Chapter

The Proposal for Modeling Methodology for Enterprise Content Management (ECM) Systems: Modeling Tools Selection

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Abstract

Content management is one of the strategic directions of the ICT development in modern enterprises. This trend is spurred by the increasing amount of data, information, and explicit knowledge (that is content) whose characteristic features are lack of structure and multimediality. A dynamically growing market of ECM platforms, defined as the set of components and technologies used for managing content in any given area of the company, has emerged. Researchers focusing on ECM agree that the current aspect of content management is much more recognizable in the business practice rather than the theoretical and methodological ECM toolkit as a separate discipline of IS. This chapter presents the main elements of the author's methodology of modeling the enterprise that is preparing for the ECM platform implementation. The working name of this methodology is enterprise content management modeling method (ECM3). The modeling methodology is understood as a set of assumptions and perspectives of building the enterprise model, analytical tools to create it, and stages of the completion of the analytical process. The chapter presents the assumptions of methodology, selected analytical tools as well as practical examples from the actual ECM implementation.

Keywords: enterprise content management (ECM), enterprise content management modeling method, content workflow, organizational structure, locational structure, BPMN, UML

1. Introduction

Undoubtedly, the biggest challenge over the next few years that IT community will have to face is the exponential increase in the amount of data processed [1]. The IDC analysts quoted above estimate that 80% of data is produced by enterprises. The form of the data is significantly changing too with the domination of unstructured data, i.e., documents of various types and formats, e.g., announcements, e-mails, messages, sound and image recordings. Approximately, 90% of the data processed is unstructured [2]. This unstructured character of data has been encapsulated in the notion of content managed by processes and technologies which at the beginning of the century were collectively called enterprise content management (ECM). Current ECM definition, created and updated by Association for

Information and Image Management (AIIM), reads: "it is a dynamic combination of strategies, methods, and tools used to capture, manage, store, preserve, and deliver information supporting key organizational processes through its entire lifecycle" [3]. Today, ECM is one of the strategic directions of the ICT development in modern enterprises. A market comparison of ECM tools and ERP systems is a good indicator of ECM's popularity and dynamic growth. For the last couple of years, ERP systems have been the most important component of enterprise infrastructure. "Research and Markets" agency reports show that the estimated compound annual growth rate (CAGR) for global ECM market revenue for 2018–2022 is going to be 15.51% [4]. According to the same source, CAGR for the global ERP market for 2017–2025 is going to be 7.4% [5].

ECM is also a growing research area. Simons and Van Brocke in their study on the current position of ECM in the IS discipline stress its strategic and integrative character. The authors compared ECM development dynamics in technology and implementation practice to its theoretical and methodological aspects and pointed to evident deficiencies in the latter ones [6].

The author of this chapter has also encountered the problem in his research. Being a scientist and academic teacher engaged in IS analyses and design (mainly ERP, workflow, and BI), he participated in a project of ECM system implementation in a large Polish enterprise operating in the medical field. As a member of the analytical team, he was responsible for the preimplementation analysis and supervised the stage of the final solution's design once a supplier had been selected. From the project's beginning, one could see a blank area in the sector of methodologies and analytical tools dedicated to ECM systems. General methodologies, known from theory and practice, met the ECM requirements only to some extent. For the author, a business project transformed into research whose aim was to create an integrated modeling methodology for ECM systems implementation in an organization. The methodology was given a working name of enterprise content management modeling methodology (ECM3). The research adopted the design science research methodology approach. The methodology and research process used as well as the project's details will be presented in Section 3. ECM3 methodology development was initiated with the recognition of current ECM strategies and technologies state of the art, and indication of a set of tactical perspectives on an enterprise (based on the project experience). This initial stage was realized and described in the author's article [7]. The perspectives and ECM3 methodology's characteristics have been briefly characterized in Section 4. The core subject of the chapter is to present the second stage of the project, namely the process of modeling tool selection regarding individual perspectives. Its main part (Section 5) is devoted to analytical tool selection for each of the four key perspectives: content, processes, and organizational and locational structures. Conclusion contains a summary of the selection process' results and presents next steps of ECM3 methodology design.

2. ECM strategies and technologies: short overview

ECM platform technological characteristics and evolution were extensively described in the author's articles [7, 8]. In this section, we will focus on the technological aspect driving the whole ECM area, which proved to be a great challenge when creating an analysis methodology and modeling an organization implementing an ECM system.

ECM systems are not monoliths but sets of components and technologies building the foundation for creation of functional modules supporting any processes and content collections in an enterprise. These characteristics are reflected in the

literary and practical name of the platform—ECM [8]. The set of technologies which the platform embraces is huge and dynamically growing. This dynamics is reflected in a comparison of main ECM components performed by Gartner's analysts and published in the yearly "Quadrant for Enterprise Content Management" reports. In 2015, the components list included: document management, web content management, records management, image-processing applications, social content, content workflow, and extended components [9]. A year later, the set was extended with analytics/BI and packaged apps and integration [10]. In the same report, Gartner's analysts put forward their own integrative and elastic definition of ECM—"[it] is a set of services and micro-services, embodied either as an integrated product suite or as separate applications that share common APIs and repositories, to exploit diverse content types, and serve multiple constituencies and numerous use cases across an organization." This points to the persisting tendency to adapt other technologies to ECM services. For the methodology created, ECM3 is an indicator of a large and constantly widening range of objects and processes modeled, a range not required for other class systems.

As far as strategies are concerned, there are a few approaches to the ECM domain which have been used for the ECM3 development. The first is "a framework for ECM research" proposed by Tyrväinen and others [11]. The framework consists of four strategic and integrated perspectives: content, technology, processes, and enterprise. The perspectives became a starting point for searching for tactical sections of ECM3 enterprise modeling. "A Unified Content Strategy" (UCS) is the second approach, which changed the outlook on unstructured content as an element extremely difficult to manage [12]. Its assumptions are very much used in content perspective modeling (see Section 5.1). More detailed characteristics and other strategies used in ECM3 methodology building can be found in [7].

3. Research methodology

ECM3 methodology is created in accordance with a research rigor consisting in solving problems observed in a real-life project of ECM platform implementation in a large organization. The case study has become a place of problem identification where the solution is developed on the basis of the discipline's theoretical knowledge and the author's experience. Close cooperation between the researchers and the business people at most of the research stages will prove to be of key importance. The following sections thoroughly discuss the assumptions and research process of the design science research approach and provide a brief characteristic of the organization researched as well as the assumptions of the ECM platform implementation project.

3.1 Research process

The ECM3 methodology components' (perspectives, tools, procedures) building process has been conducted on the basis of design science research methodology (DSRM) for information systems research [13]. DSRM consists in solving problems (often real business world ones) on the basis of an existing theory which is implemented, tested, and then modified according to researchers' experience and intuition [14]. Implementation and testing occur within organizations interested in utilization of the solution created. The method is characterized by close cooperation between the business world and researchers [15] as well as the problem-solving process' iteration and agility [16]. DSRM approach adopted in the article was supported by an analysis of an organization facing the challenges of ECM platform

implementation (the organization and project have been described in the following section). The use case analysis contained not only the place of implementation, testing, and verification processes but also the source of the research problem definition and aim. The DSRM process proposed by Havner et al. [17] consists of six steps: problem identification, definition of solution's objectives, design and development, demonstration, evaluation, and communication. The process used to create ECM3 is presented in **Figure 1**.

3.2 The organization and project's characteristics

To discuss the research problem and its solution developed correspondingly to the process shown in **Figure 1**, the organization and project's assumptions have been presented below. The enterprise subject to this research is one of the biggest medical diagnostics laboratories network in Poland (the company's board agreed to publish information without disclosing the company's name). Its organizational structure consists of 140 laboratories and over 600 collection stations which sum together to over 1000 organizational units. The laboratories perform 28 million tests a year and the enterprise employs about 4000 people. As the network covers the whole country, its organizational structure has been divided into eight regions which are evenly spread across the territory of Poland. Each of the regions is divided into branches operating in one or two voivodeships (Polish administrative areas). A branch is made

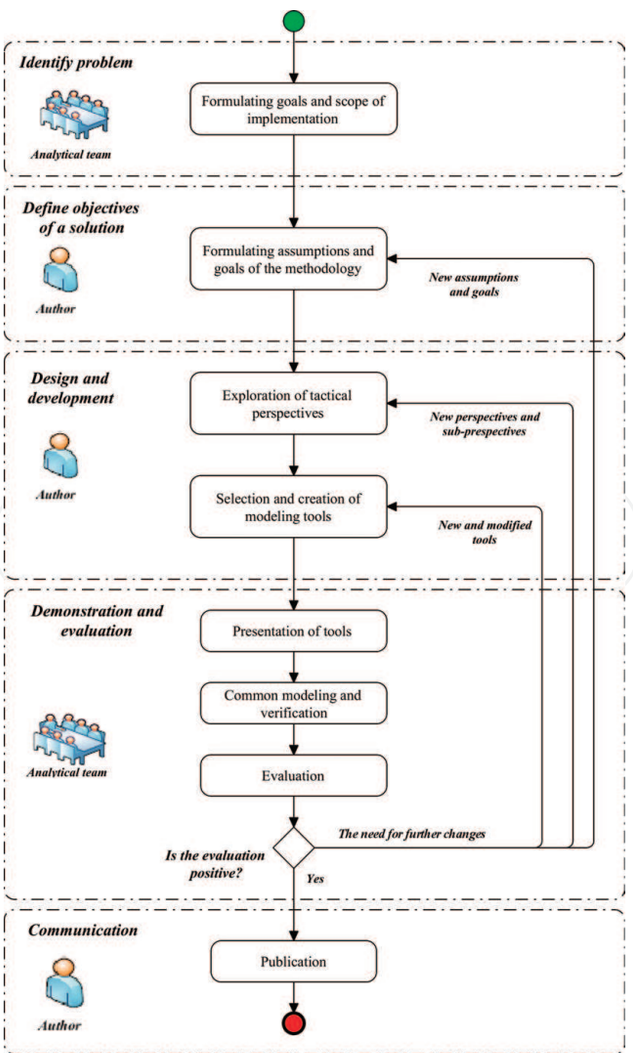

Figure 1.
The research process used in ECM3 methodology creation (based on DSRM).

up of a couple of laboratories located in bigger cities. Each laboratory is divided into laboratory units providing services for tens of sample collection stations. The company has a certified quality management system ISO 9001 as well as branch certificates PN-EN ISO 15189:2008 and PN-EN ISO/IEC 17025:2005. The territorial scope of the enterprise and the number of documents (200,000 documents a year in office circulation and 150,000 in quality management system) flowing between the organization's units gave rise to the board's decision to start a project aimed at selection and implementation of an ECM platform as a central electronic system for document and case circulation. The project was divided into three main areas: the incoming and outgoing correspondence called office document circulation, financial document circulation and approval (purchase and business trip invoices, etc.), and quality management documentation (with the required creation, acceptance, and distribution processes). The project started with a preimplementation analysis performed to build the organization's model and define its functional and nonfunctional requirements. The analysis outcome was a key to carry out the procedure of ECM platform supplier selection. Next stage consisted in developing a solution project, which was a task assigned to the researched company's analytical team and the contractor's analysts. The two abovementioned stages took 1 year. Currently, the project is in the end phase of implementation.

As has been mentioned in the introduction, the chapter's author was engaged in the project as an external expert for the analysis and design stages. In the course of these, a research gap was diagnosed—lack of ECM-platform-dedicated methodological and tool support. In the iterative research process (**Figure 1**), the author identified other significant analytical perspectives and selected tools for their modeling. The results were periodically demonstrated, tested, and corrected. The final results have been described further in the chapter.

4. ECM3 methodology: assumptions and tactical perspectives

Naming the operational analytical tools (that is, modeling languages or independent notations) is the second stage of the methodology's building. The first one is discovering the perspectives we are going to use to present a real object in order to make the model created complete and comprehensible so it can become the basis for designing new or improved objects (in our case, ECM systems). The author making use of the research process described in Section 3.1 finalized this stage and published its results in "A proposal for an ECM systems modeling method – defining tactical perspectives — lesson learnt from a case study" [7]. In the article, he identified the ECM3 methodology for the first time and pointed to its strategic attributes: integration and accessibility. In the course of the research process, there were presented six main perspectives on an organization preparing for ECM platform implementation, namely: content, process, organizational structure, locational structure, business rules, and IT environment. The perspectives are integrated, which means each of them directly or indirectly corresponds to the rest. The connections are so strong that it is practically impossible to model a perspective without considering at least one of the others. The processes perspective may serve here as a good example as it can hardly be modeled without roles, i.e., employees or groups of employees performing particular tasks. Information on roles and individual employees comes from organizational structure. When modeling a process whose core element is the question where the role is physically, we need to take into consideration the locational perspective. A typical process of financial document workflow is yet another example—without being familiar with the data structure the document contains, it is difficult to plan

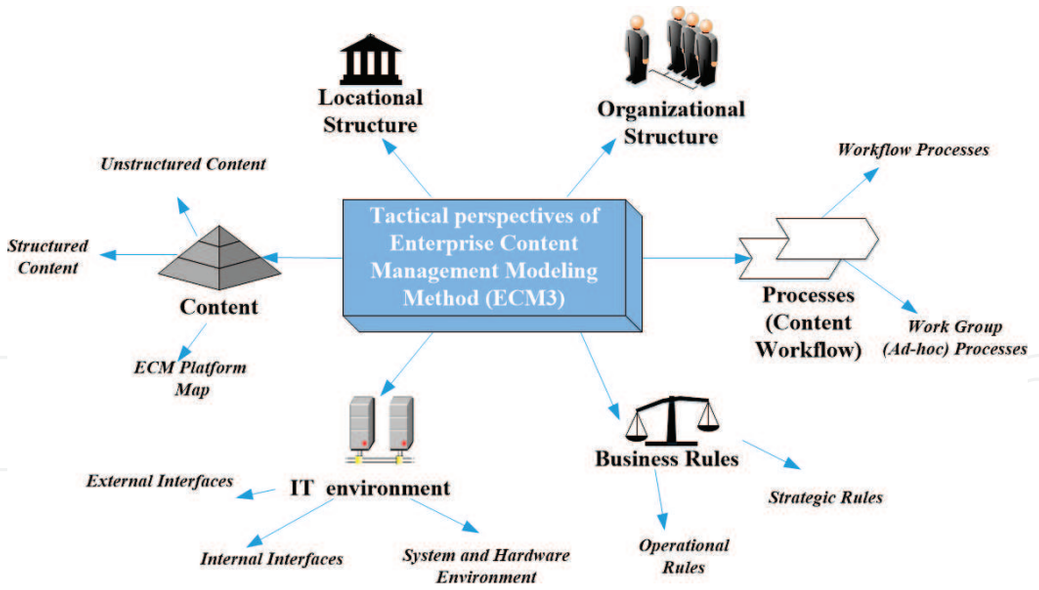

Figure 2.
ECM3 methodology's perspectives and subperspectives.

next steps of its circulation. In this case, we need to use the content perspective, which is the document's internal structure. When describing the mechanism of the presented ECM3 tactical perspectives integration, one should emphasize that it is also used to examine the completeness and conciseness of the whole organization model. The mechanism is used in many methodologies, just to mention the structured ones [18].

The ECM3 perspectives are frequently so complex that they have been divided into subperspectives. The most compound content perspective has been split into three subperspectives: unstructured content, structured content, and ECM platforms map. Each of these represents content in different forms, which is the reason why tool selection will be determined on the subperspective level. More detailed characteristics of the perspectives, their subperspectives, and the process of analytical tool selection have been presented in the next section.

A set of ECM3 methodology perspectives and subperspectives has been depicted in **Figure 2**.

The ECM3 methodology's accessibility is vital when it comes to modeling tool selection. The accessibility consists in the fact that it uses standard, generally available, and open languages or modeling notations like Business Process Model and Notation (BPMN) [19] or the Unified Modeling Language (UML) [20], both of which are completely free. It also allows us to access multiple IT tools, commercial and free ones, in which we can model in compliance with the indicated standards. The author considered using commercial methodologies like ARIS or BPMS in case of the organizational and locational perspectives. The results were discussed in [16].

5. Key ECM3 perspectives modeling tool selection

Modeling tool selection was the next step taken after identifying tactical perspectives of the organization modeled. The project subject to this research contains descriptions of perspectives recognized in to date IS theory and practice, such as data and processes, and ECM-dedicated perspectives discovered in the course of project, namely content and the organizational and locational structures. The process of perspective identification and tool selection was asynchronous (for the perspectives) and iterative. The asynchrony was largely caused by the project's

scope covering the three areas to be supported by the ECM platform: office and financial documents flow as well as quality management. The research started with an analysis of the document types, tracking their source, authors, and flow in the organization. One may say it began with the classical structural approach focusing on data (currently on content) and their processing. The works started simultaneously in all areas. The stage exposed significant differences in the importance and time devoted to modeling individual perspectives. The office and financial areas were dominated by the process perspective (documents are structurally simpler, e.g., an invoice) where processes comprise of more steps and alternative courses. The quality management area was dominated by the content perspective as the documents processed there were more structurally and semantically varied. The other ECM3 perspectives were identified later in the project. The order in which the perspectives appeared does not denote their final chronology or significance in ECM3 methodology.

The modeling tool selection was based on the criteria of their simplicity and comprehensibility for business people. Modeling is part of the business analysis stage supposed to give a clear view of the organization to be used later in IT tool design and implementation processes. Business users are data carriers; analysts provide tools and translate business knowledge to the model's formal language. One should remember that the model created needs to be verified and accepted by business people, which can only be done when it is intelligible and clearly expressed.

The sections present tool selection for four ECM3 perspectives: content, processes, and the organizational and locational structures. The other perspectives will be described with the progress of ECM3 methodology research.

5.1 Content perspective

Content is collection of structured and unstructured data, information, and explicit knowledge available in the electronic format (e.g., database records, digitalized documents, electronic documents, e-mails, messages sent through social media, or sound and image recordings) as well as the traditional format (i.e., paper or microfilm) [8]. Metadata used to describe content so that it can be later identified and categorized are the core of content management. In the DMS systems era, metadata were used to give document identification and library attributes to make it more easily searched for in electronic repositories. The original document in electronic form (scan, sound recording, or image) was attached to the set of metadata it was described by. We were able to manage the document as a whole but had no access to its actual contents. Today, when metadata can also carry document's semantic content, content management goes further—guided by the unified content strategy [12], we try to divide the document into semantic fragments and thus choose "information products" over uniform document. Information product can be further split into components consisting of elements. Such division allows us to provide access to semantic contents of a document and consequently make it reusable and adaptable. Information product (initial document) can be completely described (including its content) with metadata and stored directly in a database (not as an attachment in file system). One may conclude that currently content management is a process of converting unstructured content to semi- and fully structured one.

The ECM3 methodology content perspective has been divided into the following subperspectives: structured content, unstructured content, and ECM platform map. The first two require very similar tools, while the third one includes synthetic (bird's eye) view on all content resources available on an ECM platform. Modeling this aspect allows us to organize an organization's content resources (create its

repository) and plan which content areas and other ECM system's functionalities will be available to individual groups of employees.

5.1.1 Structured and unstructured content subperspectives

XML is the basic tool used to convert a document into information products. At the stage of design and implementation, all types of content are stored and processed as XML documents and schemas. The question arises whether XML could also be used at the analytical stage to model the shape of final documents meeting ECM system's needs. The author's project experience demonstrates it is possible and effective and can be applied, especially to documents of simple (one- or two-level) semantic structure, e.g., research procedures, instructions, quality manuals, which were all present in the quality management area of the project subject to this chapter. XML's definite advantage is the fact it has clear rules for tag interpretation and use in document's structure projection. The rules can be easily understood and learned by every business participant. Additionally, one can create tag names in the organization's business language. Creating an XML content model for a given type of quality document consists in indicating text fragments constituting the model's components and elements (in accordance with UCS) and equipping these with structural and semantical tags. The task can be performed directly in a text editor, e.g., MS Word, when analyzing examples of documents in their original form. The abovementioned MS Word is provided with special XML schema (.xsd) interpretation options and facilitates placing XML tags in the document's text. A document's analysis starts with selecting fragments of text and giving them tag names. On this basis, an analyst creates a draft of XML schema which is next attached to the document and the tagging process is repeated. XML schema is completed after a few iterations and builds foundations for respective structures in the ECM repository. These XML functionalities can be found in standard Word application since the 2007 release. **Figure 3** presents a research procedure document filled with XML schema tags.

When the documents modeled are relationally much more complex and their attributes are to be used in computational processes, we need to use other modeling techniques. In case of the project, the documents were contractor agreements, e.g., premises lease contracts. The main purpose here was to extract from the text any measurable, quantitative, or valuable attributes to build automatic mechanisms for controlling cost settlements ensuing from the agreements and, further, for their booking. Documents of this type were modeled in the entity-relationship (ER) notation and mirrored as relational data models. Less important descriptive parameters, such as rights and responsibilities of the parties, could be stored in separate metadata sets or left in the document original's scan saved as the agreements attribute. The modeling was performed following the entity relationship diagram (ERD) [18, 21], whose construction principles are extremely easy to convey to the analytical team members not acquainted with IT environment. In an exemplary document of premises lease contract, the objects specified were contract, contract subject, and premises. Next step consisted in determining the relations and attributes of individual objects. Project experience shows that employees of financial, audit, or administrative departments are well acquainted with the data relations concept as it is present in everyday use systems like ERP, CRM, or BI. Consequently, they are familiar with notions of foreign key or 1:N relations, and similar. **Figure 4** depicts a relational model of a car lease contract.

Alternatively, one can build conceptual models of documents such as contracts, using the class diagram belonging to UML [22]. Comparison of the two techniques was presented in [21]. An interesting approach to modeling advanced XML

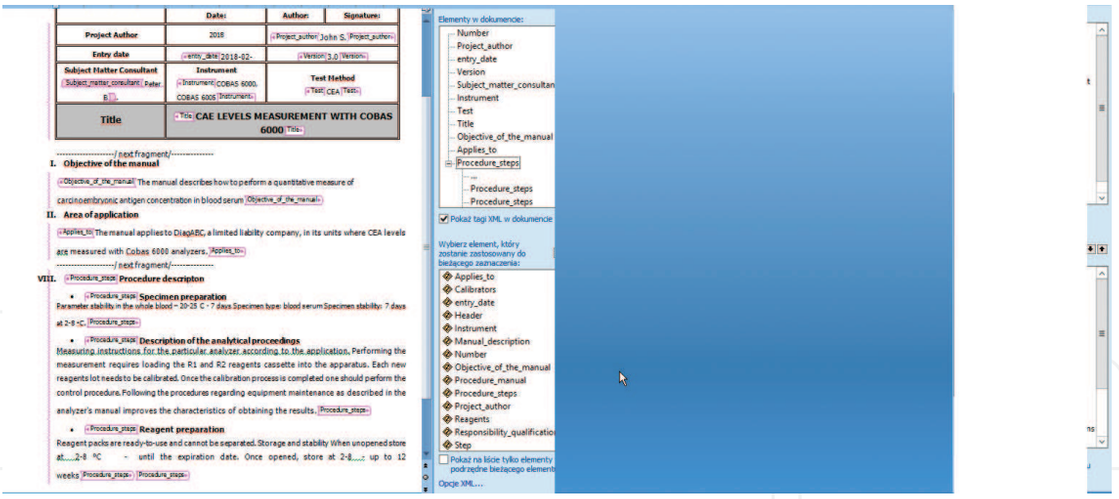

Figure 3.
Content modeling using XML and MS Word 2007.

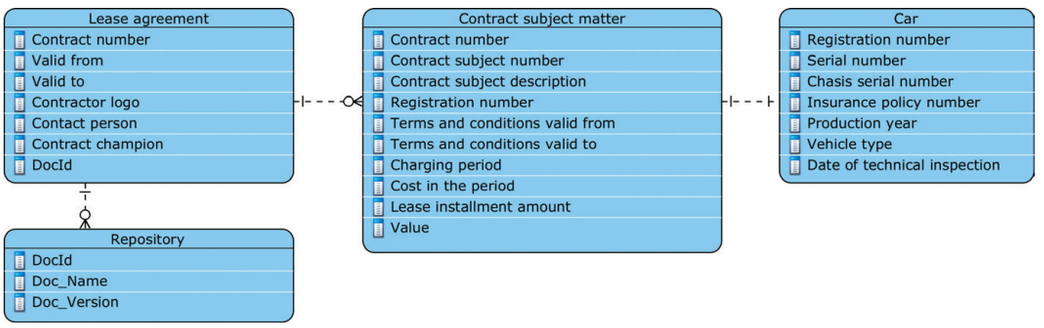

Figure 4.
Relational model of a car lease contract (ERD notation).

documents was described in [23] where UML, and in particular, class diagram were used. However, the author's project experience shows that when modeling content perspective ERD notation is more intuitive and easier to use.

ECM3 methodology also recognizes the perspective of structured content used in ECM platforms in the form of lists (or dictionaries) gathering contractors, employees, organizational units, etc. These are ordered, most often relational data which can be best organized with ERD or class diagram notations.

5.1.2 ECM platform map subperspective

ECM platform is a place where each of the organization's employees gets access to important content (stored in the ECM system's repository). They can initiate or realize tasks in the processes of document creation and circulation—like correspondence, invoices, settlements of delegations, or quality procedures, and at the same time have access to social functionalities—notice boards, newsletters, forums, blogs, wikibases (collectively called social content components).

ECM platforms are equipped with web content management (WCM) component (inherited from CMS systems). It allows us to create on an ECM platform a structure of internal sites and, in this way, give individual employees the access to various areas and functionalities of the platform. Sites can have different access configurations to the repository, processes, or social content. The ECM repository should be divided into subject areas (referred to as subjects further in the chapter) which facilitate giving the right to create, modify, or view content. In the project,

the repository was divided into the following subjects: Board, HR, Quality, IT, Technology, Microbiology, etc. Each of the subjects was assigned an editor in the form of the company's department overlooking the particular area of the enterprise. The stage of ECM platform design proliferates in site models for individual departments/subjects or groups of employees. The sites share the repository's subject areas. Each of the single site's models states who it is designed for, which subjects it will use, and what social functionalities it will have. It is a multifocused task whose components are nonhomogeneous, abstract, and informal. In the project, the technique used for site modeling was mind mapping. Mind mapping diagrams are very little formalized (they are based on just a few simple rules)—when used as tools for creative or project work, one should use their own symbols and colors [24]. Business users know mind mapping from trainings on creative thinking or project management and the technique is used by many in their day-to-day work [25]. Mind mapping as a tool for website content design was described by Deer [26]. According to him, content mapping is a "visual technique that will help you organize and understand the content of a website" and is "similar to mind maps, but it's focused on a site's content" [26].

In the project, mind maps were used to design sites for individual groups of employees or the entire organization. Single groups formed the roots of the mind mapping diagram (consequently, the site's physical name on the ECM platform was the same as the group's). **Figure 5** presents an example of a site dedicated to Laboratory Managers. The site had a few groups of employees and access to various content areas in the repository and social functions the group needed. Mind mapping notation is so simple and intuitive that ECM platform site modeling can be passed directly to target employees just providing them with the pattern. IT tools include many programs, both free and commercial, that support mind mapping. CASE-type packages also offer mind mapping diagrams as a complete analytical tool, as does the Visual Paradigm package used by the author [27].

5.2 Content processes perspective

The processes responsible for creation, modification, distribution (as well as other stages of content lifecycle) of content processed in ECM systems have been named "Content Processes" or "Content Workflow" [28]. Literature research

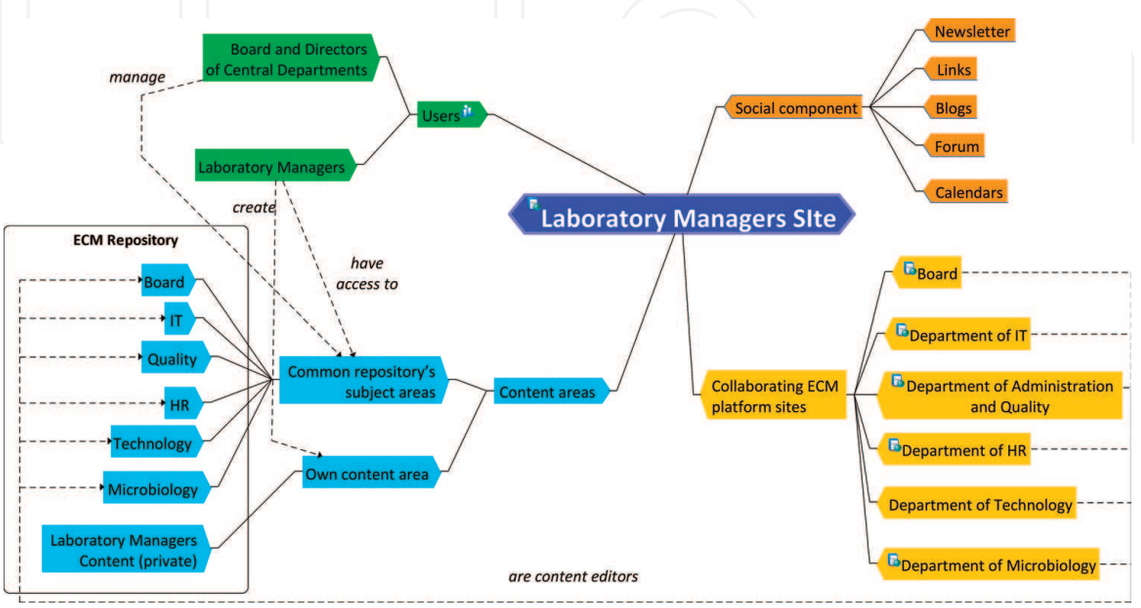

Figure 5.
Content map of laboratory managers site (mind maps notation).

and practical experience confirm that most of the content processes modeled are ordered workflows unlike ad hoc processes, which also appeared in the project. Since there are certain differences in understanding and modeling between the two types, each of them constitutes a separate ECM3 subperspective. Because of the fact workflows are prevailing and the chapter's length is limited, the ad hoc processes subperspective will be presented in the author's future articles.

Workflow processes have a defined path (compliant with organization's rules) including alternative and parallel executions. Ordering workflow processes present in the ECM area is a consequence of organizational rules, which determine what the correspondence flow, invoice authorization, or quality document preparation should look like. The rules are described in official regulations and procedures, accepted by the board and to be obeyed by every employee.

Workflow is based on roles resulting from the company's organizational structure. Assigning employees and groups of them to particular process activities realization occurs where the two perspectives meet. We may say that process described in this way becomes the basis to be implemented in ECM platform process engine. Today, selecting process modeling tools is much easier as in 2004, Object Management Group (OMG) published the first standard covering the area—Business Process Model and Notation (BPMN) [19]. When it comes to ECM platform implementation, the standard's (currently v. 2.0) superiority manifests in the fact that process engines also make use of graphic notations, mostly BPMN. Using XML format like Business Process Execution Language (BPEL) for transferring models between various tools by other developers—CASE tools and the abovementioned process engines—is yet another advantage of the standard. The notation's foundations are easy to learn and comprehend by the model's receivers. A few-minute-long introduction to its principles and elements' meaning is enough for them to actively participate in the analytical team. BPMN has also another, extended "implementation" version; being much more complex and consisting of a number of notation elements, it is rarely used at the analytical stage.

BPMN's swimlines are an extremely important concept in content workflow modeling. In large organizations, content workflow models do not consist of many activities or diverse paths (e.g., invoice circulation process is made up of registration, description, approval, and booking). The main focus there is to model who the activities will be performed by depending on the document's type or its target location.

BPMN is not devoid of disadvantages. As it is supposed to present the workflow and communication between the process' participants, it does not show more detailed information on the documents or document sets being processed. The project used the recommendations offered in [29] and the author's own data objects naming convention.

5.3 Organizational structure perspective

Organizational structure primarily "links organizational units and positions within an organization" [30]. When considering its significance in content workflows, we need to note its function in management theory. The organizational structure analysis performed by Stabryła [31] distinguishes its three outstanding functions vital to content workflow: designating the assignment of work within the system, placing the processes across time (harmonization) and space (shows where the processes are realized), and determining resources (informational and technical). Practical experience shows that proper understanding of the functions is crucial to modeling not only organizational structure but also other ECM3 methodology perspectives. Organizational structure provides content workflow

with individual activity performers (via roles which very often directly relate to positions, e.g., Lab Manager or professional superior). Roles also correspond to the employees' functions resulting from the organizational structure, e.g., warehouseman role indicates employee(s) of the Warehousing Department. Organizational structure is not only used in the processes but also in the content perspective when building ECM repository's layout, creating content access mechanism or platform sites' structure. The project execution has demonstrated that because of its significance, organizational structure perspective should be the foundation for model building in an organization implementing ECM.

Selecting suitable modeling tool is not easy as the perspective is relatively young and underestimated. The process included a comparison of ARIS, BPMS, EA, and OrgChart in the context of organizational structure and its results were presented in the author's article [16]. The tool picked was the oldest and most popular business notation—OrgChart [32]. OrgChart is an extremely simple notation—it consists of one notation element (denoting organizational unit or post) and single relation denoting subjection. It's simplicity, accessibility, and popularity, which make it so well received by business users, become limitations for analysts. The main one is the lack of clear distinction between organizational unit's artifacts: cell, post, person, and role. Another one is problem with mapping a large organization consisting of up to few hundred organizational units. In order to eliminate these restraints, stereotyping and decomposition were proposed. Stereotyping means the ability to divide notation elements into types (marked with <<..>> symbol known from UML). Decomposition consists in dividing a wide organizational structure into levels which ultimately provides us with a multilevel model equipped with a level navigation mechanism.

Figure 6 presents a single diagnostic lab with its organizational cells, posts, persons, and roles. Stereotyping mechanism was used. The roles mentioned in the diagram will be part of the medical procedure document flow.

5.4 Locational structure perspective

ECM platforms are popular in organizations searching for uniform, central, and common access content storage and processing space. Problems appear for

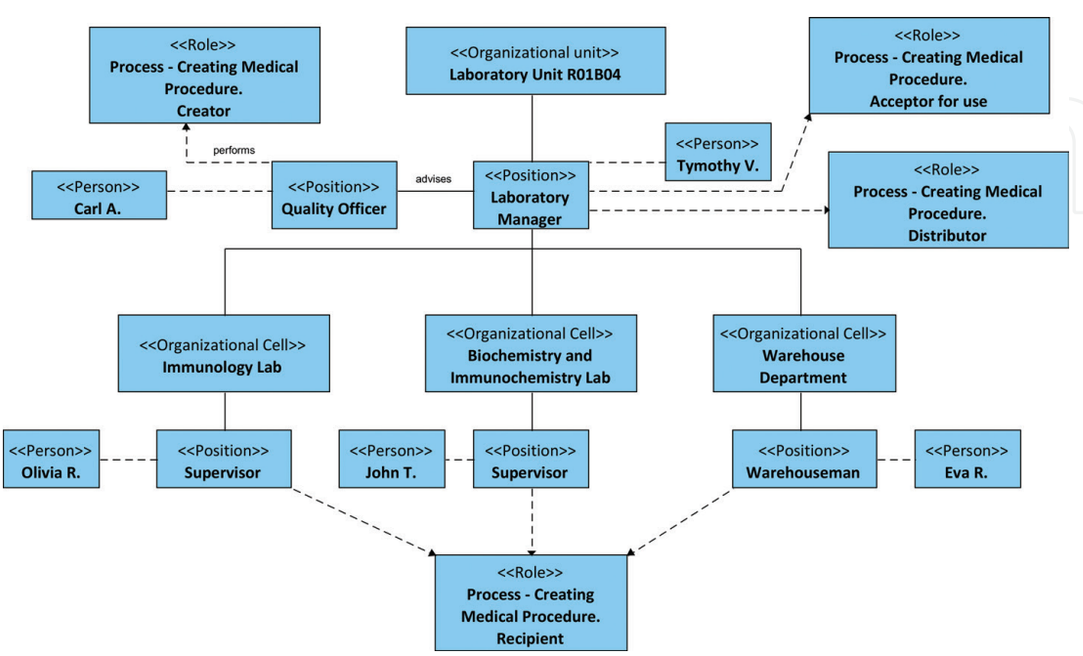

Figure 6.
Single laboratory structure (OrgChart notation).

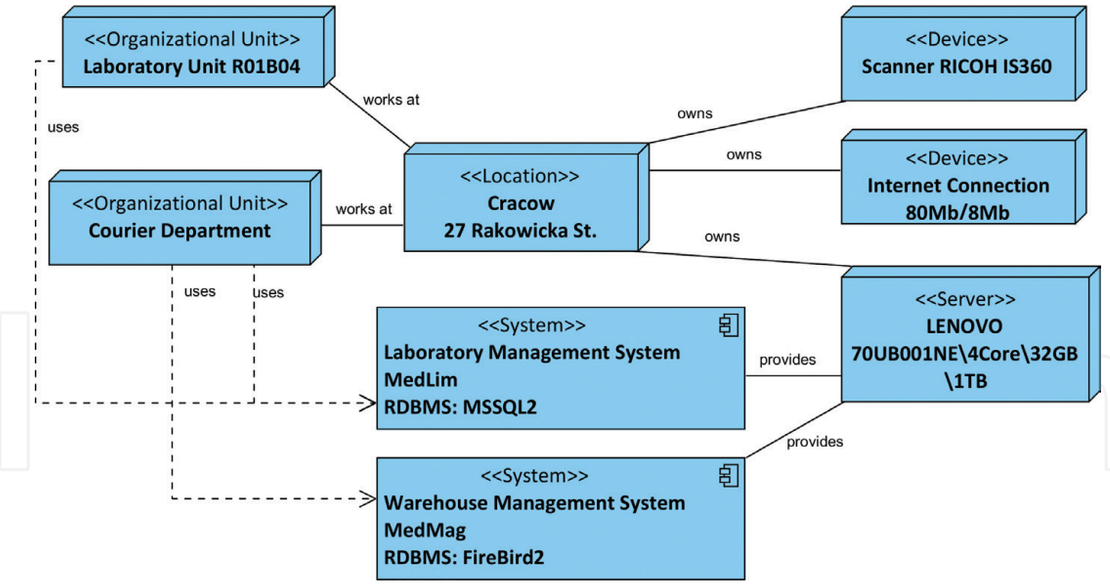

Figure 7.
Single place of document inflow (locational diagram notation).

organizations consisting of an extensive structure of physical locations where their business is run. The company subject to this chapter is a multibranch organization spread across the whole country. Switching from traditional physical document circulation to electronic one required detailed planning of a countrywide locations network. Subsequently, we had to answer the question to which locations the documents were delivered (and in what form) and which locations they were sent from, taking into account both internal and external receivers. Next step consisted in defining the IT equipment requirements for the locations (scanners, barcode scanners, printers, etc.) as well as infrastructure and software, which would be used in each of the locations by employees realizing their tasks on ECM platform. One should note that locations are not identical with organizational units (it occurs occasionally in smaller organizations). When planning a locational structure, we have to consider which organizational units use individual locations.

To date IS analysis and design methodologies have been practically devoid of the locational structure perspective. Some of its elements could be found in tools like BMPS or ARIS. Detailed comparison has been presented in one of the author's papers [16]. Since there were no ready tools dedicated to handle all the requirements, an attempt was made to extend one of the UML diagrams—deployment diagram. The diagram represents distribution of physical and software components (node elements) and their mutual relations [22]. The notation was extended with locational and organizational unit nodes support but the principles for the diagram's creation remained unchanged (named locational diagram). **Figure 7** presents a single location with two organizational units. The location is prepared to work on an ECM platform (is equipped with the right hardware, software, and connections). Decomposition can be used to build a collective locations network.

6. Conclusion

The chapter presents the second stage of the research whose aim was to create an integrated and comprehensive modeling methodology dedicated to organization preparing for ECM platform implementation, and specifically the process of analytical tool selection for key tactical perspectives on enterprise defined in the ECM3

Perspective	Subperspective	Recommended modeling tools
Content	Unstructured content	XML, ERD, UML class diagram
	Structured content	ERD, UML class diagram
	ECM platform map	Mind maps diagram
Processes (content workflow)	Workflow	BPMN
	Work group ad hoc processes	BPMN, CMMN
Organizational structure		OrgChart (including the author's modifications)
Locational structure		Locational diagram (the author's proposition)

Table 1.
A set of selected perspectives and ECM3 methodology tools.

methodology. ECM3's main perspectives are content, process (content workflow), organizational structure, locational structure, business rules, and IT environment. The chapter describes tools for the first four. An ordered list of the perspectives, subperspectives, and recommended tools is shown in **Table 1**.

The tools selected meet two core criteria—open accessibility and significant comprehensibility for non-IT business users participating in the platform's implementation. Fulfillment of the last criterion was verified in the project subject to this chapter—ECM platform implementation in a medical multibranch enterprise. All of the presented tools were demonstrated, tested, and enhanced by an analytical team which the author was a member of. Without problem reporting, criticism and numerous valuable ideas from the people cooperating with the author the ECM3 methodology's development would not be possible.

The author's next short-term research plans will focus on the description of tool selection for the two remaining ECM3 perspectives: business rules and IT environment. Next, more complex stages of ECM3 methodology development will be researched: analytical procedure, rules for analytical team member selection, and supporting IT tools. ECM3 is going to evolve for two reasons. First, the whole ECM domain is going to evolve—new technologies will be involved, new strategies created, completely new areas for the abovementioned elements' use will appear. Second, people facing the task of ECM tools implementation in an organization will have a much better knowledge and deeper experience in the subject area—the author invites all of them to cooperate.

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