

Enterprise Content Management

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1 The Information Overload Challenge

The widely discussed and still unresolved problem of information overload is exacerbated substantially by technical innovations, such as social media, and legal requirements, such as documentation demands, and thus has a negative effect on both organizations and individuals. By the year 2015 global information volume is estimated to reach almost eight zettabytes,¹ an increase of 400 % compared to 2011. This vast amount of in-

formation is stored predominantly in unstructured form, mainly in e-mails, on websites, in social media, or in textual documents (Beath et al. 2012).

Within the business context, the concept of Enterprise Content Management (ECM) has emerged to manage such primarily unstructured forms of information (Grahlmann et al. 2011). While software producers offer well-engineered and comprehensive ECM solutions,² and even BITKOM, the German ICT industry association, has defined its own thematic priority on ECM,³ research on ECM remains rather immature (Grahlmann et al. 2011; Munkvold et al. 2006; Tyrväinen et al. 2006).

2 Definitions of ECM

For a basic understanding of the term ECM, many authors (e.g., Alalwan 2012; vom Brocke et al. 2011a, 2011b) draw on the definition established by the Association for Information and Image Management (AIIM): “Enterprise Content Management (ECM) is the strategies, methods and tools used to capture, manage, store, preserve, and deliver content and documents related to organizational processes. ECM tools and strategies allow the management of an organization’s unstructured information, wherever that information exists”.

In addition, other scholars have introduced broader definitions of ECM. For example, Grahlmann et al. (2011, p. 272) propose defining ECM as “the strategies, processes, methods, systems, and technologies that are necessary for capturing, creating, managing, using, publishing, storing, preserving, and disposing content within and between organizations”.

Based upon these different definitions of ECM, there is much discussion about whether ECM is actually a new field of IS research or rather no more than a conglomeration of long established ideas and concepts (vom Brocke et al. 2011b).

According to the latter definition, ECM is an integrated concept of information management which unites content management, document management, document imaging, and records management (Munkvold et al. 2006; Grahlmann et al. 2011). ECM is also often seen as a part of knowledge management which administers the explicit knowledge within an organization (Munkvold et al. 2006). In addition, ECM unifies and expands document and knowledge management with workflow, business process, and digital archiving management. (Munkvold et al. 2006; Scheepers 2006).

The complexity and diversity of the topics covered by ECM clearly show that a new type of information system is at play here. The primary aim of ECM is to ensure that business processes are provided with all the information needed, gathered from multiple sources. For this reason, ECM systems have to fulfill various functions in order to support the life cycle of unstructured information (e.g., word processing documents), as well as offer an integration with data sources of structured information (e.g., ERP systems). Thus, the scope of ECM ranges from suitable preparation, presentation, and personalization of information for end users to the development of algorithms for the purpose of information processing and information transformation. The concept of ECM, as explained in more detail below, thus extends far beyond the initial concepts it is rooted in (Grahlmann et al. 2011; Scheepers 2006; Tyrväinen et al. 2006).

3 ECM Concept

To date, there has been extensive research on diverse aspects of ECM, but little research providing a comprehensive conceptualization of ECM. **Figure 1** shows a framework based on three levels which provide a holistic view of ECM. The framework includes the enterprise level,

¹1 ZB = 1 billion terabytes.

²According to BITKOM, the ECM market in Germany, alone, grows up to 1.6 billions EUR in 2013 (http://www.bitkom.org/de/themen/69257_75297.aspx).

³<http://www.bitkom.org/de/themen/69257.aspx> or <http://www.ecm-navigator.de/>.

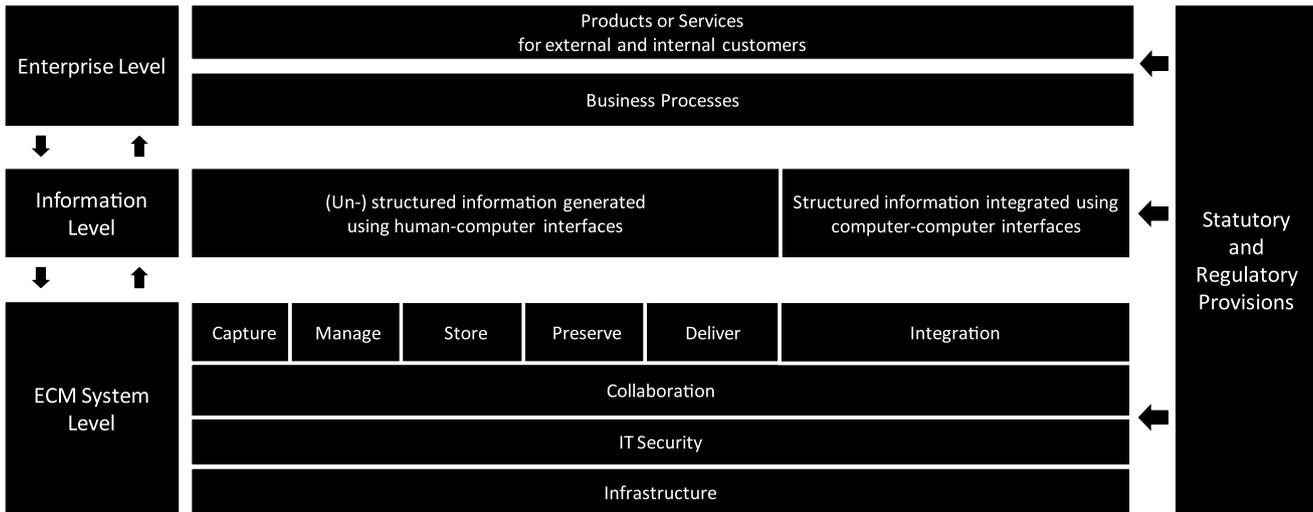


Fig. 1 Enterprise content management

the information level, and the ECM system level, whose design, however, depends on regulatory and legal requirements. The ECM concept, as illustrated in **Fig. 1** and described further in the section below, shows that at the enterprise level products and services are created and supplied to internal and external customers within an organization's business processes. All relevant and necessary information is organized at the information level. With regard to the different forms of information the creation of structured and unstructured information using human-computer interfaces and the integration of structured information using computer-computer interfaces can be distinguished. On the system level, an ECM system must at least offer the necessary technical functionality to both effectively support the non-automated creation of (un)structured information and integrate automatically generated structured data for the general use as part of business processes.

3.1 Enterprise Level

The enterprise level deals with the business-related procedures and the economic aspects of ECM. ECM is primarily responsible for supplying information for business processes in order to create and provide products and services for internal and external customers.

3.2 Information Level

The information level ensures the suitable structuring and preparation of information as well as determining the information requirements of end users and business processes. Examples for (un)structured information generated by means of human-computer interfaces are forms, word-processing or spreadsheet documents. The creation of information through communication with people is supported by the ECM system functions capture, manage, store, preserve, and deliver.

By communicating with other application systems the ECM system integrates external data sources. With the help of computer-computer interfaces, structured information stored in, for instance, ERP, CRM, or HRM systems, can be used also in the ECM system. Within the ECM system information is generally stored in the respective proprietary format. **Figure 2** illustrates the different types of information on the information level, based on the ADK structure model⁴ (Ferstl and Sinz 2012).

3.3 ECM System Level

On the ECM system level, ECM systems are "positioned as (technical) solutions for the organization-wide management of all types of content" (Grahmann et al. 2011, p. 269). This level cov-

ers the necessary technical functionalities for providing business processes with the right information. On the one hand it provides the functionality to support non-automatically generated compilation of information (capture, manage, store, preserve, deliver) and, on the other hand, the functionality for integrating automatically generated information. Managing non-automatically generated information is among the principle tasks of ECM (AIIM 2013). In addition, ECM systems support collaborative work and IT security. All parts of the ECM system have hardware and software components (infrastructure).

The main functions of ECM systems are described in the following:

- **Capture:** Content can be gathered non-automatically by people or automatically by application systems (e.g., ERP, CRM, HRM), including the extraction of contents through optical character recognition (OCR) from physical documents. To make the captured content usable, it is categorized and indexed.
- **Manage:** This function focuses on the administration of documents. In this respect, the meta-data-management is of importance. The document management is supplemented by functions such as the editing control (checking documents in and out for editing), as well as a version control.
- **Store:** Storage refers to the short-term filing of information. Different storage

⁴The ADK-structure-model by Ferstl and Sinz (2012) subdivides an application system into the subsystems *application function* (A), *data management* (D) and *communication* (K). The latter is further divided into communication with people (K_P) and communication with machines (K_M).

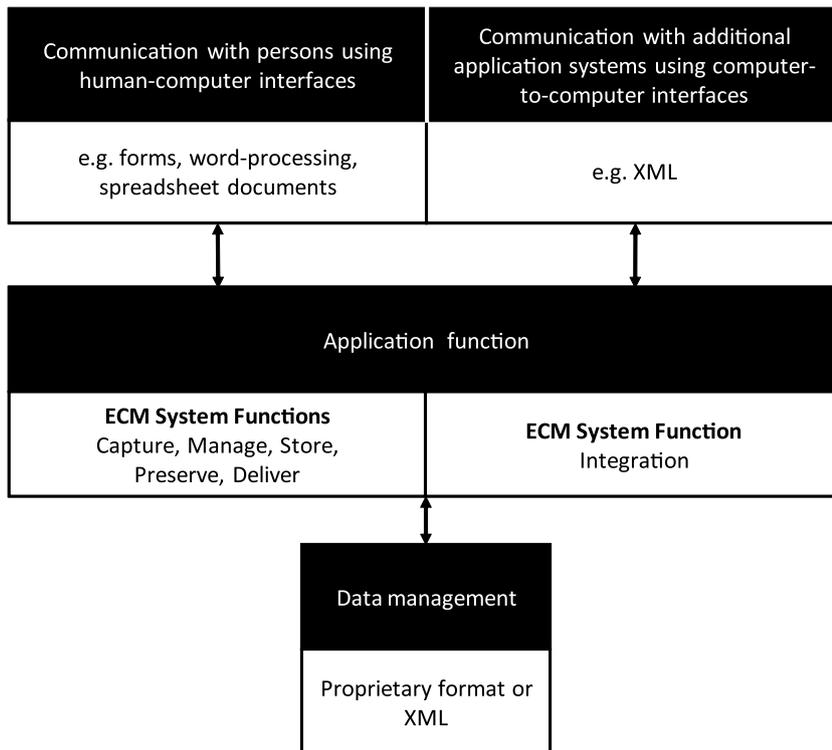


Fig. 2 Types of Information on the Information Level based on the ADK structure model (Ferstl and Sinz 2012)

technologies (such as local data systems) are used for making contents and documents available for daily use.

- **Preserve:** This feature refers to the long-term archiving of information and documents. ECM systems must in particular ensure that information is stored in a revision-secure manner.
- **Deliver:** This function refers to the publication and distribution of content to a receiver. Content can be distributed actively via e-mail etc., or passively via the Internet, intranet or extranet pages. Search functions are also part of this component.
- **Integration:** In an organization, several operational systems provide automated information processing (e.g., ERP, CRM, or HRM systems). Since these are not part of the ECM system, they need to be integrated with it. The ECM system provides features that enable the information of other systems to be further processed within the ECM system and vice versa.

Additional support functions of an ECM system include:

- **Collaboration:** Besides the basic functions for information provisioning, ECM systems provide various options for communication, coordination, and collaboration among employees, including communicating via text and visual media resources, coordinating group members and cooperating on joint tasks. In this context, social media play an increasingly important role in supporting the exchange of information among employees in organizations.
- **IT Security:** The security of information and documents are decisive considerations. Content must be protected from inappropriate and unauthorized access from within and from outside the company. Electronic signatures, user access controls, legal administration, and hardware data encryption must facilitate secure access for all types of information and documents.
- **Infrastructure:** Infrastructure components of the ECM system refer back to the key technology of ECM. Exam-

ples of hardware and software components include storage systems and algorithms for editing, preparing, and transforming information.

3.4 Statutory and Regulatory Provisions

The organizational issues of the three levels of ECM described above are subject to statutory and regulatory provisions. These guidelines define requirements for the design and execution of products and services as well as for the corresponding processes, but also for information and for system components. Examples of such statutory provisions include the Law on Corporate Control and Transparency,⁵ which regulates control and transparency within companies, the Law of Protection Network for Access Control,⁶ the Federal Data Protection Act,⁷ and the Principles of Data Access and Auditing of Digital Documents.⁸ Such requirements and statutory provisions must be adhered to at all ECM levels.

4 ECM Implementation

Depending on the particular scenario that should be served by ECM, it can be seen as a holistic management system for a broad range of information, and thus implemented as a “content warehouse” (Grahlmann et al. 2011). In this context, ECM can be understood as a service that provides different forms of information requested by other systems (Grahlmann et al. 2011). ECM can also be utilized as an integrative middleware to integrate a vertical, heterogeneous application landscape (Grahlmann et al. 2011). Here, the end user is unaware of the existence of the ECM system, as it provides the relevant infrastructure to integrate various applications and thereby allows the user, for instance, to have access to the diverse sources of information via web-technologies.

Thus ECM is a holistic concept for managing the use of information in business processes. ECM systems offer the necessary technical support for creating (un)structured information by means of human-computer interfaces and for integrating structured information via computer-computer-interfaces.

⁵Gesetz zur Kontrolle und Transparenz im Unternehmensbereich.

⁶Zugangskontrolldiensteschutzgesetz.

⁷Bundesdatenschutzgesetz.

⁸Grundsätze zum Datenzugriff und zur Prüfbarkeit digitaler Unterlagen.

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