Alfresco y Nuxeo, Inc. (2012). Alfresco y Nuxeo. Recuperado de <http://blog.athento.com/2009/02/alfresco-vs-nuxeo-gestion-documental.html>

KnowledgeTree

KnowledgeTree, Inc.(2013). Gestión de documentos. Recuperado de <https://www.knowledgetree.com/>

KnowledgeTree, Inc.(2013). Gestión de documentos. Recuperado de http://www.knowledgetree.org/Main_Page
Gestor Documental para Pymes (2013). KnowledgeTree. Recuperado de

<http://www.tecnologiapyme.com/productividad/knowledge-tree-gestor-documental-para-pymes>

http://www.smileiberia.com/es/libros_blanco/gestion_documental_open_source/las_soluciones_de_gestion_documental/knowledge_tree

LetoDMS

LetoDMS (2013). Gestor Documental. Recuperado de <http://www.letodms.com/>

MyDMS (2012). MyDMS. Recuperado de <http://sourceforge.net/projects/mydms/files/>
<http://www.letodms.com/doc/doku.php>

LetoDMS (2013). Gestor Documental. Recuperado de <http://forums.letodms.com/Celcam> (Centro de Excelencia de Software Libre). Análisis de Aplicación LetoDMS. Recuperado de <http://www.celcam.com>

LetoDMS (2013). Gestor Documental. Recuperado de <http://www.letodms.com/doc/doku.php?id=install:require>

GNU (2012). Software Libre. Recuperado de <http://www.gnu.org/licenses/gpl13.0.html>

About the authors...

Author – Stalin M. SALGADO

I was born on August 22, 1985 in Santo Domingo de los Tsáchilas; primary and secondary I studied at the Salesian Educational Unit "Domingo Sabio" in the city of Cayambe; my vocational studies performed at the Technical University of Northern Ecuador Ibarra; as a student of the School of Engineering in Systems.

