DOI: 10.2478/v10051-010-0020-3

Barriers and Benefits of Investments into Enterprise Content Management Systems

Renáta Kunstová

University of Economics, Faculty of Informatics and Statistics, Department of Information Technology, W. Churchill sq. 4, Prague 3, Czech Republic, kunstova@vse.cz

This paper reviews the development and changes in the processing of large volumes of unstructured information. Author focuses on Enterprise Content Management (ECM) system and identifies three periods of its evolution. During this time ECM evolved to be high-quality and widely available technology, but many organisations have still not implemented ECM systems. The paper contains findings of a survey about the barriers and benefits of adoption of ECM systems, conducted in February 2010 in various organisations in Czech Republic.

Keywords: Enterprise Content Management; Enterprise Information Management; Content Management Interoperability Services

1 Introduction

The growing volumes of electronic documents, e-mails, faxes, web presentations, rich media, forms and another unstructured content makes it essential that this content must be managed. Users cannot waste time searching for documents, looking for the last version, making sure that document is accessible; looking for application for viewing or editing the document, etc. Companies need better control over all unstructured content they produce or receive.

This unstructured content makes up 80% of all information sources (Marlin, 2005), implying that structured data accounts for only twenty percent of enterprise information content. Current enterprise applications (e. g. Enterprise Resource Planning, Customer Relationship Management, Supply Change Management) use just these twenty percent of enterprise data, which are managed within centralized databases. Companies have a good opportunity to gain competitive advantage by managing unstructured content, as effective management of unstructured information exchange, document sharing and whole cross-company collaboration are critical to business success today.

Enterprise Content Management system is designed to manage large volumes of unstructured information and to make content widely available. This term was introduced by the Association for Information and Image Management (AIIM) and is defined[1] as: *„Enterprise Content Management (ECM) is the strategies, methods and tools used to capture, manage, store, preserve, and deliver content and documents related to organisational processes. ECM tools and strategies allow the management of an organisation's unstructured information, wherever that information exists.“*

ECM system covers number of applications which manage the complete lifecycle of content from its creation and publication to archiving and eventual deletion.

2 A historical overview of ECM

The author has been monitoring unstructured data processing for over fifteen years and identifies the following three periods of ECM development:

- the first period is prior to the definition of the term ECM,
- the second period starts with the definition of the term ECM by AIIM in 2001,
- the third period starts around 2007 when ECM starts to be regarded as a standard part of IT architecture.

The substantial changes in the field of ECM which enable us to recognise these different periods are driven by suppliers' efforts to better satisfy changing requirements of buyers as described in more detail below.

[1] http://www.aiim.org/What-is-ECM-Enterprise-Content-Management.aspx

2.1 First period

First period started in the 1980s when organisations began with document imaging[2]. The goal was to transfer paper documents into electronic form and to manage their further processing. It was the first strategy decision which changed approach to enterprise information management.

Advances in computer networks made possible new forms of communication. Users started to exchange information through electronic mail. They required sharing of documents, better cooperation during its processing and coordination of others activities. New products called groupware[3] provided the answer to these requirements. Soon after document management systems appeared on the market.

Rapid growth of electronic documents (Lyman, 2003) led to a requirement for their archiving. First archive systems appeared concurrently with improvements in full text searching and character recognition technologies. New technology brought new unstructured data types and new applications for their management (e. g. Web Content Management, Digital Asset Management, E-mail Management).

2.2 Second period

Functionality of individual products was expanded over the last two decades of 20th century and organisations could choose among products which offered wider functionality, e.g. for document imaging, documents sharing in central repository and automating approval cycle through integrated workflow. Previously isolated applications became better integrated. The AIIM organisation recognised the general change in this field of IT systems and since 2001 started to call this group of applications Enterprise Content Management system. ECM systems cover a number of applications to manage the complete lifecycle of documents and other content (see Figure 1).

The purpose of individual applications presented in Figure 1 is the following:

- *Imaging* applications provide scanning of paper documents in the form of images and pass them along to other business application.
- *Data capture* includes tools for scanning, automatic data recognition, their collection and entering into other systems.
- *Document Management System* provides storage, sharing, versioning, retrieval and securing capabilities for any kind of unstructured information.
- *Collaboration tools* such as email, calendaring, scheduling, text chat, videoconferencing, wiki, blog help people to communicate effectively, to collaborate and to cooperate.
- *Workflow* helps organisations to increase productivity by automation of processes, it routes documents to co-workers for review and final approval.

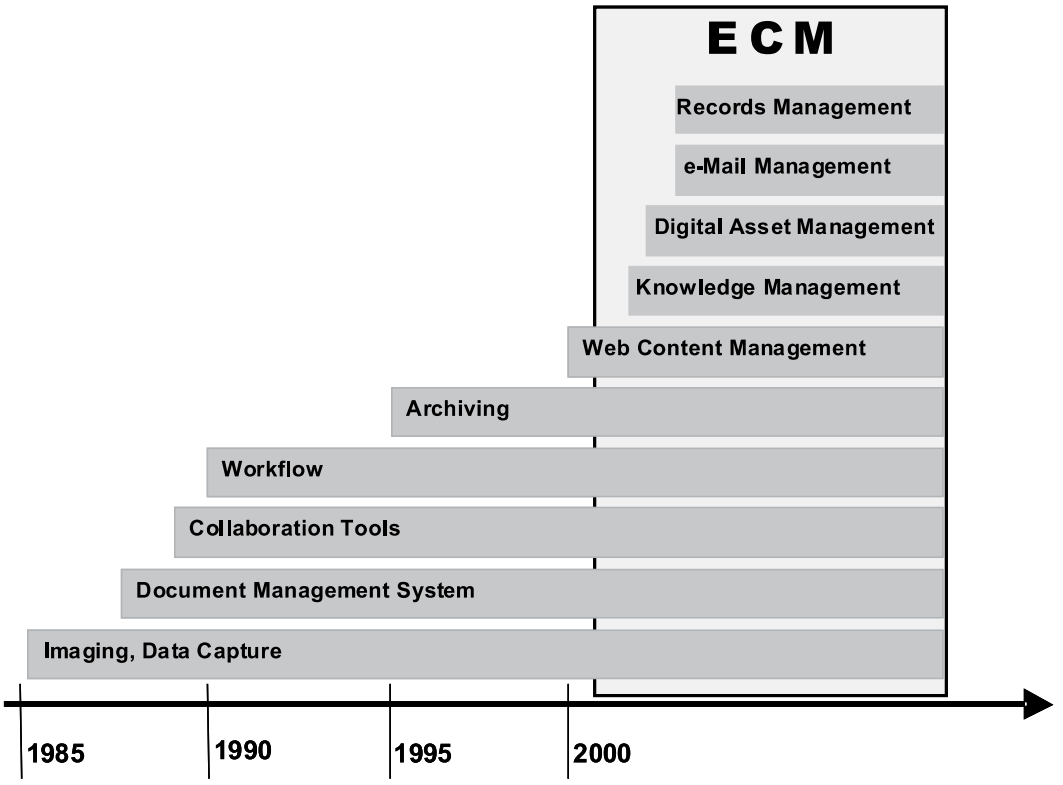

Figure 1: Evolution of ECM

[2] The first commercially successful document imaging system was developed by FileNet company in 1985 (FundingUniverse, 2010).
[3] Lotus Notes had become the de facto groupware industry standard in 1987 (IBM, 2005).

- *Archiving* is determined for long-term archiving, automation of retention and ensuring legal and regulatory compliance.
- *Web Content Management* provides content management for internal and external web sites of purpose to ensure their accuracy and their recency.
- *Knowledge Management* enables to identify, create, represent and distribute company knowledge.
- *Digital Asset Management* enables to store, view, find, compare, annotate, share and use rich media.
- *E-mail Management* incorporates email capture, sharing and full-text searching capability.
- *Records Management System* changes active documents to archive records, sets disposition policies and ensures compliance policies.

ECM is the result of integration effort to manage efficiently all unstructured information, wherever that information exists. Above-mentioned applications can be utilized independently or as a component within an Enterprise Content Management system. ECM products offer different range of these components. ECM products can be integrated with other enterprise applications such as ERP, CRM etc. They let users to share and access all types of content as part of their business process.

Information technology (IT) has always played a crucial role in supporting business processes. Its importance has increased further with so called "compliance" efforts. A new wave of regulations in many countries started-up as the consequence of a massive fraud uncovered in 2001 at the Texas energy company Parmalat, Enron and others. Organisations are obliged to comply with regulations and the term "compliance" became part of general management vocabulary especially in major corporations. New regulatory requirements such as Sarbanes-Oxley Act, Health Insurance Portability and Accountability Act, Basel II and also strong market demand for certification (e.g. ISO) produced demands on IT, above all in privacy, security, document retention and financial regulation. According to Naimoli "Regulatory requirements and legislation, such as Sarbanes-Oxley Act, have changed ECM from an optional nice-to-have capability, to a must-have system" (Naimoli, 2008). Compliance was the most significant business driver for document and records management technologies during the years 2003 - 2007, as concluded by the AIIM community survey in March 2009 (AIIM, 2009).

2.3 Third period

Third period started around 2007. From that time ECM is seen as a part of the IT architecture (Cripe, 2008). But although sharing relevant information and collaborating across the organisation becomes routine, users don't have single-access point to find, retrieve and process unstructured information from wherever it is stored, without the need to login to number of different applications. The ideal solution is to have an integrated environment providing search, access, process, collaboration and archive capabilities for all types of structured and unstructured content. These requirements became of key interest in the Enterprise Information Management[4] (EIM), which combines Business Intelligence (BI) and ECM. EIM

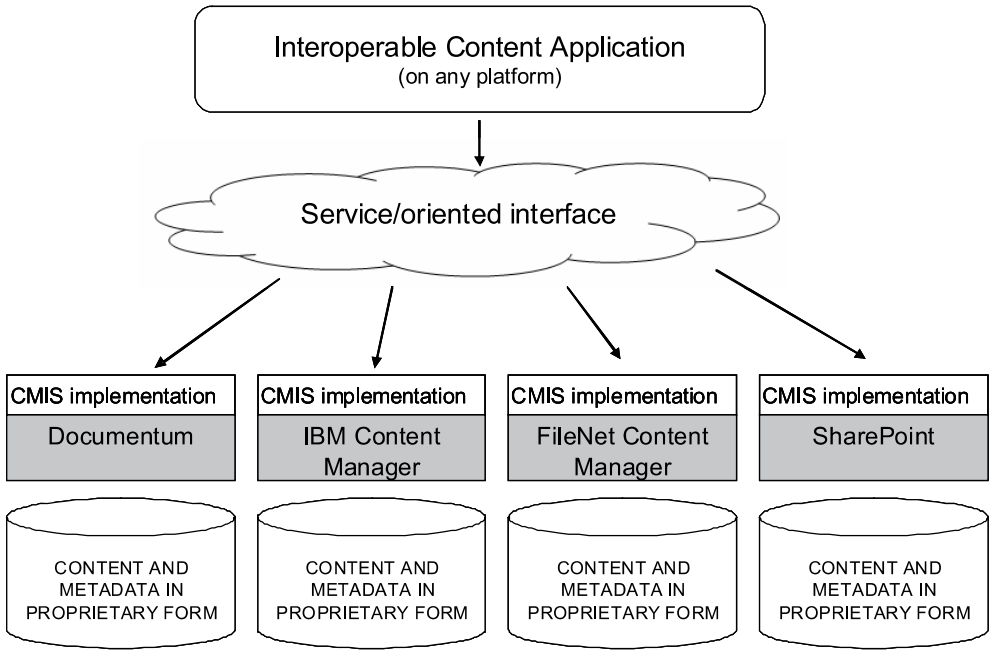

Figure 2: Principles of the integration (AIIM, 2009, December)

[4] M. D. Long predicted already in 1998 (Long, 1998) that Enterprise Information Management will become increasingly important discipline.

supports decision-making processes or day-to-day operations that require data analysis and the availability of information and knowledge. This trend that combines the management of structured and unstructured data is supported by three technologies.

- Enterprise Information Integration (EII) is a technology using data abstraction to provide virtual view on data which are managed by different applications. Data from heterogeneous data sources appear to users as a homogeneous data source.
- Enterprise Application Integration (EAI) is a technology which enables linking together several applications running under various operating systems and with different databases sources. This technology provides sharing of business processes among any connected application or data sources in the enterprise.
- Extract, Transform and Load (ETL) is a system for extraction of data from databases, their transformation according to operational needs into a suitable form and loading the data into a database or a data warehouse from which data is accessible to other analytical applications or decision tools.

In September 2008 an important new standard Content Management Interoperability Services (CMIS) was published that uses Web services and Web 2.0 interfaces to enable information sharing across Internet protocols, among document systems, publishing and content repositories from different vendors within one company and between companies. Participants in the standard development are organisations Alfresco, Day Software, EMC, FatWire, IBM, Microsoft, Open Test, Oracle and SAP. The proposed standard is available for public comment at Organisation for the Advancement of Structured Information Standards (OASIS). This standard enables greater interoperability of ECM systems.

Businesses of all sizes must have effective internal communications systems but also must implement external communications systems with their customers, suppliers, partners, investors and others to ensure their success. One of the most significant changes in the business landscape is the move toward an increasingly virtual workplace. The reality of today's business is that organisations must transmit and exchange sensitive documents and data internally and externally in a secure and cost-effective environment. ECM technologies are designed to support these goals.

The outlook for ECM investments is in the long term positive. Gartner predicted (Gartner, 2007) that the worldwide ECM software market is expected to grow more then 12 percent per year through 2010 (see Figure 3). Notwithstanding such positive predictions some reports find that "even with ECM sitting on the precipice of popular adoption, AIIM finds that it still hasn't tipped over into the mainstream of IT spending" (AIIM, 2008), concluding that "The majority of companies were not overly confident in their effectiveness in managing, controlling and utilizing electronic information".

The conclusion of AIIM survey published with a title "State of the ECM Industry 2009" (AIIM, 2009, March) highlights the difference between availability of high-quality ECM technology[5] and their implementation in organisations[6].

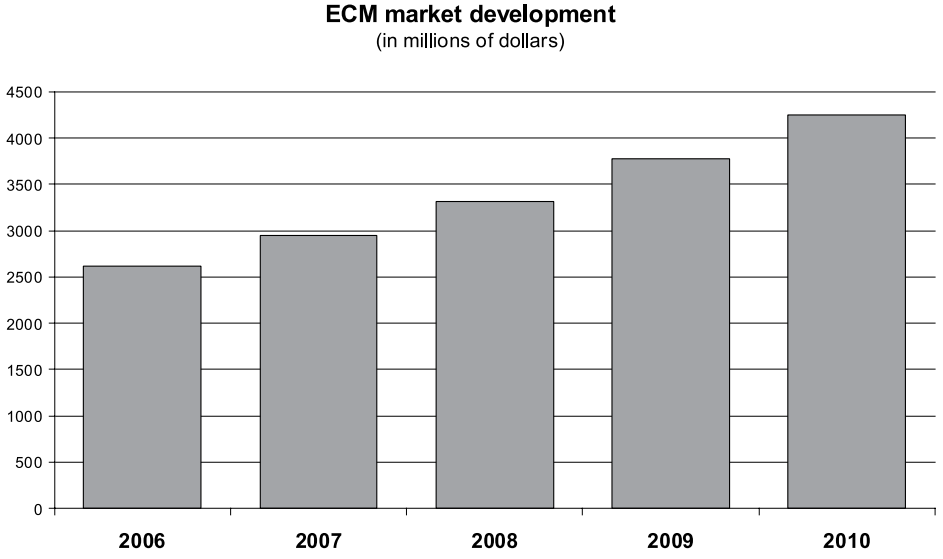

Figure 3: Forecast of total software revenue (Gartner, 2007)

[5] "IT vendors have created the concept of ECM as an infrastructure, servicing integration with other enterprise systems as well as the more traditional document-centric processes." (AIIM, 2009, March)

[6] "Most organizations are far from reaching the ideal, that ECM is pervasive infrastructure providing search, access, process, collaboration and archive capabilities for an expanding range of content types across the organization." (AIIM, 2009, March)

Although the ECM software market is growing, high-quality ECM software is available, and organisations consider ECM to be strategically important (Duhon, 2009), many organisations have not implemented ECM at all, or implemented ECM only partially. It is possible that unsuccessful implementations discourage some of the organisations, and therefore specialists must deal also with the problem why some ECM projects fail (Patel, 2010), (Byrne, 2010).

Presented review of ECM evolution describes changes in technologies and also in the requirements of organisations.

2.4 Current situation and the need to find barriers of ECM implementation in Czech Republic

No survey was available that deals with ECM implementation situation specifically in Czech Republic. Therefore the author conducted a small-scale survey with one hundred respondents in autumn 2006 (Kunstová, 2007) as a part of activities of the Czech Society for System Integration (CSSI). Important finding was that forty-one percent of respondents reported that they have not implemented ECM software in their organisation, and it is therefore likely that many organisations in Czech Republic will be implementing ECM in the future. More recent update of the situation in ECM implementation in Czech Republic is therefore needed to understand trends and their relationship to ECM barriers and benefits.

Articles and surveys mentioned above clearly show that despite the fact that organisations are not satisfied with their efficiency and despite of the availability of ECM technologies, ECM implementation in organisations lags behind. This implies that there are barriers to adoption of ECM that cause this situation. The author has not found any surveys conducted in the Czech Republic or internationally that deal specifically with the barriers to ECM adoption and their relationship to ECM benefits for organisations.

Czech organisations across the whole range from government institutions to major corporations and midsize businesses need to keep improving their efficiency to keep costs down and remain competitive in the global environment. IT support is today more and more crucial and ECM system is one of the key efficiency sources.

In order to speed up ECM implementations to help Czech organisations improve efficiency, the author decided to realise the first such survey in Czech Republic. The survey is described further in this paper.

3 Survey of current situation and future of ECM in Czech organisations

"Enterprise Content Management, its present and future" was a topic of a seminar which was held by Czech Society for System Integration in February 2010 (www.cssi.cz) and organized by the author. Representatives of most leading companies in the ECM market in Czech Republic such as IBM Czech Republic, Microsoft, Siemens IT Solutions and Services, Oracle Czech, Ixtent and Adobe Systems Inc. presented their views on a current situation and a future evolution of ECM.

In their presentations and follow-up discussions they agreed that the ECM market is one of the growing fields in Czech Republic, however they also reported that ideas and advantages of ECM are still difficult to sell in Czech organisations.

3.1 Implementation of the survey

During the seminar the author organized a survey targeted on identifying organisations' views on drivers and barriers for ECM adoption. Each participant of the seminar received the questionnaire before the beginning of the seminar along with other information and materials.

During the seminar introduction participants were informed about the purpose of the questionnaire and they also received instruction how to fill it in. Questionnaires were collected after the end of the seminar. Out of 76 handed-out questionnaires at the beginning of the seminar 65 were returned.

While, the sample of 65 organisations is not very large, the sample included respondents who by participating in the seminar showed specific interest in ECM, and as a result a high rate of questionnaire return (85%) was achieved.

3.1.1 Structure of the questionnaire

The questionnaire had three parts.

The first part included organisation and respondent characteristics: establishment of the organisation, number of locations in Czech Republic, number of employees, organisation's industry and respondent's job position. Respondents always marked one item from the list.

The second part asked about availability of individual ECM components (Imaging, Data Capture, Documents Management Systems, Collaboration tools etc.) in the organisation. Every component was shortly characterised in the questionnaire. Second part of the questionnaire was presented in the form of a table and respondents marked their answers by "X" for a relevant choice. They could choose amongst following items:

- We use this ECM component:
  - it is implemented in-house,
  - it is outsourced in the form of application servicing,
- We plan to use this ECM component:
  - it will be implemented in-house,
  - it will be outsourced in the form of application servicing,
- We do not use this component.

Third part of the questionnaire had two key questions:

- What are the biggest barriers of investments into ECM in an organisation?
- What kind of benefits would an organisation expect from investments into ECM?

Respondents could choose more items from the list. The lists of items are shown in Figure 4 and Figure 5.

3.1.2 Data analysis method

The data analysis was performed using Microsoft Excel software. Data from questionnaires were manually transcribed on to a spreadsheet and the analysis was performed using statistic functions. Main results are presented in the form of graphs in this article.

3.2 Results and analyses

3.2.1 Profile of respondents

The survey involved 65 respondents who represented organisations from different business sectors. The largest group of respondents was from the IT sector (62%). Other respondent group was from banking, finance, insurance (18%), government and public services (14%) and 6% respondents was from education. 60% of respondents were IT specialists or IT managers, 20% of respondents were business managers, 13% of respondents worked in middle management and the remaining 7% were end users.

3.2.2 Organisational Size

The largest portion (46%) of survey respondents came from medium-sized organisation (51 – 250 employees). Another 40% were from large-sized organisations (251+ employees). The remaining 14% of respondents were from small organisations (1 – 50 employees).

Most of respondents' organisations (57%) are located across 2 – 9 locations, 12% of organisations are located across more than 21 locations (i.e. multinational organisations).

3.2.3 Availability of ECM components

The findings that every organisation has implemented at least two ECM components signals significant shift in this field compared with the situation in 2006 in Czech Republic. (See above-mentioned survey which is in detail available on: http://si.vse.cz/archive/proceedings/2007/use-of-ecm-technologies-in-czech-enterprises.pdf.)

Two thirds of surveyed organisations have implemented 4 – 6 ECM components. Only two percent of organisations are using ECM components in the form of outsourcing. Most of organisations do not plan purchase of new ECM components over the next 12 months.

3.2.4 Key findings about barriers to ECM system adoptions

The first key question in the survey was "What are the biggest barriers to investments into ECM at respondent's organisation?" Although respondents could choose more answers from the list (see Figure 4), two thirds of them chose only one.

The survey identified that the most important barrier to investments into ECM system is still lack of financial, technological and personnel resources (38%) following by difficult justification of return on investments (24%).

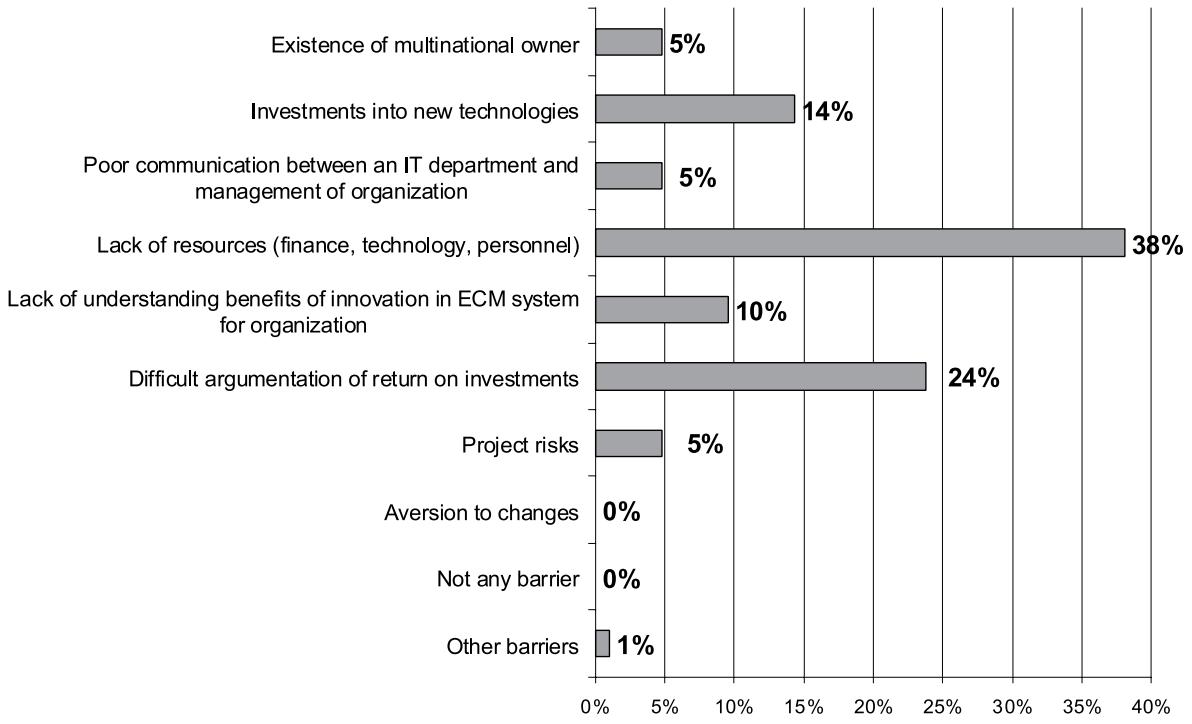

Figure 4: Identified barriers of investments into ECM system

Further data analysis did not demonstrate any significant interdependence among the marked barrier and organisation's characteristic or the number of implemented ECM applications. This was caused by the combination of small respondent sample size and the fact that two thirds of respondents chose only one item and their responses were distributed among 8 barriers, 4 organisation sectors categories and 3 organisation size categories.

The author considers significant that if the respondents are thinking about barriers in substantial two thirds majority identify just one barrier. It is possible to assume that it is the most important barrier for them and therefore they decided to choose just one despite clear survey rules option to choose more than one.

Survey findings show that the strongest barriers, in particular the lack of resources, concerns about investing into new technologies, concerns about the justification of return on investment, correspond well with a significant trend of fast-growing open source ECM market in the last few years (AIIM, 2009, December).

3.2.5 Key findings about the benefits of ECM system investments

The second key question was aimed at discovery of "What kind of benefits would your organisation expect from investments into the field of ECM?". Respondents could choose again more answers from the list as shown in Figure 5.

Two thirds respondents marked 4 – 7 items in this case. This means that from investments into ECM systems more than one benefit is expected. Respondents mostly agreed that the main benefit is a productivity increase (73%) followed-up by benefits from elimination of inefficient activities (60%), business continuity improvements (47%) and operational flexibility improvements (47%).

Notes on some of the benefits:

- *Compliance* – the organisation aims to comply with legal and other regulations.
- *Improved business continuity* – easier and less costly business recovery in case of disastrous events.
- *Operational flexibility* – the ability to make changes easily.
- *Organisational flexibility* – to embrace diversity of employees and their different work arrangements and payment schedules.
- *Environmental improvement* – improvements in general living environment by e.g. less copying or printing.
- *Productivity increase* – more work is done with the same effort/resources or the same work is done with less effort/resources.

Additional data analysis identified several relationships.

The benefit "non-efficient activities elimination" marked large-size organisations which are situated in one location.

The benefit from business continuity improvement marked above all organisation which are situated in 2 – 10 locations. These organisations marked the benefit of cost reduction at the same time.

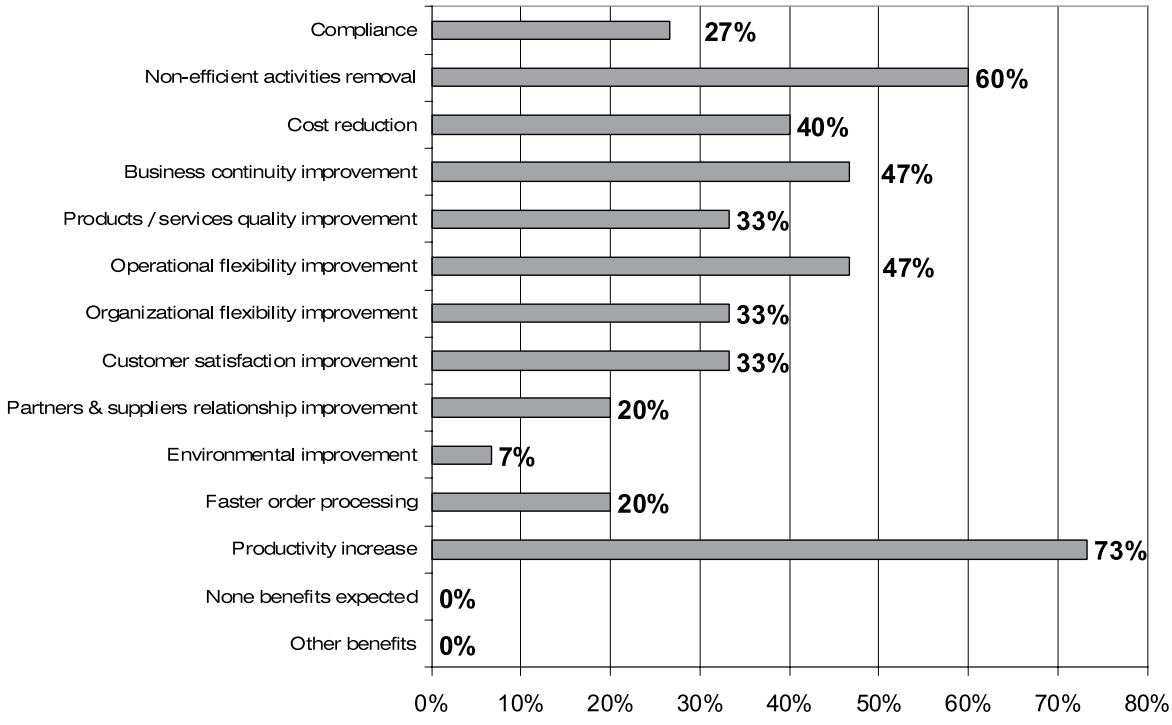

Figure 5: Expected benefits from investments into ECM system

The benefit from increasing customer satisfaction marked especially organisations which have implemented seven and more ECM components. Seven and more ECM components imply a relatively large ECM solution. Survey did not demonstrate a clear link among the number of implemented components and other organisation's characteristics.

4 Conclusion

The Association for Information and Image Management provides research surveys focused on Enterprise Content Management (see http://www.aiim.org/Research/Information-Management-Research-ECM-BPM-ERM.aspx). Data are collected via a web-form. These surveys reflect the opinions of hundreds of organisations from around the world but they do not compare results from single country. Countries are represented very differently in these surveys. Two thirds of respondents are usually from North America and they represent often organisations with thousands of employees. It is possible to identify general trends, but it is not possible to find out about the situation in the particular country.

The author has not found any surveys conducted in the Czech Republic or internationally that deal specifically with the barriers to ECM adoption and their relationship to ECM benefits for organisations..

The implemented survey as described in this paper has its limitations. The findings are based on data from only 65 organisations. However the survey covers two gaps in currently available information. It is specific for Czech Republic and it aims on barriers and benefits of investments into ECM

Since this kind of survey has not been done in Czech Republic before, it is a good starting point for similar surveys in the future and for making comparisons over the time.

The author recommends to organisations to use questions from research surveys, collect their own answers across the organisation and compare them with results available in research surveys. Such approach can help them in correct decision making.

Knowledge of barriers and benefits of investments into ECM is crucial for success of any implementation project. Companies which develop such solutions must understand them in order to make their product sufficiently functional and attractive for customer. Salespersons must use the knowledge of barriers and benefits to be able to identify customer needs and motivation for purchase and to identify key obstacles to successful implementation. People inside organisations who want to implement ECM in order to support organisation's continuous improvement process must work with barriers and benefits in order to convince their colleagues, management and all users about the project and to achieve the target and to prove the positive result.

Because the survey identified that the most important barrier of investments into the field of ECM is lack of financial, technological and personnel resources, the author expects more frequent use of open source ECM products in Czech organisations. Open source products do not require large investment, but can improve business productivity by sharing and using information and documents across organisation.

5 Acknowledgement

This paper was supported by the grant „Advanced Principles and Models for Enterprise ICT Management" at Czech Science Foundation under the number P403/10/0092. This grant is being worked at the Department of Information Technologies, University of Economics, Prague.

6 References

AIIM. (2008, June). ECM still not a priority. *Insurance Networking News.* 11, 26-26. Retrieved May 19, 2010 from Business Source Complete database: http://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=33287077&lang=cs&site=ehost-live

AIIM. (2009, March). State of the ECM industry: Who's achieved it, how are they doing it and is it working for them? *AIIM Industry Watch.* Retrieved March 4, 2010, from http://www.aiim.org/Research/State-of-ECM-Enterprise-Content-Management-2009.aspx

AIIM.(2009, December). ECM in 2010. *AIIM Webinars.* Presented December 16, 2009. Retrieved December 16, 2009 from http://www.aiim.org/Documents/events/webinars/38121.pdf

Byrne, T. (2010). Avoid ECM and WCM project failure. *CMS Watch Blog.* Retrieved June 6, 2010 from http://www.cmswatch.com/Blog/1880-Webinar---Avoid-ECM-and-WCM-Project-Failure

Cripe, B. &, Owen, J. (2008, May). ECM and SOA. *Infonomics*. 22 (3), 34-38. Available on http://www.aiim.org/Infonomics/ECM-SOA-Web-2.0.aspx

Duhon, B., MacMillan A.& Skjekkeland A. (2009, December). ECM in 2010. *AIIM Webinars.* Retrieved December 16, 2009 from http://www.aiim.org/Events/EventArchive.aspx?ID=355

FundingUniverse (2010, May). FileNet Corporation. *The Gale Group, Inc. web page*. Retrieved June, 10, 2010 from http://www.fundinguniverse.com/company-histories/FileNet-Corporation-Company-History.html

Gartner (2007, May). Gartner Says Worldwide Enterprise Content Management Software Market Will Reach $4.2 Billon in 2010. *Gartner Press Releases.* Retrieved May\'9f1, 2007, from http://www.gartner.com/it/page.jsp?id=506302

IBM. (2005, December). The History of Notes and Domino. *IBM web page.* Retrieved June, 10, 2010 from http://www.ibm.com/developerworks/lotus/library/ls-NDHistory/?ca=dgr-lnxw07NotesDominoHistory

Kunstová, R. (2007). Use of ECM technologies in Czech enterprises. In International Conference Systems Integration, 10 – 12, June 2007 (pp. 90-98). Prague: University of Economic. Available on http://si.vse.cz/archive/proceedings/2007/use-of-ecm-technologies-in-czech-enterprises.pdf

Lyman, P., Varian, H. R. (2003). How much information 2003? *Research study.* School of Information Management and Systems, University of California, Berkeley. 2003. Retrieved May 30, 2010 from http://www2.sims.berkeley.edu/research/projects/how-much-info-2003/

Long, M. D. (1998). ERM 102: Enterprise Information Management. *Chips*. 1998, April. Retrieved May 23, 2010 from http://www.chips.navy.mil/archives/98_jul/c_ews5.htm

Marlin S. (2005, October). Content's Value Enhanced. *Information Week.* Retrieved March 4, 2010, from http://www.informationweek.com/story/showArticle.jhtml?articleID=171203993

Naimoli, M. & Fari, G. (2008, September). Breaking barriers to enterprise content management. *Applied Clinical Trials.* 17 (9), 58-64. Retrieved from database Academic Search Complete

(AN 34384135): http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=34384135&lang=cs&site=ehost-live

Patel, J. (2010, June). 8 Reasons why ECM implementations experience high failure rates, and what to do about it. *Digital Landfill.* Presented May 25, 2010. Retrieved June 6, 2010 from http://aiim.typepad.com/aiim_blog/2010/05/8-reasons-ecm-fail.html

Renáta Kunstová has graduated at the Faculty of Management at the University of Economic, Prague, in Computerized Management System in Economics in 1985. Since 1985 was a member of Computerized Management Department and since 1990 works as a senior lecturer at the Department of Information Technologies at the Faculty of Informatics and Statistics at The University of Economics, Prague. Within her pedagogic and research work she focuses on analysis and design of information systems and enterprise content management. She is author and co-author of 5 monographs, 17 textbooks for students and many articles in conference proceeding and journals.