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A Business Process Perspective on Enterprise Content Management: Towards a Framework for Organisational Change

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A BUSINESS PROCESS PERSPECTIVE ON ENTERPRISE CONTENT MANAGEMENT: TOWARDS A FRAMEWORK FOR ORGANISATIONAL CHANGE

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Abstract

The huge amount of content in today's work life brings up new challenges for Business Process Management (BPM). The right content has to be provided at the right time, of the right quality, and at preferably low cost. So far, a remarkable number of software products have been developed for the management of enterprise content. However, there is still a significant lack of knowledge on how to efficiently make use of these systems in a specific organisational context. With this paper, we present a framework, taking a business process perspective on Enterprise Content Management (ECM). Within the framework, different types of content are identified that are relevant in regard to the business processes of a company. For each type of content blueprints are developed that describe how to make use of specific services of ECM systems. In order to implement organisational change, methodical support is provided on how to embed the blueprints into the business processes of a company.

Keywords: Business Processes, Business Process Management (BPM), Enterprise Content Management (ECM), Framework, Organisational Change

1 INTRODUCTION

In the course of daily business, companies create enormous volumes of content. Enterprise Content Management (ECM) is an emerging field in Information Systems (IS) research dealing with strategies, processes, skills, and technologies providing the means for administering content (Smith and McKeen 2003, p. 1). Acting as an important instrument for an effective knowledge management (Davenport and Prusak 2000), ECM enhances content availability and positively affects an organisation's business processs performance (Reimer 2002, p. 17).

The fact that the boundaries between BPM and ECM are becoming increasingly blurred in practice (Chambers 2007, p. 36) shows the necessity for guidelines on how to integrate both approaches. However, little academic work has been carried out so far on implementing ECM within BPM research. At the same time, a business process perspective has not been established yet in the field of ECM. As a result, there is still uncertainty on how to realise the potentials of organisational change by implementing ECM.

With this work, we present a process-driven implementation framework for ECM. The framework is inspired by the idea of embedding reference processes ("blueprints") within an organisation's business process structure. As these blueprints serve as guidelines on how to implement ECM, the framework is referred to as "ECM-Blueprinting". Fields of application offering great potentials for organisational change through ECM are identified by business processes specification and analysis. Additionally, the potentials of organisational change are assessed by profitability analysis.

According to a design science approach (Hevner et al. 2004; Simon 1996), we first analyse previous work in the field of ECM (section 2) and then we introduce an established framework for ECM research which has been applied within the development of ECM-Blueprinting (section 3.1). As our work is based on the perception that an ECM implementation has to be aligned with a company's business processes, we refer to the IT-Business-Alignment approach serving as theoretical foundation (section 3.2). We then introduce ECM-Blueprinting (section 4) and present the first results of its deployment in a real-life business context to illustrate its practical applicability (section 5). Subsequently, we discuss our findings (section 6). We identify limitations of the framework and reflect on the current stage of our research. We conclude with a short summary and give an outlook on future work (section 7).

2 RELATED WORK

The ECM Association (AIIM) defines ECM as „technologies used to capture, manage, store, preserve and deliver content […]" (www.aiim.org). However, ECM exceeds technological aspects alone and furthermore captures strategies, approaches and methods ensuring a suitable enterprise-wide content-rationing (Smith and McKeen 2003, p. 1). Providing means to enhance content quality and consistency and to reduce content-related costs (Rockley et al. 2003, p. 14), an integrated ECM offers great potentials to raise an organisation's business process efficiency (Reimer 2002, p. 17). Moreover, as ECM addresses issues of compliance (e.g. archiving times) (O'Callaghan and Smits 2005), it contributes to the improvement of business process effectiveness.

Despite the evident benefits ECM may exhibit and though it has been stated that ECM is an important subject of IS (Päivärinta and Munkvold 2005) as well as BPM research (Chambers 2007), it has hardly gained any scientific interest up until now. An in-depth examination of existing contributions to ECM research indicates that previous work mainly focuses on one of the following three fields: technology, strategy, or implementation. A business process perspective offering guidelines and decision support for organisational change is widely neglected. Technology-related publications dealing with ECM and associated disciplines like Records Management, Document Management or Web Content Manage-

ment (cf. e. g. McKeever 2003; Bronwing and Lowndes 2001) represent the biggest proportion of publications. For example, Reimer (2002) especially focuses on the structure and functions of ECM systems. Within his work, the business process perspective is only reverted to when estimating the impact of ECM on business process efficiency. Further approaches deal with ECM strategy development. Smith and McKeen (2003) focus on defining relevant terms and concepts for ECM. O'Callaghan and Smits (2005) distinguish ECM from related approaches and present a framework for ECM strategy development pointing out the need for decision support. However, neither of the two reports consider the necessity of aligning ECM with business processes. Rockley et al. (2003) present an overall guideline for the development of a unified content strategy. Focussing on content collaboration, they also disregard a business process view. Nordheim and Päivärinta (2004, 2006) mainly concentrate on ECM implementation issues and present a framework for ECM customisation (Nordheim and Päivärinta 2004). Finally, Päivärinta and Munkvold (2005) present a content model for ECM providing an integrated perspective on information management. A business process perspective as well is once more completely neglected.

Recapitulatory, we detect a lack of adequate methodical guidelines and decision support instruments for implementing ECM. Accordingly, Tyrväinen et al. (2006) state that ECM has widely been neglected within IS research. As the recent approaches in the field point out the necessity of implementing ECM and BPM in conjunction (Chambers 2007), we conclude that in particular the business process perspective received far too little attention. Following a design science approach (Hevner et al. 2004; Simon 1996), we therefore developed an ECM implementation framework from scratch which is mainly based on developing, analysing and re-engineering business processes. A theoretical background for this perspective on ECM is provided in the following for both, BPM and ECM. Accordingly, a framework for ECM research by Tyrväinen et al. (2006) is presented, as well as the IT-Business-Alignment approach by Henderson and Venkatraman (1992).

3 THEORETICAL BACKGROUND

3.1 ECM Research Framework

Within their framework for ECM research, Tyrväinen et al. distinguish between four relevant research perspectives: Content, technology, processes and enterprise (cf. Figure 1 and Tyrväinen et al. 2006 in the following).

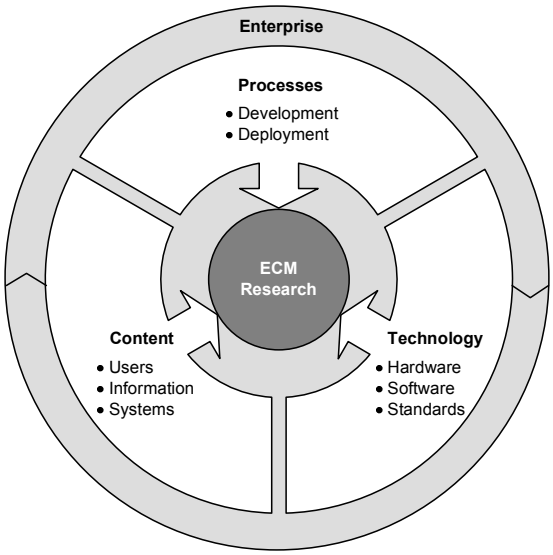

Figure 1. Framework for ECM Research

Research questions on the content level refer to information (primarily semantics of content), users (and their relations to certain content objects) and – the often various – systems (in which content objects reside). The technology perspective comprises hardware, software and standards being applied for the management of content. On the one hand, Tyrväinen et al. hold technology as an important enabler of ECM. On the other hand, they conclude that the major focus of ECM research lies in systems rather than technologies (as an ECM system comprises a number of technologies and functionalities). The process view refers to both, process development and deployment. As mentioned in the previous section, Tyrväinen et al. specifically identify shortcomings in ECM research concerning process deployment. Finally, the enterprise perspective describes the context for content management and, therewith, especially comprises social and legal aspects (e. g. archiving times) which are relevant to all other perspectives. Therefore, we arranged the enterprise as the background for the other perspectives in Figure 1.

Our work is based on the perception that an implementation of ECM has to consider all of the research perspectives introduced above. Within the scope of this paper we uphold the position that the process perspective may serve as a means to integrate the various perspectives – according to a so called fit of design. Evidence for this position is given by the IT-Business-Alignment approach that is illustrated in the following section.

3.2 IT-Business-Alignment

The term "IT-Business-Alignment" refers to the mutual alignment of business and information technology (IT) (Henderson and Venkatraman 1992). The IT-Business-Alignment approach is based on the structural contingency theory (Venkatraman and Prescott 1990) which in turn is related to the classical organisational theory by Chandler (1962). Both theories coincide in their proposition that a company's business strategy determines its organisation. Moreover, the structural contingency theory indicates that structural variables, for example a company's business strategy, influence the efficiency of information systems (Weill and Olsen 1989). To demonstrate fields of application for IT-Business-Alignment, the Strategic Alignment Model is presented in the following Figure 2.

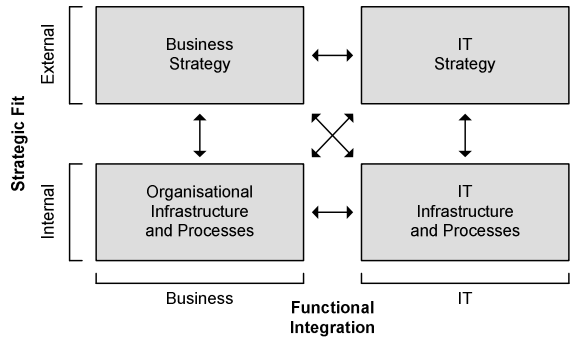

Figure 2. Strategic Alignment Model (Henderson and Venkatraman 1993)

Illustrating the coherences of the structural contingency theory, the model shows that business and IT have to be aligned on an internal as well as an external level. As a result, there are four components, namely: Business strategy, IT strategy, organisational infrastructure and IT infrastructure (cf. Henderson and Venkatraman 1992, 1993; Luftman 1996). According to the structural contingency theory, these fields have to be aligned vertically ("strategic fit") as well as horizontally ("functional integration"). Thus, strategic fit characterises the alignment between the operative and the strategic layer, while functional integration refers to the alignment of business and IT.

In conclusion, the Strategic Alignment Model demonstrates the necessity for aligning business and IT on both, an operative and strategic level. Hence, it may serve as a theoretical foundation for implementing ECM taking business processes as the origin. As presented above, further approaches in the

field of ECM explicitly focus on ECM strategy development. Thus, in the following, we primarily refer to the operative level (functional integration) by presenting the ECM-Blueprinting framework which integrates both, IT-Business-Alignment and the framework for ECM research.

4 INTRODUCTION OF ECM-BLUEPRINTING

The implementation of ECM requires methodical support according to the four perspectives of the previously presented research framework for ECM. In the following Figure 3, the ECM-Blueprinting framework is illustrated. It distinguishes between different phases (symbolised by arrows), results (symbolised by rectangles) and methods (being applied within the phases).

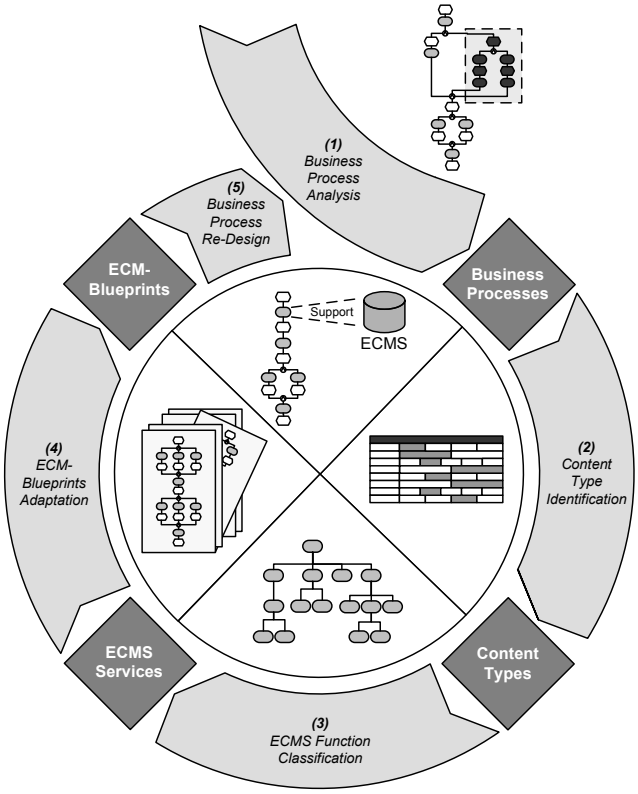

Figure 3. The ECM-Blueprinting Framework

According to the IT-Business-Alignment approach, the framework is mainly based on Business Process Analysis (phase 1). The processes are described by means of business process modelling (here symbolised by the Event-driven Process Chain (EPC) method; cf. Scheer and Schneider 2006). The conceptual specification of processes primarily serves two purposes: On the one hand, different entities of content can be identified, as they are applied within the processes. On the other hand, those processes or parts of processes that offer high potentials for improvement through ECM support can be detected (visualised by the dark coloured process elements). Next, different types of content are identified (phase 2). Therefore, certain attributes for characterising the different content types need to be elaborated (e. g. content format or media). Subsequently, attribute values are defined for the beforehand discovered content entities (e. g. format: document, media: paper). Within this phase, methodical support is represented by morphological boxes (Knackstedt and Klose 2005). As a result of phase 2, content objects possessing the same attribute values are combined into a common content type. Within phase 3, different ECM systems (ECMS) are analysed with regard to their functionalities. Functions being required to manage certain content types are assigned to ECMS services (here symbolised by a functional decomposition diagram; cf. Scheer and Schneider 2006). As a result of

phase 3, functions (and therewith systems) are identified which are necessary for managing content according to a company's individual business process structure. Hence, according to an IT-Business-Alignment, the organisational infrastructure is considered before making decisions on the IT infrastructure. Subsequently, reference processes for implementing ECM are adapted according to a company's individual organisational structure (phase 4). These reference processes, called ECM-Blueprints, consider different content types as well as ECMS services. Finally, the ECM-Blueprints are embedded into the existing business process structure (phase 5). By redesigning business processes (van der Aalst 1995), the application of processes (or process parts) is transferred to the ECMS (symbolised by the re-organised process: Within the process, the ECMS supports the dark coloured process parts which originally had been manually applied). To conclude, phase 5 refers to organisational change towards implementing ECM and therewith to the alignment of business and IT infrastructure (functional integration). The resulting benefits can be assessed by profitability analysis, for example on the basis of personnel costs. As the requirements for managing content change as well as a company's business processes, the five phases iterate (symbolised by the framework's circulation).

The following chapter presents an exemplary application of the ECM-Blueprinting framework taken from a real-life industry project. Please note that the documentation has been slightly simplified for the sake of an intentionally clear presentation of the framework.

5 APPLICATION OF ECM-BLUEPRINTING

5.1 Phase 1: Business Process Analysis

In ECM-Blueprinting, specifying business processes by means of conceptual modelling primarily serves the purpose of identifying the content entities being accessed, the organisational units that participate, and the IT systems being involved within the processes. Thus, according to the ECM research framework, the relationships between users and content may be considered, as well as the different systems in which content resides. Moreover, conceptual models serve as a basis for business process analysis. An exemplary business process that has been specified within the project is displayed in the following Figure 4.

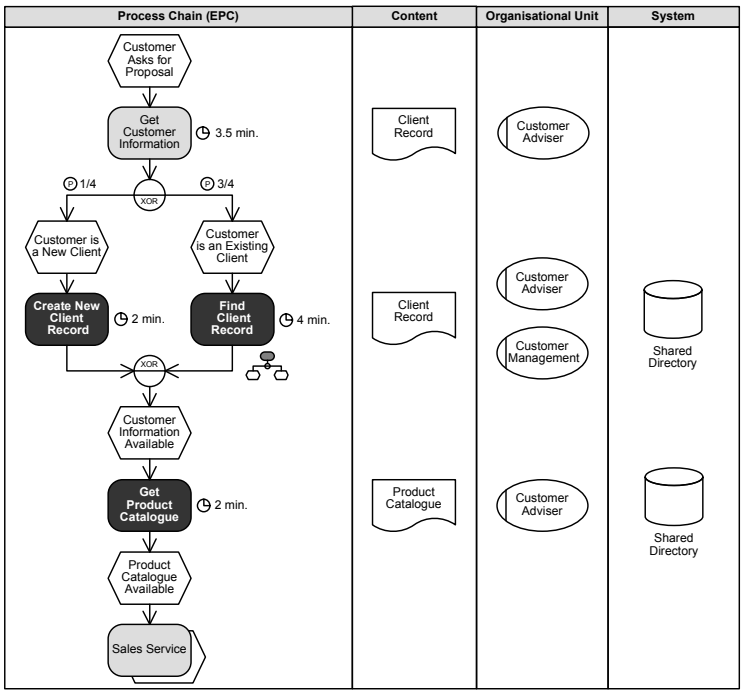

Figure 4. Example: Business Process Analysis

The considered process starts with a customer-request for a certain proposal. Hence, the customer information has to be accessed first. The customer may either be an existing or a new client. Accordingly, the customer advisor needs to search for an already existing file within a shared directory or has to create a new client record. In case the customer advisor cannot find the client's record he might have to call the customer management for assistance (this function is not part of the main business process description and therefore is displayed in a separate process as depicted by the refinement symbol, cf. phase 5). The business process finally ends with the supply of the proposal after accessing the product catalogue.

Within the example, the average lead time for each function is specified as well (represented by clock symbols). Along with event probabilities (symbolised by the "P" symbol), they can be used for business process analysis: For example, the function *Get Customer Information* takes 3.5 minutes on average as accessing an existing client record (respectively the creation of a new one) in general takes 4 (respectively 2) minutes, taking into account an occurrence probability of ¾ (respectively ¼) percent. Just like the product catalogue access (Ø 2 minutes), these functions offer high potentials for reorganisation by automation in terms of application time and personnel costs (symbolised by the dark coloured function elements).

5.2 Phase 2: Content Type Identification

The second phase of ECM-Blueprinting refers to the properties of content objects that have been identified within phase 1. Hence, it addresses the third content view of the ECM research framework (information). Regarding the content perspective, most approaches in the field of ECM primarily focus on content media. Hence, in the majority of cases content management approaches distinguish different types of content subject to their physical nature (e. g., as in contrast to digital files, paper documents have to be scanned for capturing). We hold that managing enterprise content comprises not only the physical condition, but in particular the organisational context of the content. Content entities featuring the same type of media may require an alternative management as their organisational requirements may also differ (e. g. compliance). Within our framework, the organisational context of content can be considered on the basis of business process modelling. According to the specified functional, user and system context of content, attributes representing these organisational requirements are firstly elaborated. Subsequently, attribute values are defined for all content entities. Content objects with the same attribute values are finally grouped into a common content type requiring the same ECM support.

Within the example of our project, there are two content entities: The client record and the product catalogue. Exemplary attributes and attribute values are presented within morphological boxes in the following Figure 5.

Client Record			
Attribute	**Attribute Value**		
Media	Paper	Digital	
Format	Text	Graphics	
Confidentiality	Low	Average	High
Change Frequency	Low	Average	High
...	...		

Product Catalogue			
Attribute	**Attribute Value**		
Media	Paper	Digital	
Format	Text	Graphics	
Confidentiality	Low	Average	High
Change Frequency	Low	Average	High
...	...		

Figure 5. Example: Content Type Identification

The client record is perennially stored in a digital format and contains only text elements. In contrast, the product catalogue is archived as both, a hard copy and a digital file, and may also contain graphical elements. Furthermore, the client record is highly confidential and infrequently changed, whereas the product catalogue can be accessed even by external persons and is altered more frequently. Both content objects posses different attribute values. Hence, according to our systematisation, they cannot be combined to a content type. However, the attribute values imply a deviant treatment of the two content

objects and consequently different requirements on the technological level. For example, a high change frequency requires a high availability and therewith short-time access. Hence, within phase 3, different ECMS services providing the means to fulfil these requirements are elaborated.

5.3 Phase 3: ECMS Function Classification

Phase 3 of the ECM-Blueprinting framework comprises the analysis of available ECMS with regard to the identified organisational requirements for content management. Hence, it refers to the technology view of the ECM research framework. There is a manifold of ECM solutions (e. g. *OpenText*, www.opentext.com; *EMC*^{2}, www.emc.com) and practical reports comparing their functionalities (www.aiim.org). The challenge is to identify systems and functions fitting a company's requirements best, on both, the organisational and the content level. In order to provide a systematic overview, ECMS functions can be combined to ECMS services. Within ECM-Blueprinting, ECMS services are arranged on the basis of functional decomposition diagrams. A functional decomposition diagram for the example is represented in the following Figure 6.

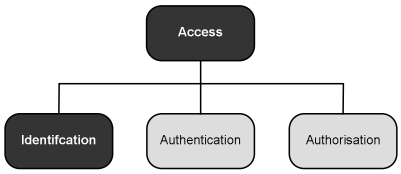

Figure 6. Example: ECMS Function Classification

Referring to the two main functions of the presented EPC (*Get Customer Information* and *Get Product Catalogue*), an exemplary ECMS service *(Access)* may, for example, comprise three ECMS functions. The *Identification* of content deals with locating mechanisms on the basis of structural content information (e. g. content title, client name, invoice date) in order to detect certain content objects. Furthermore, an ECMS may provide the functionality to check whether the content-requester is the one who he is declared to be (*Authentication*) and whether he has the right to access the content object (*Authorisation*). Authentication as well as authorisation is not necessary for each content type. Within our example, the necessity is determined by the degree of confidentiality of the two content objects. In contrast to the client record (being highly confidential), the product catalogue can even be accessed by external persons (e. g. by web access). Hence, log-in or authorisation checks are not required (symbolised by the light-coloured functions). In conclusion, phase 3 mainly serves the purpose of identifying ECMS services and functions that are (not) required for managing a company's organisational content situation. Hence, it serves as decision support in choosing the right ECM system(s).

5.4 Phase 4: ECM-Blueprints Adaptation

Within our research in the field of ECM, we are currently developing reference processes for ECM implementation (ECM-Blueprints) using the EPC method, for example, to capture, access or archive content. Thereby, we correspond with the process development view of the ECM research framework. However, as the management of content is a highly specific task, within phase 4, the ECM-Blueprints have to be adapted concerning an organisation's individual content situation (Rosemann and van der Aalst 2003). For that purpose, particularly design principles of reference modelling, like configuration (Becker et al. 2004), specialisation, aggregation, instantiation, and analogy can be applied (vom Brocke 2007). An ECM-Blueprint referring to the example of our project is displayed in the following Figure 7. It represents a guideline on how to implement content access referring to the ECMS functions presented above. Hence, it comprises content identification (by content ID), log-in procedures, and the protection of content access.

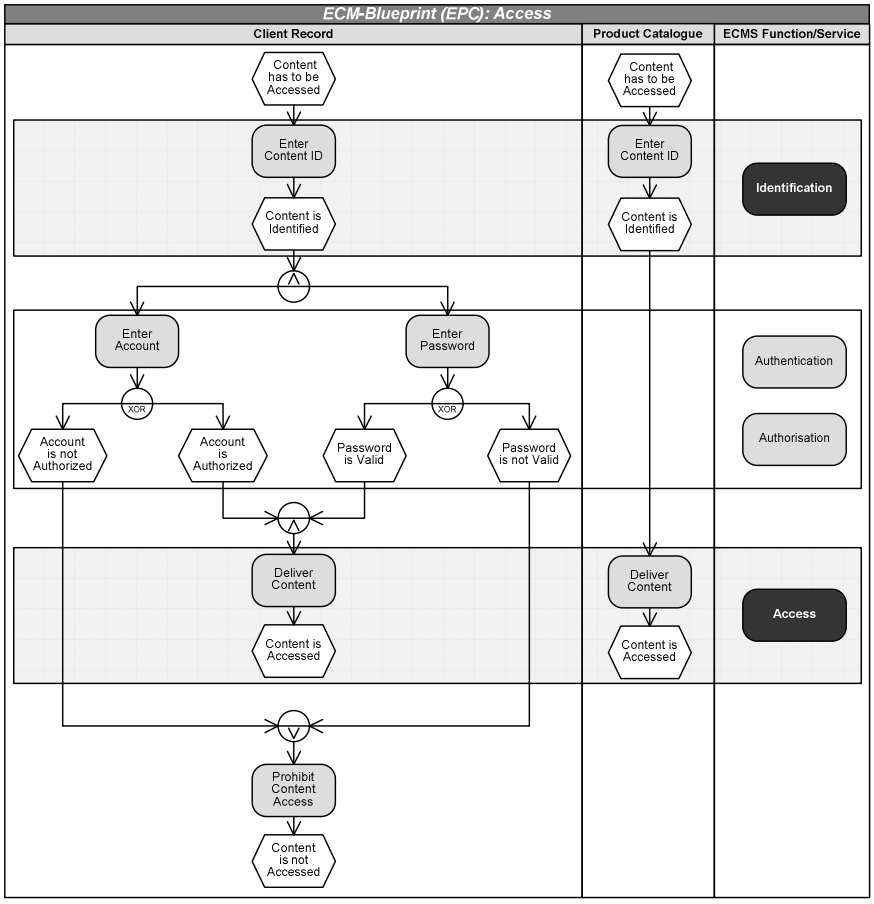

Figure 7. Example: ECM-Blueprints Adaptation

Within the example, the adaptation process is implicitly illustrated by means of configurative reference modelling (Becker et al. 2004). The defined attribute values characterising the different content types can be used as configuration parameters for the blueprints adaptation. Accordingly, the (adapted) access blueprint for the product catalogue contains no functions and events referring to authentication or authorisation (symbolised by the shaded field).

5.5 Phase 5: Business Process Re-Design

Finally, the adapted ECM-Blueprints are embedded into a company's organisational structure. Therewith, phase 5 refers to the process deployment view of the ECM research framework. In the following, this is presented in more detail for the function *Find Client Record* that is displayed in Figure 8. The average lead time for the function (originally 4 minutes on average) is reduced to 12 seconds when using the ECMS. Reverting to these time savings and to the application frequency of each function it is possible to directly calculate the personnel cost reductions that can be realised. Finally, these cost reductions have to be summed up for all re-designed processes to compare ECM benefits and the costs of its implementation (e. g. investment costs). However, please note that these time values (as well as the probabilities) have been collected from interviews with different content users. In particular the lead times of the re-engineered business process are therewith quite subjective.

Furthermore, the example shows how the enterprise perspective of the ECM research framework may – in terms of compliance – be considered when applying ECM-Blueprinting. In the re-designed process, this possibility is briefly demonstrated by prohibiting the unauthorised access of the client record (in order to thereby fulfil legal restrictions in reference to the confidentiality of a content asset).

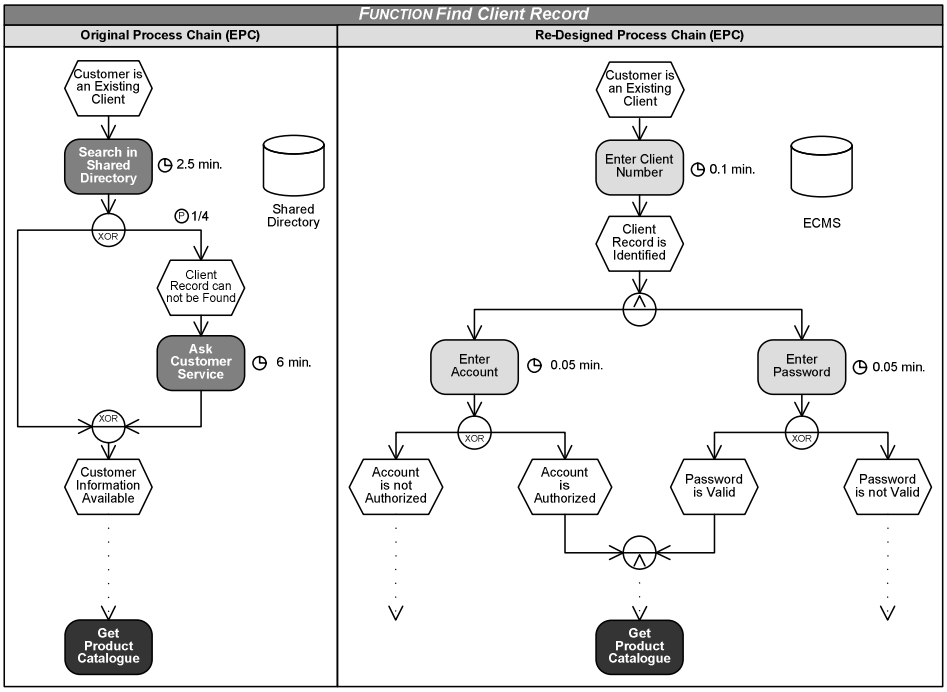

Figure 8. Example: Business Process Re-Design

In the following, we discuss our findings gained so far.

6 DISCUSSION

Our research towards the ECM-Blueprinting framework follows the design science research paradigm. In this section, we therefore reflect on the lessons learned from deploying the ECM-Blueprinting framework in order to draw conclusions.

Validation: The evaluation of the ECM-Blueprinting framework is limited to a single business case so far. To give further evidence to its applicability and usefulness, we consider additional deployments necessary. In particular, the project work focussed on the conceptual re-design of content-related business processes. As yet, the potential benefits of the re-design have been estimated by the interviewees on the basis of lead times. The actual effects of ECM on business process efficiency remain to be evaluated in more detail. For that purpose, we particularly intend to apply ethnography-based research methods (Tan and Hail 2007).

Completeness: As ECM is a highly complex task, we cannot claim that our ECM-Blueprinting framework completely integrates the entirety of the relevant design and managerial issues. We firmly believe that specifically established subfields of BPM research might need to be considered when applying our framework, e. g. people and culture (Rosemann and de Bruin 2005). On the one hand, the framework already includes an employee perspective – the content users as interviewees – in order to assess the organisational requirements of certain content assets. On the other hand, employees might also need to be integrated in the phase of business process re-design in order to avoid problems of acceptance like the "not-invented-here"-phenomenon, and to ensure a holistic application of the re-designed work flows.

Level of detail: Several phases of ECM-Blueprinting represent very complex tasks in themselves, e. g. the development of ECM-Blueprints, the content classification, or the identification of ECM services. A more detailed elaboration of precise methods and procedures for these phases depicts part of the forthcoming work. In particular, we will focus on the development of an ECM-Blueprint library, well-defined guidelines for the content classification, and a holistic systematisation of ECM services.

7 CONCLUSION

With this paper, we introduced an integrated approach of Business Process Management (BPM) and Enterprise Content Management (ECM) taking a business process perspective on the management of enterprise content. Therewith, we intend to contribute to an emerging field of IS research that has received far too little attention within the related research communities until now. By means of a comparative analysis of ECM research literature we pointed out that methodical support and decision support for implementing ECM (especially with regard to business processes) has widely been neglected so far. Accordingly, we introduced a framework for ECM implementation, named ECM-Blueprinting, by making use of established methods in the field of BPM, like business process analysis.

A theoretical foundation for our approach was given for both BPM and ECM. The IT-Business-Alignment model was used in order to give ground to the necessity of a reciprocal adjustment of business processes and ECM implementation. An established framework for ECM research was considered to identify different research perspectives (content, technologies, processes, and enterprise) that implicitly structure the procedure of ECM adoption within ECM-Blueprinting.

In order to study the applicability and usefulness of our approach, we deployed the framework in a real-life business project. The application revealed that ECM-Blueprinting may represent a helpful instrument for a company to analyse its content-related organisational requirements, implement organisational change and support content management with the most appropriate ECM systems. Furthermore, a concept was introduced which allows for the estimation of the potential increases in business process effectiveness (e. g. in terms of compliance) as well as feasible improvements regarding the overall cost-efficiency. However, we also discussed certain limitations of our approach which will be subject to future research.

Our findings may provide a basis for further research on the issue of realising organisational change by ECM. In order to further elaborate our framework and to provide a deeper insight into its practical applicability and profitability, it will be deployed within additional industry projects. A special focus will be put on the presented research fields which are first and foremost: the development of an ECM-Blueprint library, guidelines for content analysis and an ECM service systematisation.

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