TECHNICAL REPORT

ISO/TR 22957

First edition
2009-12-15

Document management — Analysis, selection and implementation of electronic document management systems (EDMS)

Gestion de documents — Analyse, choix et mise en œuvre de systèmes de gestion de documents électroniques (EDMS)

Reference number
ISO/TR 22957:2009(E)

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

In exceptional circumstances, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example), it may decide by a simple majority vote of its participating members to publish a Technical Report. A Technical Report is entirely informative in nature and does not have to be reviewed until the data it provides are considered to be no longer valid or useful.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO/TR 22957 was prepared by Technical Committee ISO/TC 171, *Document management applications*, Subcommittee SC 2, *Application issues*.

Introduction

This Technical Report provides detailed information associated with the analysis, selection and implementation procedures associated with electronic document management systems (EDMS). The development of this Technical Report is a result of organizational requests to receive vendor-neutral industry information associated with technology standards, technical reports, guidelines and best practices related to project activities.

Terms and acronyms associated with various aspects of EDMS technologies commonly change over time, as technology developers and vendors update product lines and solutions to address customer requirements. In most cases, the new terms and acronyms reflect updates and changes to how these technologies are used, incorporating additional levels of functionality, and they are very rarely a result of an entirely new core technology. This is important to note, as the core EDMS technologies are constantly maturing and solution providers are not only identifying new approaches to addressing organizational issues and requirements, but also expanding the use of these technologies into areas previously unconsidered.

For purposes of discussion, the terms "document management" and "content management" can be considered to be synonymous. As the electronic content management industry (previously referred to as the document management industry) has matured over the years, the ability to store electronic information has greatly expanded from hard copy document scanning into digital images in the early 1980s, to the management of any digital or electronic document that today is referred to as electronically stored information.

It is important to note that as the various technologies associated with storing and managing electronically stored information continue to mature and change, terms and acronyms will continue to change and, at times, be used to denote something different than previously used in the past. As such, organizations are constantly challenged to keep pace with how an updated technology is currently being referenced, especially when the same core technology is referenced differently between vendors, and at times various groups of suppliers.

The first section of this Technical Report provides detailed information describing each of these technologies, and how they operate and inter-operate.

The second section of this Technical Report provides detailed information associated with currently available industry standards and technical reports.

The third section of this Technical Report provides detailed information related to industry best practices associated with all the customary project phases for EDMS technology analysis, selection and implementation. These project activities are considered to be industry best practices. It has been demonstrated over the past 10 years that organizations following all the recommended steps and activities have a much greater level of project success while greatly decreasing, and in most cases, eliminating unnecessary technologies, user licenses, etc. This is very important, especially with most organizations carefully examining all expenditures related to technology procurements.

This Technical Report provides detailed guidance to organizations considering the use of any of those technologies that comprise EDMS (document imaging, document/library services, routing//workflow, records management applications, forms management, enterprise report management, etc.). A complete records management programme is critical to any organization and is integral to any complete and thorough management plan associated with electronic information, regardless of whether it is internally referred to as a "document", "record", "audio", "video", etc., by the organization.

All relevant project steps, tasks and activities contained within this Technical Report, together with compliance with relevant industry standards and guidelines, should be examined and "certified" by the technical implementation team as being in compliance with these industry best practices, thereby ensuring, especially for organizations that are required by government codes and/or regulations, that industry best practices, guidelines, and/or standards established by ANSI, AIIM, and/or ISO are followed.

The term “electronic document management” used throughout this Technical Report is intended as an “all-encompassing” term referring to inputting technologies [scanning, indexing, optical character recognition (OCR), forms, digital creation, etc.], management technologies (document services, workflow and other work management tools) and storage (primarily non-alterable or write-once read-many) technologies. This Technical Report provides information to users related to what technical reports, guidelines and standards have been developed for technologies commonly available in document management systems.

Over the years, the industry has utilized various terms and acronyms to describe these core technologies, including, but not limited to,

— technology utilization,

— eCommerce,

— content management,

— B2B,

— P2G,

— G2G,

— knowledge management,

— EDMS,

— ECM,

— ERMS,

— EDRMS,

— EC3M,

— WCM,

— BPM,

— etc.

It is important for organizations to recognize that technology vendors commonly develop new terms and acronyms to present updated product technology and new uses for existing technologies. While these applications and/or products typically provide additional level of functionality, they are still based on at least one of the following core EDMS technologies, including

— document/library services,

— document imaging,

— forms management,

— routing/workflow, and

— ERM.

Additionally, it is important for organizations to recognize that many acronyms have different meanings, depending on which industry and/or organization is using those terms. For example, the acronym BPM is used to describe business process management, which is a process undertaken by the organization, is also used to

reference business process modelling, and is currently being used by some vendors and vendor-specific organizations to redefine workflow. The use of this term is a good example of how vendors re-use terms commonly utilized by the industry for other purposes. Throughout this Technical Report and specifically in the document subclauses describing various implementation process and activities, the business reviews how processes function and how the organization manages these business processes. From that perspective, the entire lifecycle of any EDMS project can be referred to as business process management. This is not to indicate that there can be only one definition for any term, but it is necessary for organizations to consider carefully the context in which the vendors/suppliers are using these redefined terms to ensure the desired/anticipated technology is implemented.

Another example is the use of ERM, which is used to describe electronic report management, but is also used by records managers to describe electronic record management. This Technical Report provides information related to those terms and acronyms recognized by the document management industry that best describe the underlying technologies, enabling readers to have a foundation from which they can determine what is required by the organization, regardless of the product name or acronym used by various vendors.

This Technical Report is not intended to be an all-inclusive paper on electronic document or content management and does not attempt to influence any single technology or provide legal guidance or legal opinions. While there are storage technologies other than optical/magnetic currently available (i.e. microfilm, microfiche and hybrid storage systems) that are not included in this Technical Report, it is advisable to review those technologies if they are determined to be appropriate by the end-user organization.

Document management — Analysis, selection and implementation of electronic document management systems (EDMS)

1 Scope

This Technical Report presents a recommended set of procedures and activities that are advisable when performing analysis, selection and implementation of project phases associated with electronic document management systems technologies. This Technical Report provides user-level information outlining specific recommended activities to be completed throughout the various project phases typically performed when implementing these technologies. It outlines the steps and activities, together with compliance with relevant industry standards and guidelines that need to be examined and "certified" to ensure relevant technologies have been analysed, designed, implemented and managed, ensuring document/record validity when used in a business or government environment.

This Technical Report provides both user- and technical-level information and guidance detailing specific recommended activities and project tasks/phases recognized throughout the EDMS industry as being the EDMS industry best practice related to analysing business processes, evaluating appropriate/relevant technologies and ensuring complete technology implementation where required by the organization.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 12651:1999, *Electronic imaging — Vocabulary*

ISO 15489-1, *Information and documentation — Records management — Part 1: General*

ISO/TR 15489-2, *Information and documentation — Records management — Part 2: Guidelines*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12651, ISO 15489-1 and ISO/TR 15489-2 apply.

3.2 Abbreviated terms

API	application programming interface
ASAP	asynchronous service access protocol
B2B	business-to-business
BPM	business process management

BPR	business process re-engineering
COLD	computer output to laser disk
COM	computer output microfilm
COTS	commercially available off the shelf
CSF	critical success factors
CWAD	common workflow audit data
DMA	Document Management Alliance
ECM	enterprise content management[1] or electronic content management[2]
EC3M	enterprise content, collaboration and communications management
EDMS	electronic document management systems[3]
EDRMS	electronic document records management systems
ERM	enterprise report management
ERMS	electronic records management systems
G2G	government-to-government
ICR	intelligent character recognition
IDL	interface design language
IT	information technology
OCR	optical character recognition
ODBC	open database connectivity
ODMA	Open Document Management API
OLE	object linking and embedding
OMG	object management group
OMR	optical mark reader
P2G	public-to-government
RFP	request for proposal
RMA	records management applications
SOAP	simple object access protocol
WAPI	workflow application programming interfaces
WCM	web content management
WfMC	Workflow Management Coalition

1) Enterprise content management is defined in ISO 12651-1 as a set of tools and methods that allows an organization to obtain, organize, store and deliver information crucial to its operation. It can be broken down into five major components consisting of capture, manage, store, preserve and deliver content.

2) Electronic content management is the same as EDMS in that it focuses on the technology aspects of the overall environment.

3) Although there is a difference between enterprise content management, electronic content management and electronic document management systems, in this Technical Report the acronyms EDMS and ECM are used synonymously from the perspective that both require the use of core technologies, together with policies, procedures and methodologies to successfully design, implement and manage electronically stored information.

4 Electronic document management technologies

4.1 General

Even in today's world, many organizations still function almost entirely in a “paper-driven” environment. This environment is a direct result of the need to maintain information on all aspects of the organization and can be seen throughout many organizations. When considering EDMS technologies, organizations should consider implementing the necessary foundational components and then add other functionalities as required.

Electronic document management systems (EDMS) has become an all-encompassing term, referring to the integration of various underlying technologies including

— document imaging (used to convert hard copy documents into digital format),

— document/library services (used to manage digitally born documents) (most EDMS systems allow users to use this technology to also manage scanned documents, if desired),

— workflow (used to route, track, and otherwise manage electronic documents and work activities),

— enterprise report management (ERM) (used to store electronic formatted reports),

— forms management (used to incorporate interactive forms and manage related forms data),

— optical character recognition (OCR)/intelligent character recognition (ICR) technologies,

— various applications (also considered add-ons) such as records management applications, legacy system integration tools, etc.

Electronic document management systems provide users with greater access to digital information from a common user interface, through the utilization of industry standard Internet browser technology. One of the primary reasons users prefer this level of technology is the distributed functionality and extent of digital information availability that can be accessed almost immediately after implementation.

The structure of EDMS technologies can be viewed as a set of building blocks as noted below in Figure 1. The lowest level is the operating system.

Database services and storage device drivers are installed onto the server as the second layer. The selection of the database to be used is typically at the discretion of the organization, but has become standardized through the use of open database connectivity (ODBC) tools which have resulted in the database components to be considered a “commodity item”, rather than a specialized tool.

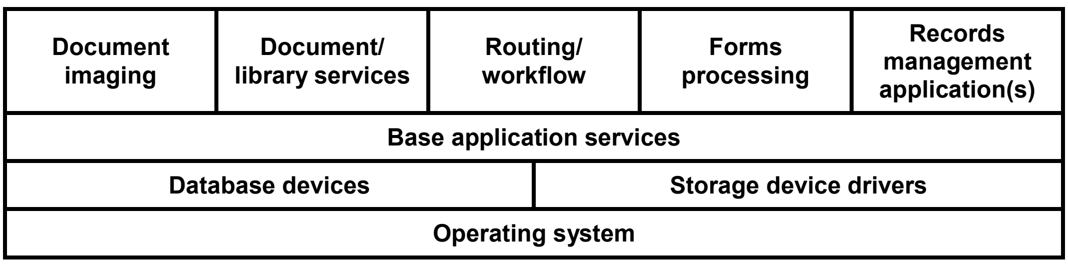

Figure 1 — EDMS technology building blocks

The third layer includes the base ECM application components and services provided by the service provider. This layer typically includes the solution configuration tools, application programming interfaces, and application components that integrate the core applications components with the database services and provide the components integrating the storage environment with the overall solution.

The fourth layer incorporates the various core technologies of EDMS. Each of these core technologies (with the exception of the operating system layer) are further described in 4.2 to 4.11.

4.2 Database services

There has been a significant shift from developing custom technology solutions at the database level to configuring or implementing commercially available software over the past 10 years. As the EDMS industry and associated technologies matured, end-user organizations were able to shift from a “development” model to a “configuration” model for the base technological components.

This is an important consideration for any organization evaluating EDMS technologies from the perspective that almost all of today's EDMS solutions have moved away from the need to have specialized database administrators towards actually discouraging organizations from changing and/or modifying the EDMS database table structures and configuration, which in many cases now result in the solution provider withdrawing solution support. While years ago it was important for the organization to hire dedicated EDMS database administrators, this is no longer the case. Over the past 5 years, the industry has noticed that almost all EDMS solutions (with the exception of highly specialized solutions) have effectively standardized on the most commonly used database platforms, enabling the solution providers to offer standardized support, thereby significantly reducing the organizational cost associated with hiring database specialists solely or primarily dedicated to managing the EDMS solutions.

4.3 EDMS application services

The next layer in the “building block” is considered to be the EDMS server application. Early in the development and maturity cycle of EDMS technologies, end-user organizations were required to provide database administration and resources. During the late 1980s and early 1990s, the EDMS technologies had not matured to the level approaching the commercially available off the shelf (COTS). While the EDMS technologies were maturing, end-user organizations were required to maintain the database together with the application.

Current versions of enterprise EDMS solutions have shifted the database administrative functions back to the vendor with the end-user organization responsible for daily application maintenance and periodic server maintenance. Most enterprise EDMS solution providers provide their products with technical support including system installation, initial configuration, application updates/patches, etc. This major shift from requiring significant technical resources at the end-user level to vendor-supported solutions has resulted in an extensive amount of vertical market penetration. This has been achieved through the use of the standard technology components configured to address specific environments and business needs.

4.4 Core technologies and application-specific modules

There are various core technologies and application-specific modules that provide specific functionality including some or all of the following core technologies: document imaging, document/library services, workflow, forms processing, etc. All enterprise EDMS solutions have at least one of these core technologies and in most cases include multiple components. Furthermore, many solutions have integrated both the document imaging and document or library services components into a single application, while other solutions simply integrate these components together as required by the organization.

4.5 Document imaging technologies

Document imaging technologies enable users to scan hard-copy documents into the system and store them in digital format. These technologies enable users to index or enter “metadata” into the system and always utilize some form of storage technology to save the digital version of the document. The following are the four basic components to document imaging systems:

— input;

— identification;

— storage;

— retrieval.

The *input* components typically consist of multiple single-sided (simplex) and/or double-sided (duplex) document scanners (or other input devices such as facsimile). The scanning stations are used to convert hard copy documents into a digital format for subsequent storage and management in the document imaging system. The *identification* stations allow users to identify (or index) incoming documents, allowing them to be retrieved at a later date. The *storage* part of the system consists of various components connected to the document management or workflow server and is used to store, retrieve and manage digital information. The *retrieval* part of the system consists of the user issuing a request for information that is then processed by the server. These requests are processed and the information is retrieved from the appropriate storage media connected to the server.

4.6 Document or library services technologies

Document or library services technologies enable organizations to manage digitally born documents. Document or library services applications utilize applets, or thin-clients, to control the authoring, check-in/out, and/or version control of documents being developed, managed or stored. This enables collaborative development when desired, together with a mechanism to store or manage digitally born document libraries. The basic capabilities of these technologies include allowing authorized users to

a) load or import digitally born documents directly into the system,

b) enter relevant metadata associated with the document,

c) create virtual folders linking various documents together,

d) check information in/out of the repository,

e) co-author documents also referred to as collaborative development,

f) secure access at document level,

g) maintain detailed audit trails,

h) make changes and check the modified information back into the repository,

i) manage whether original documents are updated or replaced during the update operations,

j) establish security levels for groupings of documents.

The management portion of document or library services technologies includes the ability to restrict access to certain documents or group of documents to only authorized users. Together with security controls, these technologies enable users to be granted different levels of access. For example, the author of a document might only grant read access to all users outside of a specific organization while granting “check-in/out” control to others who are working on updating the document. As the other users prepare to update the document, they would “check” the document out of the library, update the information, and then “check” the document back in.

Document/library services technologies ensure that any other user attempting to check the document out would not be allowed to check it out, and they would be notified that someone already has a copy being updated. Upon completion of the update cycle, the system automatically updates the version number of the document and makes it available to all authorized users.

Similar to document imaging, there are four basic processes associated with document/library services technologies (it should be noted that these terms may vary depending on various perspectives records management versus content management versus archival management, but the underlying functions remain the same with slightly different terminology and/or descriptions):

— import;

— identification;

— storage;

— management/retrieval.

The *import* components typically consist of enabling users to import digitally born information into the system. This digitally born information can be any format/structure and can be loaded into the system in original or native format. Digital data does not need to be modified prior to being stored and should include all relevant indexing or metadata associated with the information. The *identification* components allow users to identify (or index) this digital information, allowing it to be retrieved at a later date, as well as providing a vehicle to store information related to the digital data itself [such as author, purpose, subject(s)], and all types of information required by the end-user organization to fully track all necessary metadata. The *storage* part of the system consists of various components connected to the EDMS or workflow server and is used to store, retrieve and manage digital information. The *management/retrieval* part of the system consists of the user issuing a request for information that is then processed by the server. These requests are processed and the information is retrieved from the appropriate storage media connected to the server.

4.7 Workflow technologies

Workflow technologies can provide different levels of routing, tracking and administration. These technologies can be grouped into three categories:

— administrative;

— ad-hoc;

— production.

Administrative workflow is typically used by organizations where the processes do not change, or change very infrequently. *Ad-hoc* workflow provides the ability for a user to create a “work process map” for a specific piece or type of work. *Production* workflow incorporates administrative workflow and ad-hoc workflow capabilities and provides extensive tracking and logging capabilities. When considering production workflow technologies, the organization should consider whether to use role-based or user-based technologies. User-based technologies require specific users to be assigned to specific tasks, while role-based technologies enable organizations to assign and re-assign users to groups or “roles” which are easily managed.

Workflow provides for the automation of business processes enabling users to control the process logic. This ability to control the various business processes enables mission-critical, content-centric business applications to operate in an environment otherwise cumbersome to implement and manage. This has resulted in most EDMS vendors offering an integrated workflow engine or integrating the workflow engine with various workflow products readily available throughout the industry. The primary difference between these two approaches is whether the product consists of only those components developed by the primary product supplier or whether the primary product supplier has integrated specialized technologies developed by other suppliers.

In the new approach to organizational networking, workflow is becoming a tool in the automation of processes and information posting to a website. In these environments, workflow applications are becoming tightly integrated to legacy applications. The actual integration of workflow and other EDMS technologies has become more prevalent as various coalitions, standards committees and EDMS vendors have completed development of various standards.

The maturity of workflow technology and the associated trends are based on the separation of the processing rules from the processing scripts or work routing. In more sophisticated workflow environments, workflow scripts are tightly integrated to specific activities making the routing, editing, approval and submissions of content manageable at the user level. Interaction with the various thin-clients would trigger sub-processes as defined in the workflow script, resulting in the appropriate applet being downloaded and/or launched.

Workflow computing is the automation of work processes performed throughout an organization. A workflow application automates the sequence of actions, activities or tasks used to run the process. This includes tracking the status of each occurrence of the process and providing tools to manage the process. The following are the four basic components to a workflow system.

a) **Processes**: An automated workflow application is made up of the different tasks or activities that are necessary to be completed to achieve a business goal. The workflow engine manages these processes. The workflow application works in conjunction with the engine to manage the work process.

b) **Work queues**: Work items are created and distributed according to preset rules and placed into work queues. Users or groups of users are assigned to various work queues as required for processing. Work items within these queues can also be automated.

c) **Tools**: There are various tools accessed by the user, including forms display, word processors, terminal emulators, legacy applications, etc. These tools are used to access existing host applications and perform office related activities as required to complete work.

d) **Object data**: "Object data" is another term for any digital content referenced and/or used by the workflow system. The term became more prevalent after the computing technology was able to support video, audio and other forms of information into the workflow system. These objects become the work item to be processed during the normal course of business.

4.8 ERM technologies

Enterprise report management (ERM), which was previously known as computer output to laser disk (COLD), is an integrated software and hardware solution that stores and indexes formatted computer output (pages) on optical disks, magnetic disks, or magnetic tape as an alternative to paper printouts or computer output microfilm (COM). This formatted output consists of point-in-time reports, such as transaction listings of statements and invoices. Once this page output is stored on the ERM subsystem, it can be electronically retrieved, viewed, printed, faxed, and distributed to workstations and host computer terminals within organizations or throughout an enterprise.

While there are many different data types in the computing environment, the type of data with which ERM technology is concerned is typically the result of transactions (data files and database records) being formatted by the application into page-oriented form for printing on paper or COM. The structure and format of this output is known. This data is time-period focused, i.e. it is a snapshot of an internal system at a given point in time. These reports are often the basis for analysis or comparative reporting and they include the printed record received by users such as a statement or invoice. ERM systems have been designed primarily to handle this formatted output.

Essentially, the ERM process involves two procedures: recording (indexing and storing the data) and retrieving (making the data available to users). Within these two simple procedures, however, lies a myriad of complex tasks. Data should be downloaded or transferred to the ERM system server before being processed. The method used to transfer the data from the mainframe/host system to the ERM subsystem will vary depending on the communications capabilities currently in place. Recording consists of writing new documents to the storage media and then making them available for retrieval. Recording speeds vary from system to system and are most critical in high volume systems. The recording process involves

— transferring the data to the storage subsystem from the host,

— processing the pages from the transferred file (i.e. extracting index keys, compressing and writing to optical storage), and

— adding the index records to the associated ERM database.

