A STUDY ON ELECTRONIC DOCUMENT MANAGEMENT SYSTEM INTEGRATION NEEDS IN THE PUBLIC SECTOR

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ABSTRACT

Same as other organizations the public sector institutions use a multitude of various information systems. However, unlike in the private sector, the most critical are not the systems for resource planning, finances, or supply chain management. Since the key business processes in governmental institutions are related to creating and processing of documents, the main and most critical information system is document management system. Laws and regulations are prepared therein, letters and answers to the petitions by citizens are being written, and often it is used for processing contracts and financial documents. Nowadays the number of different information systems in one institution is constantly increasing and correspondingly emerges the need for integration between them. One choice is to obtain an expensive Enterprise Resource Planning (ERP) and Enterprise Content Management (ECM) system and embark on their adaptation and acquisition. Another choice would be conducting a research in order to identify which systems reciprocally need interfaces for data exchange. This article deals with various types of information systems and their relations to document management system. In the aspect of public sector, the article contains analysis about the necessity of system integration and possible problem cases during the process of integration.

KEYWORDS: *document management system, information system integration, enterprise content management, electronic document workflow.*

I.   INTRODUCTION

Any organization in the public sector deals with large amounts of different documents on a daily basis – letters, petitions, applications, suggestions, contracts, acceptance certificates, invoices, staff documents, orders and regulations, instructions, rules, technical documentation, standards, legislations, laws, protocols and numerous others. Often some unofficial documentation as e-mail correspondence, meeting notes and similar texts are also considered parts of document circulation in an organization. Most governmental institutions use document management systems (DMS) in order to maintain the multitude and amount of documents and organize the document circulation by making the documents indexable and searchable. However, as it can be seen from the vast amount of document types, they refer not only to records management and its processes, but to several other areas of activities in an organization, for instance, finances, human resources, audit etc. Therefore the institution has sooner or later come to a decision about the integration of document management system to other information systems (IS). In this article, integration is not to be understood as a complete merging or consolidation of systems. Integration is a process that makes systems able to cooperate and exchange data according to business processes of the institution. In the context of electronic document management, integration is to be understood as the "promotion of interoperability for different types of information systems, in order to ensure optimal work directed towards processes of document circulation during their whole life cycle, for all types of electronic documentation"[1].

The author of the article is himself working at a governmental institution and is responsible for the circulation of electronic documents and the document management system, including administration, development planning and collaboration with other information systems at the institution. During the last two years there has been an extensive work of implementing a new document management system, also involving integration with other information systems – Customer relationship management system (CRM), accounting IS, human resource IS, electronic services IS and others. Therefore the main method used in this research is experience and observations during the integration process of information systems. Conclusions from practical research are complemented with opinions of another specialists and a research of the market for document management systems in order to learn how many developers pay attention to such questions as integration with other systems. The article deals with diverse information systems used in the public sector: user directory, finance management system, human resource management system, workflow management system, enterprise resource planning system, office software, CRM system, web portal, Enterprise Content Management (ECM) system.

Section 2 looks at the substantial aspects of system integration and main problem questions of this process. Section 3 inspects alternatives of integrating DMS with different systems – the usage of ECM and ERP systems. Section 4 pays attention to the most popular information systems and software types in the public sector (user directory, finance management system, web portal, human resource management system, workflow system, CRM system, office software) and the possibilities of their integration with DMS. Section 5 consists of conclusions, author's suggestions on system typology for the integration with DMS and the scope for further research. Section 6 indicates the main spheres for further research.

II.   SYSTEM INTEGRATION

When deciding to conduct a system integration of any kind, the organization has to be ready for an extensive work both from the side of the institution and the system developers. "The real challenges arise when a company's information systems need integration. The advantages are, no doubt, numerous: from the reduction in the costs of maintenance of several information systems to simplification of work flow." [2]

Among challenges there are both the integration costs and the time necessary for the project. One has to take into account that until the moment when systems start working in the new shape, they still have to operate in their base mode. Also the data migration might be necessary. Same as with new systems, it is anticipated that not all the co-workers will be satisfied with the change of their responsibilities and business processes in the institution. Therefore in a governmental institution it is essential not only to issue an order by the management for implementing a new system or integration platform, but also to conduct some explanatory campaigns which would improve both the work quality and the productivity.

"The integration of the information systems for a company, "today", it is necessary more than ever before, because in the companies, there are tens or hundreds of separate applications, which involves high costs and long time to matching the information. Therefore, the integrated information systems must inter-connect and inter-communicate as a complex, complete and coherent system and all systems parameters should interfere in order to assure compatibility and combined inter-operability." [2]Many developers of information systems have recognized the importance of integrity with other IS and are emphasizing that they are working towards this goal. For instance, *FileHold*pays special attention to integration with *Active Directory* services in order to improve the management of users, their access rights and roles in the DMS. *docassist* focuses on business systems in particular and offer integration solutions with ERP systems, human resource management systems and CRM systems. There are also some developers who turn to some seldom needed integration tasks. For example, *docSTAR* offers options how to integrate DMS with geographical IS.

When considering the integration of DMS with other systems, most often expressed considerations are about the influence of the integration on document management and circulation. However, it is as important to consider its influence on other systems as well. The integration process has to involve both the specialists for document management and experts of the systems and spheres to be integrated. "When you want to connect a business application with a document management system,

companies are forced to change both in the DMS and in the business applications, so as to prepare both ends of the channel to communicate." [3]

With regard to integration of information systems, there are numerous sceptical opinions. For example, S.J. Bakulin, specialist at the Moscow Engineering Physics Institute (State University) claims that only every tenth integration project is successful: "It is known that 80% of integration projects are failures. The reasons for that are mainly typical – poor risk management, unsuccessful setup of specifications and other." [4]Bakulin emphasizes that integration process is gradually becoming more complicated to perform because of the increasing system complexity: "When the complexity level of a project is rising, it also involves increased complexity of data schemes. The conditions of data exchange constantly become more complicated. Simple data conversion turns into elaborate business process involving data not only in several different systems, but also requiring user involvement in decision making in order to transform the data into useful information, i.e. the data would acquire context and meaning." [4] However, without integration of systems it is often not possible to electronize and improve business processes in an organization; therefore the integration option has to be chosen.

Ideally DMS integration options with other IS should be considered and applied already in the development phase of the document management system. Olga Skiba, specialist at the IT company "InterTrust" promotes not putting back the issue of potential integration and deal with it during the phase of DMS implementation planning: "When starting to plan strategies for further development (integration with other systems, ensuring the document circulation internally and inter-branch etc.) it is necessary to assess the approximate scope of the project and evaluate the options." [5] During this phase it is essential to consider potential information systems that are planned to start working with by the organization. However, the goal of this article is to deal with ready and working systems' integration options.

III.   ECM AND ERP SYSTEMS

Starting from the beginning of 2000s the main task of IS developers has been the integration of different systems and the opportunity to develop one sole product that would include all the functionalities needed in an organization. This has been emphasized also by specialists at the Moscow State University of Economics, Statistics and Informatics, A.V. Boychenko and V.K. Kondratyev: "Main directions in the development of information technologies in every circumstances are nowadays: development of integrated corporate information systems, ensuring that these corporate information systems are able to cooperate between themselves and with other information resources, creation of unified informational environment."[6]Two major types of information systems have gained great popularity during the last few years - Enterprise Content Management systems and Enterprise Resource Planning systems. Many large organizations tend to use this software in order to replace their specific information systems and support systems, for instance, DMS.

Enterprise Content Management (ECM) system is the best alternative for integration different systems, for it comprises the functionalityof a document management system and functions needed for the document circulation inside the organization. However, ECM systems is not a universal means of replacing all the IS in the organization – they cannot fully process and analyse structural data in the organization (for instance, financial data). "The Association for Information and Image Management clearly and accurately defined the terms Enterprise Content Management as the technology that captures, stores, preserves, manages and deliver collected data and relevant information that directly impact the processes of the organization. Further, ECM includes sort of tools and techniques that potentially allow the company management for some unstructured information in the organization wherever these pieces of unstructured information emanate. Moreover, it has been said that the technological components that the Enterprise Content Management possesses in this date are practically coming from the software products that the Electronic Document Management Systems or the EDMS used to have." [7]As one can see, ECM systems are able to ensure not only the circulation of documents and non-documents, but also the complete circulation of information in an organization. Nevertheless, they lack some functions that are sphere-specific and essential in the public sector. These are in particular finance or human resource management, client data storage and management, business intelligence tools etc.

In order to secure the management of resources, needed and used by an organization, several different Enterprise Resource Planning (ERP) solutions are available in the IT system market. Between the most popular there are*Epicor*, *Infor*, *Mycrosoft Dynamics*, and *SAP*. Unlike other ECM systems, ERP systems are meant exactly for processing of structural data. "ERP isan integrated information system built on a centralized database and having a common computing platformthat helps in effective usage of enterprise's resources and facilitates the flow of information between all business functions of the enterprise (and with external stakeholders)." [8]Expert opinion on ERP is also not unambiguous. Its wide functionality is generally appreciated, but the high costs and inability to replace all the IS in an organization count against it. "Replacing the entire information systems portfolio of an enterprise with ERPs is neither possible nor economical due to the following reasons. Firstly, there is no ERP solution that will provide all the functionality an organization requires and therefore some custom applications will be present among the candidate applications for integration. Even if it were possible through a combination of different ERP packages to complement the inadequacy of coverage, not every enterprise would be willing to depend on such solutions. Secondly, there is always a tendency to maximize the returns of the past investments on information systems. Throwing away some expensive items for some fancy reasons is not an attractive action in business, which is usually aimed to reduce its spending unless the spending promises profitable outcome." [9]

ECM in combination with ERP can ensure creation, processing and storage of all the necessary data. However, in this case the main drawback is the high costs. Both ECM and ERP solutions are expensive, massive and their hosting and maintenance require many resources. Public sector institutions, especially in developing countries, usually do not have such resources; hence several smaller systems are used for document and resource management. In the last years the global financial crisis has negatively influenced the solvency of the public sector as well, therefore one can assume that governmental institutions will henceforward choose to maintain several smaller systems (often the ones they already possess) and gradually upgrade them in order to ensure optimal interoperability. "Obviously the ideal solution would in this case be justone information system that would enable storing corporate information and managing the access rights for users from different levels and areas. Such information system would also have to ensure the functionality of circulation and management of all the documented information in the institution. Yet the documentation in an organization is currently that diverse that it is not realistic. Nevertheless, many developers are working on this task."[1]

IV. DMS INTEGRATION WITH DIFFERENT TYPES OF SYSTEMS

4.1.Integration with AD

Almost all organizations with the number of employees above 20 use a mechanism for structure, authentication and authorisation of network users. One of the most popular mechanisms is *Microsoft Active Directory*, designed for *Windows* domain networks. Nevertheless, often such alternatives as *Fedora Directory Server*, *OpenDS*, *Apache Directory Server*, *Oracle Internet Directory*, *Novell eDirectory*and many others are used.

Many developers of document management systems choose to base the system user maintenance model upon one of the abovementioned user directory service mechanisms. DMS basic functions usually enable integration with *Active Directory*. The institution has to decide whether to maintain their own list of users and their access rights with all the necessary metadata in the document management system or to acquire the data from the directory. Most often it is the combination of both options – user authentication is based on the directory, whereas the access rights are assigned and further actions are registered in the user base of the system itself.

The main benefit of DMS integration with user directory is the employees' satisfaction with the process of authorization. If document management system is a part of IT systems in the institution that use user authentication based on user directory, then it is not necessary to input user name and password (or they are identical with the basic user credentials). Several systems also have an option of managing user rights in the DMS from the user directory, using security group mechanism. When users have been divided into groups, one only has to define analogue groups in the document management system, synchronise them with the user directory and thus every user acquires a user

rights package assigned to the particular group. This model ensures a more convenient way of managing users and their rights – it can be done in one place.

Main drawbacks of the DMS integration with user directory are renewability in case of a disaster, unstable connection and safety. In case of a disaster, if the user directory is destroyed and it is not possible to restore it, the document management system practically has no users and all the tasks and user history are lost. Unstable connection between the user directory and the DMS can become a problem if user cannot authenticate into system. Finally, the question about safety. In case of a united authentication for all systems it is possible that the user enters the password only once – when turning on the computer. Accordingly all the IS of the institution are now available from this computer and the physical safety of the computer itself can become an issue. However, it is not a problem question of system integration, but rather of work organization.

4.2. Integration with finance management system

Although for governmental institutions finance management systems are not that vital as for the business companies, there is a certain amount of actions in the public sector that are based on the support of finance management systems. It is particularly important at the end of the year, when the planning of next year's state budget is at its peak and every institution has to provide financial calculations about the previous year and provide data about resources needed for the next year. And, during the year, contract checking and purchase organization is also necessary. "Financial Management Systems: Information systems that support financial managers in the financing of a business and the allocation and control of financial resources. Includes cash and securities management, capital budgeting, financial forecasting, and financial planning."[10]

Though at the first glance it seems that finance management systems do not have many common fields and features with the records management process and document management in an institution, the author of this article holds a view that integration with DMS is mainly necessary and can significantly increase work quality and productivity in financial departments.

When integrating document management systems and financial systems, an essential question is how to separate types of documents that are common for both systems and which system to store them in. A good example could be contracts. Same as submissions, letters, regulations etc., contracts are stored in accordance with requirements of records management – they are placed into numbered folders in compliance with the nomenclature of the institution. If the document management system has a workflow module, contracts are then given away to further processing or reconciliation directly in the document system. One has to take into account the fact that after a while contracts are mainly passed on to the archive together with their respective nomenclature folders. However, this is the only relation contracts have to the document management system. The actual work with contracts is carried out in the finance management system: contract registering, filling in the metadata, implementation control, changes to contracts, acceptance reports etc. Thus on the whole contracts as documents live two separatelives – in the document management system where they haveoriginally been registered and first reconciliation and processing aredone, and in the finance management system where contractsare being used by the factual users of them – the accountants. In this case it seems easier that contract as a document type would be best processed only in the finance management system. However, let us not forget that contracts, invoices and acceptance reports are above all documents and thus they have to comply with particular document storage requirements and be placed in a common document storage location.

After surveying governmental institutions in Latvia about their methods of processing financial documents, one has to conclude that most of them do not follow the suggestions for good practice and simply register a duplicate copy of the document in every one of the systems. Though in this case it is ensured that the document in question is found both in the document management and financial system, the integrity of it cannot be guaranteed. If any changes occur to the document in the financial system, it means that the copy (or the original) found in the document management system is already incorrect. Only way to prevent this problem is the integration of document management and finance systems, resulting in an automatic synchronisation of modified items in one or both directions. However, beneath the surface this option has several problems as well, for instance, different bodies of mandatory metadata in both systems. For the document management system, metadata are vitally important (author, date created, number, nomenclature folder, version etc.), whereas the metadata in

the finance system are completely different (sum, currency, payment time, contract partner etc.). These metadata are mostly defined mandatory on the database level already. Therefore, when exchanging documents between systems, errors may occur, if any of the fields is not correctly filled or left blank. It must be pointed out that a records manager who is usually responsible for the initial input of the document into the document management system has no competency regarding the accounting fields (if applicable in the DMS).

An essential question about any system integration is the frequency of data synchronisation. In case of document management and finance systems, initially it might seem that data synchronisation should be done after every change. However, such system would be very resource demanding for the software, computer network and routing devices. Since governmental institutions deal with financial documents relatively less often than companies in the private sector or banking, for a short period of time it is acceptable if there are some data discrepancies between the two systems in question. Most important is the correctness of the data in the system where the calculations are done, respectively, in the finance management system. The document management system, on its turn, can receive the refreshed data once or twice a day or, in case of special requirements, once an hour.

As can be seen, when planning the integration of document management and finance systems, there are many factors – both technical and organizational – that have to be taken into consideration.

4.3. Integration with web portal

These days in developing countries almost every governmental institution has its own web portal used for breaking the news about the industry or inside of the institution, conducting surveys for citizens, summarizing opinions, and for publishing the most current regulations, press releases etc. Usually one or two administrators are responsible for the web portal – they perform all the necessary work of inserting, deleting and exchanging the data. The data that have to be published are often received per administrators' e-mail or – at the best – using fileshares. It is obvious how much can be gained (or rather – how many resources could be spared) if integrating web portal and the document management system. A well-developed DMS already has all the metadata fields necessary for publishing a document: title, author, date, comment (or abstract). Only one feature would have to be added – publish on portal – which should be followed by the integration script, when delivering the document in question to the web portal. Subsequently, the administrator would only have to place it into the appropriate section. Unlike many other aforementioned systems, in this case there is no need for reversible data synchronization as in the web portal only the end versions of documents are published and they are not to be changed anymore at all.

Looking into a further perspective, it is possible to convert DMS into a tool that enables specialists in public services to communicate with the society with the help of it. In this case it would certainly require some extensive functionality supplements as, for example, creating an opportunity for the citizens to ask questions on the website of an organization, which would then hand them over to responsible executors in the document management system as tasks. Sergei Bushmelev, system analyst at DIRECTUM, one of the largest software development companies in Russia, emphasizes that it is exactly the socialization and data exchange (not only internally) that are the most important development tendencies for DMS: "It is the person – the user of the system who has gradually become the central element of the DMS instead of the content. It is most important to ensure cooperation with colleagues, work and project group members, remote and field office employees, but moreover – with external partners, clients and citizens. From a document archive, the DMS turns into a system for collaboration between the organization and people. It is expected that this tendency will likely carry on developing. The scope of document exchange will henceforth also become wider and different potential socialization mechanisms in DMS will be used; various systems will be integrated as well. All of it will improve the effectiveness of employee interaction, work organization and exchange of information in electronic format." [11] Worth mentioning that until recently it was widely claimed that DMS can be used as the integration platform between different systems in need of interoperability. For instance, in 2005 Valery Lvov, representative of document management system developing company "Optima Integration" suggests to utilize DMS exactly for this purpose: "Not every company is disposed to giving up all the implemented and already customized systems. Therefore one particular system becomes the system for integration and usually it is the DMS." [12] However, one has to take into account that formerly DMS was only a document repository and a

registration tool, whereas now, at least in the public sector, it has turned into a huge support system and often the DMS itself requires an integration platform or an in-between system in order to cooperate with other systems at the institution.

4.4.Integration with human resource management system

Integrating document management and human resource management systems is one of the most complicated processes when developing system interfaces. Employees, their status (position) and potential absence have huge and direct impact on document circulation in a company; therefore the systems have to work rapidly and without errors. "Human Resource Management Information Systems: Because the personnel function relates to all other areas in the business, the Human Resources Management Information Systems play a valuable role in ensuring organisational success. Activities performed by the Human Resources Management Information Systems include work-force analysis and planning, hiring, training and job assignments." [13]

Same as with other systems, it is possible to duplicate all the data and maintain a separate list of staff and positions in the document management system. However, maintaining staff data, especially in large organizations, is a huge task and because of the double work human resources are shed unnecessarily. Moreover, this approach may involve time shifts, causing errors in the document circulation process. Human resource management system is always the first one when staff related information is entered - about staff vacations, business trips, changes in positions, departments etc. In this case the administrator of the document management system always has to monitor these changes and immediately (not later than one working day) adapt them into DMS manually.

The main part of DMS that needs all the newest data from the HR management system is the workflow module. All up-to-date document management systems contain a more or less advanced workflow mechanism. Assigning tasks and documents to other employees is directly related to position hierarchy at the institution. Tasks as *Execute*, *Review*, and *Prepare reply* can only be given to the subordinates, whereas such tasks as *Reconcile*, *Visa*, and *Sign* are mainly directed towards the superiors. In order to avoid chaos in the document circulation of an institution, it is essential to overtake the most current staff positions data from the human resource management information system correctly.

It is also vitally important for the aforementioned workflow module to work properly so that the current status of an employee is clear – whether he/she is working or absent (business trip, vacation, illness etc.). If a document or a task is being assigned to an absent person, the document management system has to alert the employee who was assigning the task or even automatically forward it to the employee who is replacing the absent employee. One has to take into account different details as well, for instance, changes in status of an employee during the time period of the active task. If the task deadline is set to 10 days but the assigned employee is going on vacation in 5 days, the assigning person should receive a notification about this issue. All these data should ideally be acquired from the human resource management system.

Additionally, when inspecting the integration of DMS and human resource management system, one can emphasize the public availability of staff data within the institution. During the last years it has become popular to include an internal staff portal in the document management system where it is possible to search for documents, contacts and employees within the institution. Thus the portal needs an accurate list of employees and metadata (names, surnames, phone numbers, positions, departments, executive managers). The source of the necessary data for this list should be the human resource management system.

4.5.Workflow system

All up-to-date document management systems contain functions for creating workflows. However, they are not always advanced and customizable enough for institutions with complicated structure or many various types of tasks. The bureaucratic apparatus of state government is known for its hierarchical structure, complicated assignation of tasks and responsibilities and numerous types of assignments. Therefore, when acquiring a document management system, the *out-of-the-box* workflow system does not always correspond with the requirements of the institution. The main reason for this is the necessity of creating sophisticated automatic workflows with restrictions for their initiation. For instance, when the status of a document is changed from *Prepared* to *Reconciled*, the workflow would have to create x tasks for x different employees to *Visa* the document and x tasks for

further sign-off of the document with the restriction that all the *Visa* requirements are successfully fulfilled. For such cases, separate workflow management systems are usually acquired which then have to be integrated with the active document management system. In public sector, almost all tasks arise only from an initiating document. Previously in the article we have looked upon the integration of document management system with human resource management system and basically the principles are the same – the workflow system has to receive up-to-date human resource data either from the document management system or from the human resource management system, if the institution has decided to create such an interface. However, in this case the reason of the task is important – the document itself. Even if the workflow management is a separate software product, in the task view, it has to be able to display the document with all the metadata, history and content from the document management system. Moreover – in this case most of the workers will work exactly with the workflow system and the document management system will 'remain' for the records managers and IT administrators, and for the document search as well. Thus it means that in the workflow system there have to be options of opening the documents, editing it and even creating new, related files; every change also has to be immediately displayed in the document management system. As can be seen, from all the aforementioned systems it is the integration with the workflow system (if external software is used for this task) that is vitally important for the existence of document management system.

4.6.Integration with CRM system

During the last few years Customer Relationship Management systems have become very popular among different business branches and almost every middle-sized or large company maintains their own client database. Concerning this matter, public sector institutions are a bit behind, for they basically have no contacts that would fully fall within the category of *client*. On the whole, every resident of the country is the client of a governmental institution. Ideally governmental institutions would have to work with the data from the *Population Registry* and the*Register of Enterprises* – they are also state-wide systems and contain data about all the residents and companies. However, in the developing countries the integration between different systems is still in process and every governmental institution uses its own IS and data, seldom sharing them with other public sector institutions.

 "In many cases, CRM systems are software applications that integrate sales, marketing, and customer service functions. The main objective of CRM system is to give to all customer interacting persons and departments Access to shared customer data in real time." [14]Even though public sector institutions do not have any clients, in relation to document management systems it is important to store data about correspondents, authors of submissions, other governmental institutions etc. Every document contains metadata with some information about its author (in case if the received document is a submission the metadata would be author's name, surname, personal ID number, address, e-mail address, phone number). Thus, after a while, the system has stored some information about the correspondence partners. If taken into account that both resident and enterprise data are maintained in one system, the institution should consider implementing a CRM system and integrating it with the document management system.

While document management system only maintains the basic data about a contact person (or a company), the CRM system is able to store much more data, for example, number of calls, applications for appointments, dates of appointments and similar; moreover, all these data can be used for reports and analysis, thus making the public sector closer and easier accessible for the citizens. Same as with other aforementioned systems, document management system can be integrated with the CRM system or the unhandy alternative can be chosen – maintenance of two different *client* registers in both systems.

One of the biggest problems within the organizations not only in the public sector is the overuse of the system after it has been acquired. With 'overused' one has to understand the problem that the relatively main information system in an organization is being artificially adjusted for all the business processes and the functionality of the system is being used not only for its sole purposes. In the context of CRM, if an institution has an active CRM system, it has to gradually become the only source of external contacts. It is the same with the human resource management system that also has to be the only authentic source of data about the employees of the company. Though the document

management system also contains modules enabling maintenance of contacts and employees lists, in a big organization with specific systems the document management system should be used for its sole purposes: creating, processing, circulating and archiving of documents. If the institution already has an external web portal for informing the citizens, then there is no need of using the function of creating a web portal built-in in many DMS. If the DMS has an in-built *Notepad* type text editor, the employees should not necessarily use it, for they have a far more comfortable option of creating documents with the help of office software and then transferring them to the system. Going back to the question about the integration of DMS with the CRM system, we can conclude that the integration is highly preferable – as in case of need, the data from the CRM system can be used by other business systems that need cooperation with clients or the contacts data base of the organization.

"CRM-type of systems have been and continue to be a success, contributing significantly to the increasing performance of a business, is a well-known fact, but what is less known and publicized is the effort behind integration of these systems with other systems of a company." [2]

4.7. Integration with office software

Comfort is particularly important when creating and processing documents. Employees in the public sector are familiar with the office software, have a good knowledge of it and achieve best work results when using the most accustomed office tool. Therefore one of the main tasks of the document management system developers is to ensure a most extensive integration with the office software. First of all, one has to take into account that one of the most important work tools in the public sector is now the e-mail. Employees have used to opening it in the morning and closing only in the evening, in case of need checking it from home, on a business trip etc. Assigning tasks and exchanging documents through e-mails is a common praxis already for years. Therefore it is not sure that, if implementing a document management system, the habits of the employees would change. At least in the beginning some of the employees will not recall checking the document management system on a regular basis – as this would be the first place where the newly created tasks and documents to view are found. Therefore integrating DMS with e-mail is a primary need. The minimum would be to send a notification via e-mail to the person receiving a new task. However, ideally the document management system should notify (per e-mail) both the assigned person (receipt of a new task, warning about a nearing deadline, delay notification) and the person assigning the task (successful task received/read confirmation, task completed, task delayed). However, the main drawback of such integration is that employees do not get accustomed with working with the DMS; they connect to it only when an e-mail notification has been received. Therefore many employees are not even aware of all the useful functions and user friendliness of the system.

Many document management system developers are trying to integrate DMS functions into such office software as text editors (as *MS Word*) or spreadsheet editor (*MS Excel*, for instance). However, the result is not always as good as shown in the advertising materials. The experience of the author of this article indicates that such integration can cause problems in usability, administration and stability. Firstly, standard users are accustomed seeing their office software the way it is and any additional fields or toolbars, in their opinion, only decrease the work quality. Secondly, problems arise because of administrating different versions of office software. If everyone at the institution is using one particular software package of any developer (for example, *MS Office 2010*), then everything is more or less alright. But, if there are different software versions even from the same developer or different products by several developers, then the integration with the document management system is not always running as planned. Last, the question about stability. Even *Microsoft* representatives have admitted that the instability of their software can be mainly caused by 3rd party add-ons: "Windows Error Reporting data has shown that add-ons are a major cause of stability issues in Internet Explorer. These add-ons significantly affect the reliability of Internet Explorer. These add-ons can also pose a security risk, because they might contain malicious and unknown code." [15]The stability of *Microsoft Office* also depends on different 3rd party add-ons. The experience of the author of the article on integration of different document management systems with the office software indicates that add-ons from the DMS often slow down the work of the office software significantly or even cause it to crash.

To conclude we can say that integration with the office software is presented as a huge advantage by many DMS developers, promising more comfort and benefits for work. However, the user of the

document management system has to carefully assess if full integration is really necessary. While e-mail notifications are necessary for ensuring the usage of the system, additional functions in the office software are not always beneficial.

V. CONCLUSION

Fewer and fewer information systems now work fully independently and gradually all organizations choose to start integration. Processes meant to improve by digitalization are often overlapping and therefore information systems need interfaces enabling collaboration. Document management system in the public sector is the one IS of central basic actions and almost all the business processes are more or less related to document management. Therefore there are two ways to follow – either to implement one large system that is capable of including, optimizing and digitalising all the processes in the organization or to integrate the existing systems. First option is significantly more expensive; besides, there is no such system that could contain all the necessary functions for a governmental institution. Whereas a huge business corporation can implement ERP, it is not enough for governmental institutions, as there is a need for a high level document management system. ECM systems are on their turn not suitable for finance operations, calculations and analysis – daily and frequent activities in the public sector. Therefore it is the option of integration chosen most often – by carefully analysing and choosing which IS should be collaborating.

After long practical and theoretical research and review of different types of governmental institutions and their needs, the author of the article has come to a conclusion that systems whose integration with the DMS is possible, can be divided into three groups: 1) integration with these systems is mandatory or very necessary; 2) integration with these systems if advisable and would improve their administration and usage, and enhance processes within the institution; 3) integration with these systems is necessary only in particular cases or for particular institutions.

Integration is mandatory for:
- Finance management system;
- Human resource management system;
- Workflow system.

Integrationis advisable for:
- AD or its analogue;
- CRM.

Integration is optional for:
- Geographic information system;
- Office software;
- ERP;
- Web portal.

Disregarding the fact which type of integration has been chosen and how many systems are obtaining new interfaces, the institution has to be aware that changes of this scope has to receive a full support from the upper level management and cannot be only an initiative of the IT department. The integration of information systems is always resulting in significant changes for business processes and might even cause some staff changes; moreover, it is not to forget that employees require instructions, trainings and improvement of professional skills. Any system integration can be carried out as a project with all the main phases: assessment, planning, development, testing, and implementation. All phases require active collaboration not only by external system developers, but also by specialists from the governmental institution itself, as only they fully comprehend the processes in the particular institution.

VI. FUTURE RESEARCH

This article inspects potential integration of document management systems with various different information systems used in governmental institutions. However, the article only deals with the most widely used and popular systems in detail. Yet the governmental institutions, dependent on their work specifics, often use a great deal of other information systems, for instance:
- payment systems related to banking sector;

- geographical and Global Positioning Systems if the employees of the institution work out of office on different objects, important on state level;
- data repositories;
- medical and bioinformatics information systems.

If preferred by the organization, the document management system can be integrated with almost any other IS used in the organization. However, specific and organization-dependent IS require special approach and analysis for the integration process. Future studies could carry out an in-depth review on DMS integration possibilities with other types of information management systems that are not closely related to document circulation and record keeping.

Future research can also attend to different case studies about document management system integration with other IS – both in public and private sector.

Additionally to already mentioned research fields, a much wider scope could be approached – a study on compatibility, integration and customization of Enterprise Resource Planning and Enterprise Content Management systems.

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