

# DETERMINING THE MATURITY LEVEL OF BUSINESS ORGANIZATIONS FOR ICT IMPLEMENTATION IN THE CASE OF ELECTRONIC CONTENT MANAGEMENT

*Dejan S. Milenković*

Serbian Armed Forces, General Staff, Department of Telecommunications and IT (J-6), SAF, Belgrade, Republic of Serbia  
e-mail: [dejan.milenkovic@vs.rs](mailto:dejan.milenkovic@vs.rs),  
ORCID iD: <http://orcid.org/0000-0002-2424-6940>

DOI: 10.5937/vojtehg64-10567

FIELD: Information Technologies  
ARTICLE TYPE: Professional Paper  
ARTICLE LANGUAGE: English

## *Abstract:*

*Starting from the fact that the use of electronic content is an imperative of our time, and from a general opinion that the application of modern information technologies can establish a solution for a reliable and simple organization and systematization of documentation, it can be stated that the organization's success depends directly on the achieved level of information management.*

*Timely, accurate, verifiable, readily available and consistent data are more than necessary for business activities; however, the basic problem of the use of these data is not their existence, but the place and manner in which these data are stored and organized within distributed business units. In addition, the introduction of information technologies into business processes results in more and more useful data; nevertheless, the question is the degree of their utilization.*

*The object of the study was to determine the degree of "maturity" of business organizations for the implementation of information and communication technologies, viewed through the prism of organizational, personnel and technological maturity of an organization for the implementation of an electronic content management system. At the same time, the use of appropriate maturity models for electronic content management aims at approaching the maturity model concept to business organizations.*

**Key words:** *ICT, electronic content, content management system, maturity models, business organizations.*

## Introduction

One of the most important factors for successful business process management is the amount of information and the method of its usage. Information and knowledge are essential for successful management at all business organization levels. This reduces uncertainty in the activities of business organizations, saves material resources and leads to rational engagement of human resources. During the implementation of business processes, information exchange between business organization units is required. Depending on the availability, accuracy and timeliness, information can affect the acceleration or deceleration of activities performed.

Linking business units through information and communication technologies enables an electronic access to relevant content as well as to coordination, integration, delivery, analysis and presentation of information. All this contributes to timely and high-quality decision making.

Information contained in electronic content has enormous significance for the business organization, regardless of its size or industry in which this organization works. There are no high-quality decisions without high-quality information. Since modern information and communication technologies are highly developed, the problem is not how to get information but how to identify useable information.

The subject of this study is to determine the degree of "maturity" of business organizations for the implementation of information and communication technologies, as seen through the prism of organizational, personnel and technological maturity of the organization for the implementation of an electronic content management system. Also, one of the objectives of applying relevant maturity models for electronic content management is introducing the concept of maturity models to business organizations.

## ICT – basis for electronic content management

The development of information and communication technologies leads to the adjustment of business organizations to the market in order to be competitive, more efficient and more successful. In all markets of the modern world soaked in information and communication technologies, information plays a crucial role. The situation is similar with business organizations where timely information and its processing are crucial for the advantage on the market.

Modern management has less and less time to make decisions about the activities of business processes. There is a large amount of

data that must be processed and transmitted. Preference is given to business organizations which make decisions about their activities on the basis of timely, reliable, accurate, verifiable, consistent and easily accessible data (Milenković, 2015b, pp.7).

### *ICT – the concept, role and importance*

Linking business units through information and communication technologies (ICT) provides an opportunity for a comprehensive approach to relevant data, to coordination, integration, delivery, analysis and presentation of information. All this contributes to making timely and high-quality decisions.

The main reason for the establishment of ICT is enabling storage and sharing of data contained in the electronic form. Virtual organizations are formed, with asynchronous, distributed and collaborative work teams who cooperate in the development of projects (collaboration), in different places (distribution) and at different times (asynchrony). As Katuu points out (Katu, 2013), ICT have contributed to the work of many organizations to become more efficient and more successful.

The introduction of ICT leads to changes in the processes of management and decision making. ICT help managers to perform their functions more easily and efficiently. Changes in management reduce costs of horizontal communication, enabling teamwork and flexibility. Monitoring changes in the environment is critical, which means observing the real environment, competition and financial conditions that business processes and technology trends depend on (Klein and Methlie, 2009, pp. 18-22).

The importance of ICT for the business system is a common use of decision support software, unified information access, enabled electronic communication and data exchange, data management, increased productivity and reduced costs in business systems.

The development of ICT has enabled faster and better communication, improved business processes, secured storage of information, and facilitated information search from any location in the world, 24 hours a day. Thanks to ICT, quality computer connectivity of organizational units is achieved through the capacity, speed and efficiency of data collection, processing, transmission and data protection. Computer networking of organizational units contributes to the following (Milenković, 2013, pp. 4):

- the use of common data and unique understanding and knowledge of a real situation;
- increased efficiency and shortened time required for decision-making, and
- increased overall efficiency of the organization as a whole.

### *The concept of electronic content management*

Organizations use a variety of ways to manage their electronic content, from network and local drives to specialized software such as the content management system (*Enterprise content management system*, ECMS). In an extremely negative sense, Katuu points out (Katuu, 2013) that there are cases that electronic content is not managed in any way.

According to Pelz-Sharpe (Pelz-Sharpe et al, 2010), content management systems are often used as a synonym for terms such as Electronic Document Management System (EDMS), Electronic Records Management Systems (ERMS), Integrated Document and Records Management Systems (IDRMS) and Electronic Document and Records Management systems (EDRMS).

In the context of this study, a content management system represents the most sophisticated element in managing electronic data essential to decision-making processes. The Content Management System can be defined as a set of strategies, methods and techniques used for creating, storing, processing and distributing content and documents that are a part of the life cycle of organizational processes.

The results of the introduction of electronic content management systems are increased availability and easier content control, information access control, more efficient implementation of business processes, saved material and human resources, reduced operating costs, and certainly support to decision making.

### **Determining the maturity degree of electronic content management systems**

In order to make any decision on improving data management practices and to began implementation of new or improvement of existing solutions for data management, it is necessary to analyze a real situation of electronic content management in an organization. So-called maturity models are used for the evaluation, presentation and monitoring of the conditions and capabilities of organizations in performing their functional processes. This part of the work shows the dimensions (elements) of a maturity model of an electronic content management system in the context of its implementation within large business organizations such as a military organization.

### *The definition of the maturity model*

Each complex business organization uses an electronic content management system (which manages documents and other electronic files). Such a system can range from storing unstructured files on local

disks or network devices, providing only the access rights to users, up to highly sophisticated software components for the management of corporate digital content in all business segments. The level of development of content management in most business organizations is between these two extremes.

In order to analyse real conditions of electronic content management in an organization, it is first necessary to assess the content by determining the type of the content, where and how this content is stored and whether and how it is managed. The answers to these questions are the key to determining the content "maturity".

Since determining the "maturity" of a business resource is a complex process which requires an analysis of multiple dependent and independent parameters, special models, so-called maturity models, have been developed. Initially, maturity models have been used for the purposes of software engineering. Later, the application of maturity models extended to other disciplines, such as: business process analysis, public administration services, financial management, human resource management, health sector, management of information technologies and project management. Maturity models are used for monitoring, evaluation and presentation of the current state of a corporation, such as, for example, a level of "maturity" of the corporate ability to perform assigned functions.

The maturity model of business organization content management is one of the models of information and data management, which developed in accordance with the principles of maturity (Matthew, 2003). This paper shows the dimensions (elements) of the maturity model of the content management system in the context of its implementation within large business organizations, with the aim of timely decision making in critical moments.

### *Dimensions of the maturity model of the content management system*

In this paper, the emphasis has been placed on maturity models relating to electronic content management in terms of corporate environment. In order to determine properly the level of maturity of the organization in terms of its relationship to corporate content, it is necessary to define the dimensions and elements of maturity.

According to Pelz-Sharpe and Katuu (Pelz-Sharpe et al, 2010) (Katu, 2013), the maturity of the content management system is identified through the following dimensions:

- data i.e. content storage,
- system efficiency, and
- system flexibility.

Where each of the above dimensions has some specific attributes. In assessing the dimensions required for data storage, it is necessary to identify the following attributes:

- *locations* where the content is located (Are data stored on local hard disks or on network shared resources? Are data in the context of already existing content management solutions?), and

- *formats* in which it is located (including outdated and specific formats) or in what format the content will be kept in perspective.

When considering the location, i.e. data storage capacity, it is necessary to examine the processes related to the *access* to the content. In principle, this means that it is necessary to answer to the following questions: What content is there? Is the content currently available to customers? How are shared content locations controlled? How do users share the same content?

Assessment of the dimensions for storing data from the content management system also includes considering a plan for using storage space. In organizations with low maturity, planning and development of strategies for the management of storage capacities are rarely or almost never done. In this case, solving the problem of how to maximize storage capacity is left to information technology (IT) experts. In organizations with a higher level of maturity, IT professionals have a possibility to obtain systematic reports on system usage and storage space. In this way, experts and managers can better and more easily perceive and understand the effects and trends that the content management system has on the overall operations of the organization.

Content management systems should cover the whole life cycle of content, from its creation, through distribution and final withdrawal from operational use (deletion or permanent archiving) (Milenković, 2015b, pp. 56-59). A critical characteristic in carrying out processes in the organization is their *efficiency*. Business organization systems that use manual data processing (due to which data are multiplied or there are unnecessary activities within the process) contribute to excess spending of resources, which can be either staff time spent in work processes with the content (documents), or technological resources that must be purchased to support management.

The business process *automation* is the first criterion for the efficiency of the organization. In organizations with low maturity of the content management system, content management processes are mainly performed manually and require more (redundant and non-automated) steps in all phases of the content lifecycle. In organizations with a higher maturity level of the content management system, many processes are automated, with no negative impact on their quality. Organizations with a medium level of maturity are usually in the phase

of identifying bottlenecks and failures in managing content manually. They are also in the initial stage of analyzing available technologies that can simplify these processes. The result of the automation of the content management process is easier identification and retrieval of the content in a myriad of business documents. In most organizations, transfer of content is a critical factor in achieving business goals. In organizations with low maturity of the content management system, there is no management of content transfer: electronic files are exchanged several times; neither content versions are dealt with nor the use of current versions is controlled; in addition, risk factors and distribution costs are increased. In organizations with a higher level of maturity of the system, content management processes are integrated with information technologies within the content management system. This contributes to the transfer of content to be managed in a reliable and efficient manner, within the framework of optimized business processes.

In organizations with a low maturity level, there are templates of documents but files are managed in an inconsistent way. Implementation of the content management system allows the use of the tool which easily manages the design and formats of electronic content, using standards of business organizations.

The synergy of the concept of content management with information and communication technologies represents an ideal content management system which achieves two goals: *to create once-used anywhere* and *content as you like on demand*. (Milenković, 2015b, pp. 54). The organization with a high level of maturity system reaches these goals by building tools and processes of maximum flexibility.

Creating arbitrary content (on the user's demand) in organizations with a low maturity content management system is typically a difficult and long process. It usually takes a long time to find the already existing content that users need in order to create new content (document). Still worse is the situation when the existing content cannot be found. As organizations acquire higher levels of maturity in the implementation of content management systems, their tools for content management not only keep the content in structured standardized forms but also enable simple and efficient creation of different types of output documents with the same content used in the proper context.

According to Katuu (Katuu, 2013) using metadata can improve the creation of new content and its use through all stages of the life cycle. In organizations with low maturity content management systems, metadata represent only time of the creation and changes of documents as well as basic information about their authors. Also, using metadata is limited to

good practice and users' skills. By achieving a higher maturity level of the content management system, organizations become skilled in planning, organizing and incorporating metadata in all their content. In this way, working with corporate content becomes effective.

Applying consistent business rules combined with effective metadata provides optimal flexibility and consistency of required content (Milenković, 2015b, pp. 60). To achieve the highest level of maturity, it is necessary to:

- constantly analyse business processes,
- continuously improve business rules on creating, storing and using content, and
- carry out the integration of all these processes and rules in the context of the content management system.

### *One example of the electronic content management maturity model*

To obtain effective content management systems of business organizations, business strategy and development of the system regarding technology must be clearly defined together with strategies of applying best practices. There are many ways to determine the maturity of the content management system, and "maturity" primarily stems from: (Milenković, 2015a, pp. 206–210):

- the use of content management systems at all levels of management in the organization,
- degree of the management of the document life cycle,
- development of organizational awareness of the importance of managing unstructured information, and
- the amount of critical data which has been successfully managed.

An electronic service for the exchange of electronically signed documents, established in the MoD and the SAF, has been used as an example of the application of the maturity model for digital content management. This service is a precursor of the Document Management System for Digital Content in the MoD and the SAF (Milenković, 2014, pp. 37-40).

Thirteen dimensions of maturity, largely affecting the content management system, have been discussed. The maturity model dimensions have been classified into three categories: personnel, information and systems, as shown in Table 1 (Milenković, 2015a, pp. 207).



Table 1 – Review of the categories and dimensions of the maturity model  
 Таблица 1 – Обзор категорий и размеров модели зрелости  
 Tabela 1 – Pregled kategorija i dimenzija modela zrelosti

Category	Personnel	Information	Systems
Maturity dimensions	Professional competence	Content/Metadata	Volume
	IT competence	Depth	Width
	Process dimension	Manage	Security
	Compliance of processes	Reuse	Usability
		Finding	

Each of the dimensions is described further on. For a practical application of the maturity model in a business organization and for the assessment of the achieved level of maturity in a specific business process, each of the dimensions is allocated a numerical value in an arbitrary assessment range (for example, from 1 to 5). The numeric value represents the evaluation of the achieved level of maturity (where a value of 1 represents the lowest level, and a value of 5 the highest level of maturity).

The *Personnel* category is described through four dimensions (Cameron, 2011):

- Professional competence refers to the ability of employees to understand the concept of content management systems.
- IT competence refers to the ability of employees to properly use existing and new information systems.
- Process dimension means the achieved level of the analysis of business processes in terms of content management.
- Process compliance involves a measure of the efficiency of cooperation between business process experts and IT experts, or their level of understanding and synchronization.

The *Information* category has five dimensions:

- Content / Metadata is a measure of the conducted analysis of content and its metadata in the context of business processes.
- Depth refers to the completeness of the content life cycle management.
- Management refers to the presence of rules and procedures for the management of business information.
- Reuse means the possibility to use the content for other business purposes.
- Finding means the possibility of finding the right content at the right time.

The *System* category has four dimensions:

- Volume presents a collection of organization business processes included in the content management system (for example, document management, business process management, etc.)

- Width represents the scope of business organizations vertically and horizontally, in accordance with business needs.
- Security represents an extent to which access to business content could be, in terms of security, reflected in the activities of the organization.
- Usability is an extent to which the implemented system corresponds to the actual business processes and needs.

## Conclusion

This paper presents an overview of the connection of electronic content necessary for decision making and information and communication technologies. The work shows one of many studies on the management of electronic content as well as information necessary for decision making in complex organizational structures.

Starting from the fact that the use of electronic content is an imperative of our time, and from a general opinion that the application of modern information technology can establish a solution for a reliable and simple organization and systematization of documentation, it can be stated that the organization's success depends directly on the achieved level of information management, i.e. information contained in documents.

Timely, accurate, verifiable, easily accessible and consistent data are more than necessary for business activities: however, the basic problem of the use of these data is not their existence, but the place and manner in which these data are stored and organized within distributed business units. In addition, the introduction of information technologies into business processes results in more and more data: nevertheless, the question is the degree of their utilization.

The emphasis is placed on maturity models regarding electronic content management in organizations. In order to properly determine the level of maturity of an organization in terms of its relationship to corporate content or any other component of its business processes, it is necessary to define the dimensions and elements of maturity. Dimensions vary depending on the maturity of the sector the organization belongs to.

## References

Cameron, S.A., 2011. Enterprise content management: a business and technical guide. BCS, The Chartered Institute.

Katuu, S., 2013. The Utility of Maturity Models—The ECM Maturity Model within a South African context. In Capability assessment and improvement workshop (CAIW) at IPRES.

Klein, M. and Methlie, L.B., 2009. Knowledge-based decision support systems with applications in business: a decision support approach.

- Matthew, L., 2003. Mission-critical Network Planning. Artech House Inc., London.
- Milenković, D. 2013. Statističko upravljanje repozitorijumima elektronskih dokumenata primenom koeficijena preferencije. Doktorska-disertacija. Beograd: Fakultet organizacionih nauka.
- Milenković, D. 2014. Razmena elektronski potpisanih dokumenata u Ministarstvu odbrane i Vojski Srbije. Konf-zbor. InU: Simpozijum o operacionim istraživanjima SYM-OP-IS.
- Milenković, D. 2015a. Primena modela zrelosti za utvrđivanje stanja upravljanja korporativnim sadržajem. Konf-zbor. In: Konferencija o računarskim naukama i informacionim tehnologijama YUINFO, Kopaonik.
- Milenković, D. 2015b. Upravljanje dokumentacijom u poslovnim organizacijama. Zadužbina Andrejević. Monografija.
- Pelz-Sharpe, A., & et al., 2010. ECM3 - ECM Maturity Model.

---

## ОПРЕДЕЛЕНИЕ ЗРЕЛОСТИ УРОВНЯ ОРГАНИЗАЦИИ ПО РЕАЛИЗАЦИИ ИНФОРМАЦИОННЫХ И КОММУНИКАЦИОННЫХ ТЕХНОЛОГИЙ В СЛУЧАЕ ЭЛЕКТРОННОГО УПРАВЛЕНИЯ ИНФОРМАЦИОННЫМ НАПОЛНЕНИЕМ

Деян С. Миленкович

Вооруженные силы Республики Сербия, Генштаб, Управление телекоммуникаций и информатики (J-6), г. Белград, Республика Сербия

ОБЛАСТЬ: информатика

ВИД СТАТЬИ: профессиональная статья

ЯЗЫК СТАТЬИ: английский

*Резюме:*

*Исходя из факта того, что использование электронного контента является императивом нашего времени, и общего мнения о том, что применение современных информационных технологий может создать решение для надежной и простой организации и систематизации документации, успех организации напрямую зависит от достигнутого уровня управления информацией.*

*Принимая во внимание, что для предпринимательской деятельности более, чем необходимы своевременные, точные, легко доступные и поддающиеся проверке данные, основная проблема использования этих данных заключается не в их существовании, а местонахождении и организационном методе их хранения в рамках бизнес-единиц. Кроме того, внедрение информационных технологий в осуществление бизнес-процессов способствует ежедневному накоплению полезной информации, в связи с чем возникает вопрос о степени их использования.*

*Цель данного исследования заключается в определении степени «зрелости» коммерческих организаций для внедрения*

*информационно-коммуникационных технологий. Данный вопрос рассматривается сквозь призму организационной, кадровой и технологической зрелости организации для внедрения электронной системы управления контентом. Применение соответствующей модели зрелости в управлении электронным контентом направлена на принятие данной модели коммерческими предприятиями.*

Ключевые слова: *информационные и коммуникационные технологии, электронный контент, системы управления контентом, модели зрелости, коммерческие организации.*

#### UTVRĐIVANJE STEPENA ZRELOSTI ORGANIZACIJE ZA PRIMENU INFORMACIONO-KOMUNIKACIONIH TEHNOLOGIJA NA PRIMERU UPRAVLJANJA ELEKTRONSKIM SADRŽAJEM

Dejan S. Milenković  
Vojska Srbije, Generalštab, Uprava za telekomunikacije i informatiku (J-6),  
Beograd, Republika Srbija

OBLAST: informatika  
VRSTA ČLANKA: stručni članak  
JEZIK ČLANKA: engleski

##### Sažetak:

*Polazeći od činjenice da upotreba elektronskih sadržaja predstavlja imperativ današnjeg vremena, kao i od opšteg stava da se primenom savremenih informacionih tehnologija može uspostaviti rešenje za pouzdano i jednostavno organizovanje i sistematizaciju dokumentacije, uspeh organizacije direktno zavisi od dostignutog stepena upravljanja informacijama.*

*Imajući u vidu da su za obavljanje poslovnih aktivnosti više nego potrebni pravovremeni, tačni, proverljivi, lako dostupni i konzistentni podaci, osnovni problem upotrebe tih podataka nije njihovo postojanje, već mesto i način na koji su ti podaci smešteni i organizovani unutar distribuiranih poslovnih jedinica. Takođe, uvođenjem informacionih tehnologija u obavljanju poslovnih procesa, korisnih podataka je sve više, ali se postavlja pitanje stepena njihove iskorišćenosti.*

*Predmet rada jeste utvrđivanje stepena „sazrelosti” poslovnih organizacija za primenu informaciono-komunikacionih tehnologija, posmatrano kroz prizmu organizacione, kadrovske i tehnološke zrelosti organizacije za implementaciju sistema upravljanja elektronskim sadržajima. Ujedno, primena odgovarajućih modela zrelosti za upravljanje elektronskim sadržajima ima za cilj i približavanje tog koncepta poslovnim organizacijama.*

Ključne reči: *informaciono-komunikacione tehnologije, elektronski sadržaj, sistemi upravljanja sadržajem, modeli zrelosti, poslovne organizacije.*

Paper received on / Дата получения работы / Datum prijema članka: 24. 03. 2016.  
Manuscript corrections submitted on / Дата получения исправленной версии работы /  
Datum dostavljanja ispravki rukopisa: 22. 06. 2016.  
Paper accepted for publishing on / Дата окончательного согласования работы / Datum  
konačnog prihvatanja članka za objavljivanje: 24. 06. 2016.

© 2016 The Author. Published by Vojnotehnički glasnik / Military Technical Courier  
(www.vtg.mod.gov.rs, втг.мо.упр.срб). This article is an open access article distributed under the  
terms and conditions of the Creative Commons Attribution license  
(<http://creativecommons.org/licenses/by/3.0/rs/>).

© 2016 Автор. Опубликовано в "Военно-технический вестник / Vojnotehnički glasnik / Military  
Technical Courier" (www.vtg.mod.gov.rs, втг.мо.упр.срб). Данная статья в открытом доступе и  
распространяется в соответствии с лицензией "Creative Commons"  
(<http://creativecommons.org/licenses/by/3.0/rs/>).

© 2016 Autor. Objavio Vojnotehnički glasnik / Military Technical Courier (www.vtg.mod.gov.rs,  
втг.мо.упр.срб). Ovo je članak otvorenog pristupa i distribuiru se u skladu sa Creative Commons  
licencom (<http://creativecommons.org/licenses/by/3.0/rs/>).

