



DEMO_net

**Content Management Systems in
eParticipation Contexts**

DEMO_net Consortium

Editor details

Author Name	Organisation	Email
Christian Schneider	UKL	christian.schneider@uni-koblenz.de
Sabrina Scherer	UKL	scherer@uni-koblenz.de
Maria A. Wimmer	UKL	wimmer@uni-koblenz.de

Author details

Author Name	Organisation	Email
Sabrina Scherer	UKL	scherer@uni-koblenz.de
Christian Schneider	UKL	christian.schneider@uni-koblenz.de
Maria A. Wimmer	UKL	wimmer@uni-koblenz.de

IST Network of Excellence Project
FP6-2004-IST-4-027219
Thematic Priority 2: Information Society Technologies

DEMO_net
The Democracy Network

DEMO_net : D 14.3 CMS

Content Management Systems in eParticipation Contexts

Editor: Christian Schneider, Sabrina Scherer,
Maria A. Wimmer

Revision: Final

Dissemination Level: P

Author(s): Sabrina Scherer, Christian Schneider,
Maria A. Wimmer

Due date of deliverable: 31 December 2007

Actual submission date: 14 February 2008

Start date of project: 01 January 2006

Duration: 4 years

WP no.: 14

**Organisation name of lead
contractor for this deliverable:** CNR-ILC

Abstract: As part of a series on emerging technologies for eParticipation (Web 2.0, CMS, Social Networking tools, personalization, NLP), this booklet investigates the concept, context and solutions for Content Management Systems (CMS) in general, and in their applicability for eParticipation areas. CMS are crucial to support eParticipation, although they are not to be understood specific eParticipation tools. Instead, CMS especially provide means for managing information and content – both, in internal applications and in form of web content management.

Project funded by the European Community under the FP6 IST Programme

© Copyright by the DEMO_net Consortium

Table of Contents

<u>1</u>	<u>INTRODUCTION</u>	<u>6</u>
<u>2</u>	<u>OVERALL DESCRIPTION OF CONTENT MANAGEMENT</u>	<u>7</u>
2.1	THEORY	7
2.2	RELATED APPROACHES	9
2.3	MODELS AND TOOLS	11
2.3.1	CMS made simple	12
2.3.2	Drupal	12
2.3.3	Joomla!	12
2.3.4	Plone	13
2.3.5	Textpattern	13
2.3.6	TYPO3	13
2.3.7	WordPress	14
2.4	ASSOCIATED RESEARCH GROUPS	14
2.4.1	The Data Management Association	15
2.4.2	Knowledge Management of the AIFB	15
2.4.3	Multimedia Content Management at the DFKI	15
<u>3</u>	<u>APPLICATION OF CONTENT MANAGEMENT SYSTEMS</u>	<u>16</u>
3.1	BUSINESS AND COMMERCE	16
3.2	GOVERNMENT	16
3.3	ONLINE EDUCATION	17
<u>4</u>	<u>FUTURE SCENARIOS FOR CMS IN EPARTICIPATION APPLICATIONS</u>	<u>19</u>
<u>5</u>	<u>CONCLUSION AND OUTLOOK</u>	<u>21</u>
	<u>REFERENCES</u>	<u>22</u>
	<u>APPENDIX A: LIST OF CONTENT MANAGEMENT SYSTEMS</u>	<u>24</u>

Executive Summary

As part of a series of booklets on emerging technologies for eParticipation, this booklet investigates the concept, context and solutions for Content Management (CM) and Content Management Systems (CMS) in general, and in their applicability for eParticipation areas. Content Management has a strong potential to support eParticipation in all levels of engagement. CMS are crucial to support eParticipation, although they are not to be understood specific eParticipation tools. Instead, CMS especially provide means for managing information and content – both, in internal applications and in form of web content management.

Content Management is a computer or web-based technology, which embodies a set of processes and technologies that support the creation, update and maintenance of digital information.

Content Management Systems, and especially Web-CMS, are well-known in many online portals nowadays. They are no longer off to think, because the tools do a lot of things, like:

- faster updates of a web site,
- easy-to-use interface, where authors don't need to have any knowledge about programming languages,
- each page bases on one standardised layout design (like Corporate Identity),
- accountability, because login data is tracked and often history functionality is given, and
- direct online access to web content.

This potential is being examined in the context of this booklet. It first gives an overall description and introduction in the area of content management for the field of eParticipation. Definitions of content management and content management systems are provided, too. Likewise, different system types are distinguished: CMS, Web-CMS, and Semantic-CMS, etc. Also this booklet describes different models, tools and associated research groups in the field of CM/CMS. Finally, a list of content management systems in different application areas as well as future scenarios for systems in eParticipation contexts are provided.

1 Introduction

Content Management is a computer or web-based technology that supports the creation, update and maintenance of digital information. The term describes a set of processes and technologies that provide a possibility to have information and content always up-to-date. In this context, content is a unit of data with some extra information attached to it. McKay refers to content as follows: "That piece of data could be a Web page, information about an upcoming event, a Microsoft Word document, an image, a movie clip, or any piece of data that has meaning to the organisation deploying the system" (McKay, 2006).

The link between eParticipation and Content Management can be seen in many levels of engagement. Main usage of CMS is identified in the level of eInforming: this concerns the one-way online channel that provides citizens with policy and civic information. Content management systems are the underlying technical infrastructure, which provide such information in a structured and user-friendly way, and these systems enable the content bearers to easily publish and keep such information updated.

Content Management Systems (CMS) can be classified as Web-based Content Management Systems (WCMS) (see section 2.1), Information Management, Knowledge Management, or Semantic Content Management Systems (SCMS). This booklet mainly focuses on WCMS, because today these are very complex editorial systems, which coordinate web-based working processes and help to create content online. They are used for websites with a high degree on information and timeliness (Baumgartner, Häfele, & Maier-Häfele, 2003). For this reason, nearly every modern website – no matter whether in commercial or governmental areas - use a CMS (see section 3.2).

The first WCMSs appeared in the mid 1990s. They were developed as a result of the needs of the market for a solution in respect to the growing complexity of the websites and the need to differentiate between content and design (presentation layer). Rothfuss and Ried distinguish between two different CMS, the first-order CMS and second-order CMS (Rothfuss & Ried, 2001). First-order CMS are systems for a systematic collection and administration of information in a single logical asset. Second order systems are complex publishing systems. Nowadays, more than 300 CMS or WCMS are available in a free or commercial licence model with a varying set of functionalities. In this booklet, we only concentrate and investigate the most known open source systems, like TYPO3, Joomla! and Plone.

This booklet is organised as follows. The next section provides an some background theory to content management systems. It also gives an overview of the common open source WCMSs. Section 3 describes the application of CMS in Business, Government, and Online Education. In section 4 we bring the subjects of eParticipation and content management together, and present scenarios of usage of CMS in the field of eParticipation. We conclude with a brief reflection and an outlook.

2 Overall description of Content Management

2.1 Theory


There exist many definitions for CMSs; the simplest defines a CMS as a system for managing content. In the Content Management Bible (2002), Boiko provides the following definition of content management:

“At the highest level, content management is the process behind matching what you ‘have’ with what ‘they’ want. You’re an organisation with information and functionality of value. They’re a set of definable audiences who want that value” (see (Boiko, 2002), p.66).

Boiko further states on managing content that it is the “overall process for collecting, managing, and publishing content to any outlet” (see (Boiko, 2002), p.66). Adapted from this definition, Boiko defines a CMS as “a system that collects, manages, and publishes information and functionality” (see (Boiko, 2002), p.81) and, consequently, consists of the following subsystems (cf. (Boiko, 2002), pp.83):

- The *Collection System* provides support for the incorporation of contents from different sources within specific structures. This includes support for content creation from scratch (authoring) as well as gathering from existing sources (acquisition) and its aggregation. Furthermore, it provides support to convert between different formats. Collection services to support the user in entering content are part of the collection system.
- The *Management System* is in charge of the management and control of information repositories, workflow, administration facilities, user groups, and support processes for other subsystems. It defines and controls the information flows used by other subsystems. Beyond that, it defines the parameters for the functioning of the system.
- The *Publishing System* is responsible for final production of publications and digital information products in an automatic or semiautomatic manner. It uses template based publication models and provides personalisation options for users. Beyond that, it provides the possibility to produce for different platforms and/or users.

As the definition of content management is not restricted to any outlet, the term Web Content Management (WCM) is the content management process to “Web based audience” (McKeever, 2003). Hence, WCM involves the management of content at websites in the Internet. WCMs provide technical laypersons the possibility to create, manage and publish more complex websites. The users do not need any (or just little) technical knowledge to create and edit websites. Beyond that the generated web sites are conform to the - once defined - cooperate identity (the presentation templates).




Following Powel and Gill (2003) most WCMSs support in achieving the following features (see (Powel & Gill, 2003), p. 45f)¹:

- Streamline and automate content administration: HTML² sides are created automatically with the filled content by the Publishing System. For this, the “content authors” do not need to have expertise in HTML.
- Implement Web-forms-based content administration: The Collection and Management System is completely web based. That means that content administration can be done with web forms using a Web browser.
- Distribute content management and control: The content administration can be distributed to many persons, which do not need to have any technical expertise. The responsibility for website updates and maintenance is no longer only at the “bottleneck” of web managers.
- Separate content from layout and design: The publication (presentation) format is independent from the content and stored separately.
- Create reusable content repositories: Templates, graphics, images and content are created once and reused.
- Implement central graphic design management: The graphic design of the Web sites is template-driven and centrally managed to ensure a consistent and professional look and feel.
- Automate workflow management: An example for a workflow system is the timely publication of content. The next person in the chain is alerted by the CMS when an action is required (e.g. reviewing before publication).
- Build sophisticated access and security: User roles (who can access, add, modify or delete which content) can be defined.
- Make content administration database-driven: The database should be the central repository for all types of content.
- Include structures to collect and use metadata: Metadata as e.g. author, creation date, content description etc. should be stored in the database.
- Allow for customisation and integration with legacy systems: An application programming interface (API) should provide the possibility to expose the functionality of the system.
- Allow for archiving and version control: There should be the possibility to store and manage revisions of content.

¹ Most of these goals are not restricted to WCMSs; they are so general that they can be applied for other types of CMSs as well.

² Abbr. for Hyper Text Markup Language



The vast amount of data – in the Internet and intranets as information sources – results in a number of challenges for a (W)CMS with regard to scale, heterogeneity, and distribution of content (Fisher & Sheth, 2004):

- Heterogeneity of data sources: The data in the Internet, intranets and other sources differ structurally and syntactically from each other. There are HTML web sites, plain text as well as multimedia content etc. that have to be managed and published/presented.
- Distribution of data sources: The data are distributed across several desktops, servers, network file-systems, and databases on a network (Internet and/or intranet). Furthermore lots of different protocols (e.g. HTTP, HTTPS, FTP, etc.) are used for data access.
- Data Size of data sources: The amount of data in networked data bases (as e.g. the Internet) is huge. Hence managing such a huge content is a resource intensive task.
- Relevance of data sources: Finding the relevant information in networked areas is a time intensive task, often based on key-word-search.

Different user groups are also a challenge for a (W)CMS in respect to the usability. The users of CMSs can be of different age, have different education and some may have disabilities.

2.2 Related approaches

Semantic Content Management Systems (SCMS) try to overcome the challenges of relevance, distribution, and heterogeneity of data sources by the enrichment of managed content with semantics ((Semantic Content) (Management Systems)) and with the help of semantic technologies ((Semantic) (Content Management Systems))³. Maier (2005) defines semantic content management as the management of “meaningful organised content, i.e. documented knowledge embedded in a context” (see (Maier, 2005), p. 435). For further information on SCMS see section 2.2.

Another type is Enterprise Content Management (ECM), i.e. the technologies “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” (Duhon, Patel, & Tucker, 2005). This definition is more restricted to the content of a closed area than the general definition as introduced above.

Further types of CMSs are (Prideaux, 2004):

- Document Management Systems (DMS) focus on documents of any format. They are used primarily for internal purposes (i.e. managing the electronic documents of an organisation or department) rather than for presenting the documents for public consumption.

³ http://ontoworld.org/wiki/Category:Semantic_content_management_system

- Digital Rights Management Systems (DRMS) manage property rights information for any content that exists. These systems tend to specialize in areas where Digital Rights are a priority (such as music or video).
- Asset Management Systems (AMS) manage so-called content "assets" (images, video, audio, and other binary, non-textual content). They tend to be used in organisations where assets like music streams, video streams, images, pictures, etc. are numerous (such as photo agencies or graphic design companies).

With the ubiquity of the Web, many CMSs are now classified as WCMSs, either because they have a Web-based interface or because they focus on a Web-based delivery system over the Internet or an intranet. Plone e.g. provides a Web management interface and Web-based delivery system. (McKay, 2006)

Boiko lists the following key applications that can be based upon a CMS (cp. (Boiko, 2002 129), p.152ff):

- Personalisation of content to make it easily accessible.
- Technology to manage complex Web sites.
- Sharing of information based on multiple publications.
- Managing the catalogues behind commercial web sites.
- Knowledge Management in the sense of collecting, managing, and distributing the knowledge of an organisation.
- Infrastructure for online communities.

Several terms are often used in context of Content Management, in particular Information Management, and Knowledge Management (see above). The transitions between the definitions information and knowledge (management) are often smoothing (Bouthillier & Shearer, 2002; Wilson, 2002). Fensel defines Knowledge Management in (Fensel, 2003) as the process of "acquiring, maintaining, and accessing the knowledge of an organisation" (see p. 95). A working definition for knowledge comes from Prusek and Davenport (1998) saying that "knowledge is a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information", which "originates and is applied in the mind of knowers"⁴. Using these definitions, a CMS can help collecting and publishing the information that enables the organisation to organise their knowledge.

New forms of (web) content management (systems) and collaboration emerged with Web 2.0^{5,6} and social networking⁷. Blogs or Weblogs, a form

⁴ A more detailed discussion on Knowledge Management is provided in the DEMO-net sub-deliverable D 5.2 on knowledge management (see www.demo-net.org)

⁵ For a detailed description and survey of the term Web 2.0 and its applications see O'Reilly Tim: What Is Web 2.0. Online available at <http://www.oreilly.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html>

of online diaries that can be attended by one or more persons, need an easy way for publishing and editing content as everyone should be able to do so. Hence the technique behind can be seen as a special form of WCMS for textual content with comment functionality. Another special form of WCMS are wikis that can be modified by all users of the website. Everyone should be able to create, edit and delete content in a wiki. It is a good possibility for authors to work together on the same text.

2.3 Models and tools

Various web content management systems exist. In the following, we provide a general description of several systems and the URL⁸ where either the tool can be downloaded or further information is available. We then briefly describe each tool considering: the underlying technology it uses, the type of interface it presents, and the availability of maintenance and plug-ins. A simplified list of state-of-the-art CMS can be found in Appendix A.

Figure 1 shows a matrix of the features of a content management system with a focus on WCMSs.

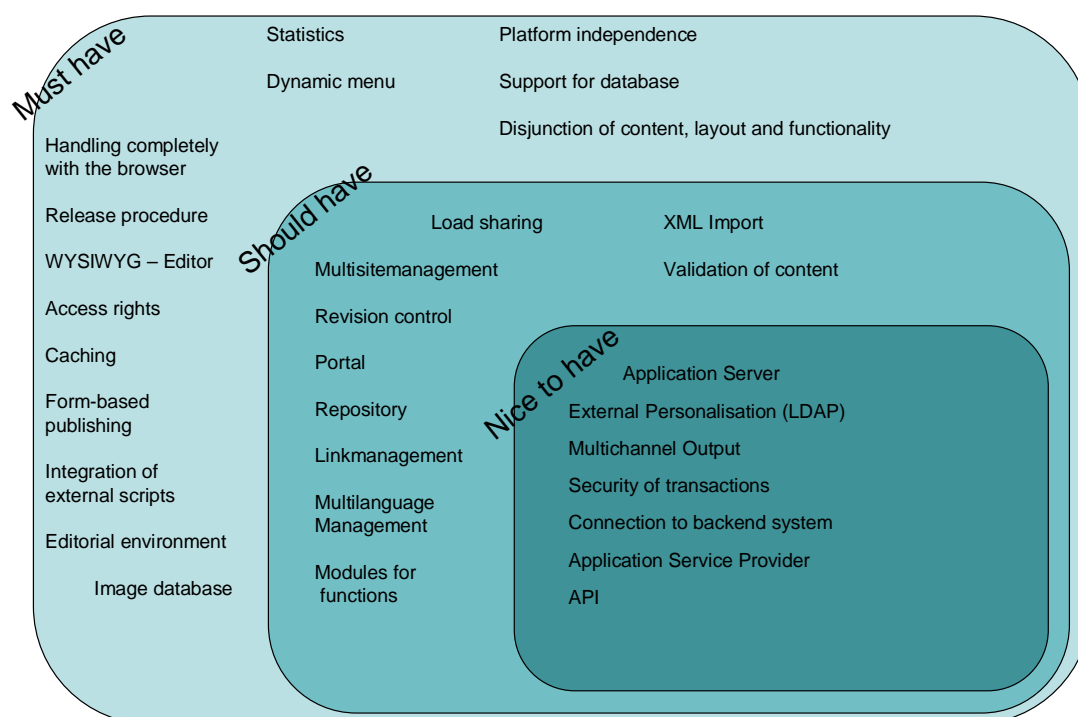


Figure 1: Content Management System⁹


In the following, CMS systems are listed in alphabetical order. They are described and then explained with of the underlying technology used, the

⁶ DEMO_net Booklet: The role of Web 2.0 technologies in eParticipation (2007)

⁷ DEMO_net Booklet: Social Networks (2007)

⁸ Uniform Resource Locator

⁹ <http://www.jdk.de>



type of interface they present content with, and the availability of maintenance and plug-ins.

2.3.1 CMS made simple

<http://www.cmsmadesimple.org/>

CMS made simple provides a fast and easy way to create a web site and manage its contents. It is often used to make a home page for private use - or a multinational corporation. A community in a forum exists to answer questions. Good documentation exists in form of a wiki in several languages. The system is easy to use to add content. Add-ons can be included wherever desired. Good maintenance availability and modules for various categories, like calendars & scheduling, eCommerce, etc. are provided.

This CMS is based on PHP and MySQL and is in the latest release candidate 1.2.2 "Holetown" available. It provides all "must-have" features (see Figure 1) and a community of developers.

2.3.2 Drupal

<http://drupal.org/>

Drupal is an open source content management platform on PHP basis used in a variety of websites ranging from personal blogs, corporate brochures and large community-driven websites via modules. The database behind is based on MySQL. Text and pointers to other kinds of content are stored in this database, dynamically retrieved and composed, and presented to a user in response to a request sent via a web-browser.

The latest available releases are Drupal 4.7.8 and 5.3. Drupal supports the "must-haves" in Figure 1.

2.3.3 Joomla!

<http://www.joomla.org/>

Joomla! is a WCMS to easily create and design the content of websites, written in PHP with a MySQL database connection. A Framework API allows for developing own modules into the system. Joomla! has an easy and comfortable user interface. This results in a fast success and easy-handling mechanism for the user. Furthermore Joomla! is flexible with a number of add-ons that provide a wide range of additional features. Joomla! is a successor of the WCMS Mambo. At the moment there are two releases available, Joomla!1.5RC3 and Joomla!1.0.13fullversion.

The environment provides the "must-have" features and several "should-haves" of Figure 1 with the help of available extensions. The Joomla! community is currently. Further developments and maintenance features are expected in the future.

2.3.4 Plone

<http://plone.org/>

Plone, with the underlying Zope-Server, which is based on Python, enables to put together almost any Web site and easily update it. This provides building content-rich sites quickly for gaining a competitive advantage. The software is free and open source. It has a large set of features and is comparable in terms of features and performance to many closed-source content management systems.

Apart from the must-have and many should-have features (cf. Figure 1), it provides several of the “nice-to-have” features such as an application server and external personalisation (LDAP). The latest release is Plone 2.5.5, which is a maintenance release for Plone 2.5.

Plone is not only a simple Web-CMS, it provides Document Management and also Knowledge Management. In the Web2.0 period it can be seen as a portal, web site or community site. Because it bases on Zope, there is a large user group which develops and uses this system.

Plone is also used as the underlying Web-CMS for the DEMO_net project, see <http://www.demo-net.org>.

2.3.5 Textpattern

<http://www.textpattern.com/>


Textpattern is a flexible and easy-to-use content management system, which is free and open source. It requires PHP 4.3+ and MySQL 3.23+. It is a web application designed to help overcome several hurdles to publishing online, and to simplify the production of well-structured, standards-compliant web pages. There are no extensions or plugins available. To make it an easy-to-use system all functionalities are part of the core system, which is available in release version 4.0.5. The system provides several “must-have” features.

2.3.6 TYPO3

<http://typo3.com/>

TYPO3 is a web content management framework, which bases on PHP and MySQL. It is developed for enterprise purposes on the web and in intranets. It offers flexibility and extendibility while featuring an accomplished set of ready-made interfaces, functions and modules. TYPO3 is a small to midsize enterprise-class Content Management Framework offering both, out-of-the-box operation with a set of standard modules, and a high-performance architecture accommodating customised solutions or extensions.

For authors, TYPO3 is a user-friendly, intuitive tool, allowing content editors to produce and maintain web pages, using sophisticated functions in just a few clicks of the mouse. Seamless integration of multimedia content types and dynamic server-side image manipulation and generation are among the numerous standard options inside this



comprehensive toolbox for web-based communication. Also included is an internal messaging and workflow communication system for shared authoring and collaboration.

For administrators and content managers, TYPO3 features a detailed user permissions system for implementing professional content creation and editing workflows.

TYPO3 is a server-side platform-independent application that can be used with virtually every browser available. TYPO3 is database-driven and scales easily to deliver web pages and embedded formats in an enterprise content providing environment. Out of the above reasons it provides all “must-haves” and “should-haves” (cf. Figure 1).

TYPO3 is open source software published under the GPL and available in release 4.1.x. Many extensions are available.

2.3.7 WordPress

<http://wordpress.org/>

The development of WordPress dates back to 2001. It is a free semantic personal publishing platform with a focus on aesthetics, web standards, and usability. It is meant to be a Web2.0 weblog software solution. Because of simplicity and minimalism, it can also be used as a CMS. WordPress is written in PHP and it uses a MySQL database.

The system can create, manage and publish content without any changes or any other functionality, such as a plug-in. There is a distinction between content and layout.

The latest version is 2.3.1. A large international developer community and user group exists for WordPress. In 2005 the 1.5 version was downloaded over 900000 times, which shows the great distribution. As it is not really a CMS, WordPress is difficult to analyse with the model of Figure 1. Anyway, a number of “must-have” features are provided.

2.4 Associated research groups

The field of associated research groups is difficult to investigate for CMS. This is due to the fact that information, content and knowledge management are all popular fields of research with a long history in terms of informatics. In fact, research groups who address specific features of CMS don't do this just in the area of CMS. Instead, they act in a wider scope of e.g. knowledge management systems, document management systems and process management, advanced web servers, etc.

In consequence, a large list of expert groups can be named. We have selected only two of them to exemplify below. Users can go to the websites to see the wide spectrum of activities of these groups to grasp a flavour of the breath and depth of research in this field. The first we name is an association which gives an overview of a number of expert groups working in the field (which is not comprehensive either).

2.4.1 The Data Management Association

<http://www.dama.org>

The Data Management Association (DAMA) is an international not-for-profit association of data resource management professionals with chapters and Members-At-Large around the world. Data Resource Management is the development and execution of architectures, policies, practices and procedures that properly manage the full data lifecycle needs of an enterprise. DAMA International is governed by an Executive Board and an Advisory Board consisting of recognised leaders in the field of information management. DAMA produces an annual Symposium that is the premier event in the arena of Data and Information Management. DAMA annually honours individuals who have distinguished themselves in the area of data and information management with the DAMA Achievement Awards.

2.4.2 Knowledge Management of the AIFB

<http://www.aifb.org/>

The research group Knowledge Management of the Institute of Applied Informatics and Formal Description Methods (AIFB), Germany is dealing with semantic web based knowledge and content management. They have several publications in this area.

2.4.3 Multimedia Content Management at the DFKI

<http://www.dfki.de>

The research group "Multimedia Content Management"¹⁰ of the German Research Center for Artificial Intelligence (DFKI) investigates the management (what includes processing, retrieval, maintenance, and publication) of multimedia content. As they state is the management and retrieval of video content more difficult than managing a collection of static images. Multimedia content management research has changed from feature extraction towards semantic content description and representation.

¹⁰ For further information see <http://www.dfki.de/web/research/km/expertise/research/multimedia-content-management>

3 Application of Content Management Systems

Content Management Systems, and especially Web-CMS, are well-known in many applications nowadays for the services they provide, like:

- faster updates of a web site,
- easy-to-use interface, where author don't need to have any knowledge about programming languages,
- each pages underlies one standardisation rule (like Corporate Identity),
- accountability, because login data is tracked and often history functionality is given,
- and direct online access to web content.

This section shows several applications of CMS.

3.1 Business and commerce


(W)CMSs are widely used in (and the base of many) (web) business applications and commercial websites as e.g. Internet shops and market places, customer relationship management software, etc. They are used in Business to Customer (B2C), Business to Business (B2B) as well as Business to Administration (B2A) applications.

Fensel et al. stated in 2003, the B2B area will be about 80% of the web's electronic business (Fensel, Hendler, Lieberman, & Wahlster, 2003). The optimisation of business relationships will be supported by the flexibility and openness of Internet based eCommerce. B2B market places are the middleware that connect a large number of potential clients without the need to implement a large number of communication channels. The main problem of the Internet based market places is the heterogeneity of the exchanged content thus content management is the challenge for B2B eCommerce. Content management has the problem of unstructured and unclassified product data that should be classified and described in various dimensions and personalised (Fensel, 2001).

3.2 Government

Web-CMSs are also used in the field of government. The Australian Government Information Management Office¹¹ provides a checklist to help the agencies to manage their online content (Australian Government Information Management Office, 2004a) and select a content management system (Australian Government Information Management Office, 2004b). The check points shall help to provide a good online experience for the users, to avoid problems that may arise if some resources are obsolete or wrong, and to make the creation and maintenance of online content more user friendly for agency staff (Australian Government Information Management Office, 2004a).

¹¹ For further information see <http://www.agimo.gov.au/>



The Government Site Builder (GSB)¹² has been developed by the German Federal Office of Administration as the central content management solution for the Web sites of the federal administration. On the technical basis – a content management system – the GSB provides complete standard blocks to all functions of a CMS and a web page. So content applications help to create simple Web sites as well as complex multi-channel services in the shortest possible time to implement them cost-effective.

The devices of the GSB were based on the typical requirements of authorities conceived. They include, for example, finished layout templates or navigation concepts. In addition, other modules, which are not original to a CMS but to a WCMS, are offered, such as newsletter or search functionality. The German governments can use all modules for their demands, specifically configure them or add additional proprietary developments. The GSB was used in more than 90 projects in more than 50 agencies¹³, as e.g. the portal of the Federal Government www.bund.de.

3.3 Online Education

Another application area for CMSs is online education. Online education is technically characterised by the use of a computer network to present or distribute educational content and the provision of two-way communication (student to student, student to teachers, and students to staff) via a computer network (Paulsen, 2002). Following (Schneider, Synteta, & Fr  t  , 2002), the following categories can be generally mentioned for learning activities:

- Gathering and distribution of information: Teachers and students share resources and the activities are designed to help them gather information and make it available to all.
- Creation of collaborative documents: Students can write definitions, analyse cases, solve problems, write documents and create illustrated documents together around specific themes.
- Discussions and commentaries around productions: Students identify together facts, principles and concepts and clarify complex ideas. They formulate hypothesis and plan solutions, make links between ideas, compare different points of view, argue, and evaluate.

Since these activities are information intensive tasks, the use of CMSs in online education is obligatory. But not only the teaching and learning content has to be managed. Information about students, courses, teachers, other stuff, payment, etc. needs to be managed. An online education system needs a lot of systems that should play together. Figure 2 shows these systems and their interrelations.

¹² For further information see <http://www.government-site-builder.de/>

¹³ http://www.bund.de/nn_295590/Fremdsprachen/Struktur/EN/Startseite-en-knoten.html__nnn=true contains a list of recent projects.

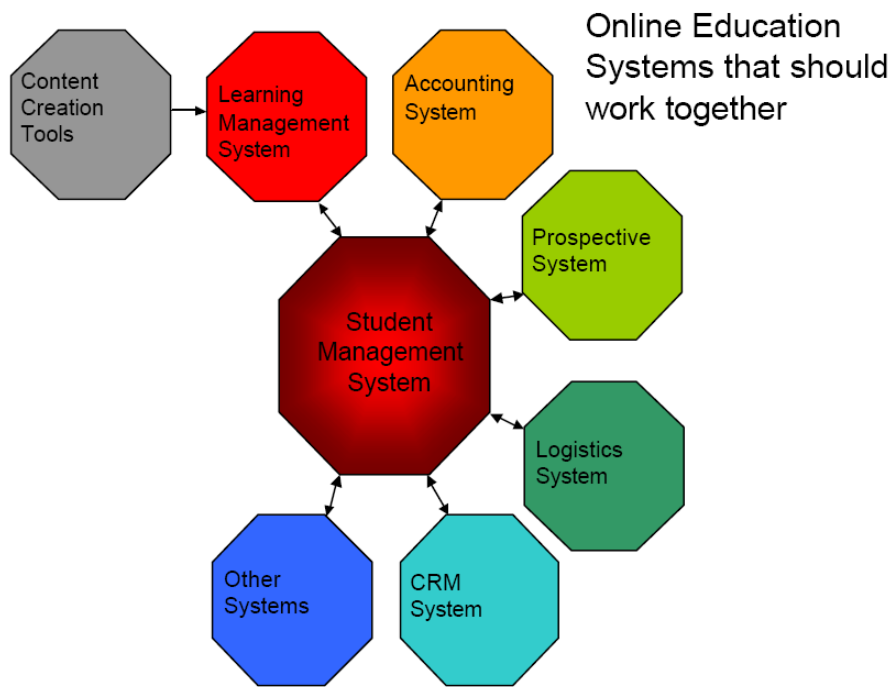


Figure 2: The hub model for education systems ((Paulsen, 2002), p. 4)

4 Future scenarios for CMS in eParticipation applications

In the context of eParticipation, content management can be helpful in all levels of engagement as defined in Deliverable D 5.1 of DEMO-net: eInforming, eConsulting, eInvolvement, eCollaborating, and eEmpowering. In particular, CMSs play a key role in eInforming.

More and more services, data and information are available on governmental websites and become increasingly complex. Hence the effective management of these resources is a complex and critical task. A main functionality for a system is the task-management and the workflow-management. For example a change on a website will be done by one author. To make it available online another employee is responsible for this, but the approval must be done by a third one. This workflow is very important in the context of eParticipation and the informing and engagement of different stakeholder.


As the amount of data and information in the Internet is dramatically increasing, easy access to content is a very important issue. It is expected that ICT-based solutions shall provide the right information a user needs for doing her job. To provide a flexible and personalized access, especially ontology and semantic web technologies bear a large potential (cf. (Warren & Davies, 2007), p. 181). The information needs to be modelled, structured and interlinked (Staab, Schnurr, Studer, & Sure, 2001). As Fensel et al. state, semantic and structural definition of documents with semantic web technologies bear new facilities such as (quotation taken from (Fensel et al., 2003), p. 4):

- Intelligent search instead of keyword based search
- Query answering instead of information retrieval
- Exchange of documents between different domains with ontology mapping
- Definition or personalised views to the documents

Hence SCMSs will become more important in future content management applications.

In eParticipation the time intensive process of gathering information can be largely supported by these technologies. The interlinking of different eParticipation applications (as e.g. web forums, blogs) will increase hence the interoperability features of content management applications will be important.

Mennie (2001) gives a survey of online consultation technologies. Therein the author stresses the requirements and needs for CMSs in online consultation processes: management of supporting information, participant data, feedback information, and results based on environment and metric data. The conclusion is that there is no technical difference between consultation site's content management and the content



management of a typical web site. The author highlights the necessity of security policies and up-to-date content in the decision making process (Mennie, 2001).

An example for an eCollaborating platform based on a CMS is Gov2DemOSS¹⁴. It achieved the eGov Good Practice Label by the EU in November 2006. Gov2DemOSS is an open source¹⁵, generic but customisable collaboration supporting eParticipation platform. It provides institutions and organisations the possibility to keep their communities informed, manage their information repositories, gauge public opinion, interact directly with their constituents, and involve them in the decision making process (Koulolias, Karamagioli, & Xenakis, 2006). Gov2DemOSS includes the following features besides typical CMS features (see (Koulolias et al., 2006), p. 500):

- User registration to ensure portal access only to viable members: The user registration uses a standard authentication system with username and password and an email verification system. Different parts of the application can have separate databases. Only registered users can post or reply messages in the forums.
- Event calendars to ensure more transparency and easier time planning
- News section to inform stakeholders
- Deliberation forums to provide participation possibilities for stakeholders
- Blogs for state-of-the-art information sharing
- Polls for gauging users' opinion
- Petitions to mobilise citizens around specific issues
- Secure, private and personal messaging service for forum users
- Member Profile Page to provide a record of each user's details and of their contributions
- Search Engine for easy access to information

The Gov2DemOSS platform has more features than a traditional simple WCMS to support collaboration and deliberation.

The explicit use of CMSs in eParticipation is mostly restricted to the management of non-media data nowadays, as e.g. simple HTML sides, MS Word documents etc. The connection to interfaces behind the web page need to be done and needs further investigation. Often tools for this are unknown and need to be developed.

¹⁴ For further information see <http://www.gov2u.com/>

¹⁵ Gov2DemOSS uses the open source CMS Mambo (<http://www.mamboserver.com/>)

5 Conclusion and outlook

CMSs play a crucial role in many applications. Especially WCMSs are widely used and had an important impact for the distribution of huge content in the Internet. Almost everyone with few technical experiences has the ability to set up a webpage with the usage of a CMS. Several existing CMSs are easy to use such that people without any technical experiences can fill CMSs with content.

Beyond that (W)CMSs are extended by many other features mainly with collaboration supporting tools as e.g. discussion fora, chats, etc. and so-called Web 2.0 applications as e.g. Blogs, and Wikis. Since all these applications and tools provide more and more content, the integration of such applications is essential.

CMSs are widely used in eParticipation and particular in the field of eInforming. In this field before the spreading of CMSs, often webpages were not tracked or authorised in any standard or consistent fashion. Web site management/maintenance was ad hoc. This was a significant risk that out of date or incorrect material was displayed on the web and these results in uninformed stakeholder groups. Collaboration possibilities are not used extensively in eParticipation area as well as the management of content beyond application boundaries.


WCMSs involves the management of content at websites in the Internet. Different user groups are a challenge for a (W)CMS in respect to the usability. The users of CMSs can be of different age, have different education and some may have disabilities. They provide technical laypersons the possibility to create, manage and publish more complex websites. They do not need any (or just little – depending on the CMS selected) technical knowledge to create and edit websites. Beyond that the generated web sites are conform to the - once defined - cooperate identity.

Management of content in the context of eParticipation means: enabling authors without complex technical knowledge, enabling collaborative authoring of web pages, enabling workflow processes including authorisation processes, enabling multi channel output to ensure consistency of information across the web site, and management of metadata to enable personalisation, searching and syndication.

Content management is crucial in most eParticipation areas, even though CMS are not specific for eParticipation. However, the usage of CMSs in eParticipation areas is growing only slowly. Often, the potentials, the benefits and the power of well organized content via CMSs are not recognized till now. We hope that this booklet has contributed to create awareness about the usefulness of CMSs as well as about understanding how CMS can effectively be used in eParticipation applications.

References

1. Australian Government Information Management Office. (2004a). Better Practice Checklist: Managing Online Content. Retrieved 2007/10/15. from <http://agimo.gov.au/practice/delivery/checklists/content>.
2. Australian Government Information Management Office. (2004b). Better Practice Checklist: Selecting a Content Management System. Retrieved 2007/10/15. from http://agimo.gov.au/practice/delivery/checklists/select_cms.
3. Baumgartner, D. P., Häfele, H., & Maier-Häfele, K. (2003). Evaluation von Content-Management Systemen. Innsbruck: Bundesministerium für Bildung, Wissenschaft und Kultur
4. Boiko, B. (2002). Content Management Bible. New York, USA: Hungry Minds.
5. Bouthillier, F., & Shearer, K. (2002). Understanding knowledge management and information management: the need for an empirical perspective. *Information Research*, 8(1).
6. contentmanager.eu.com. What is a CMS. Retrieved 2007/10/17, from <http://www.contentmanager.eu.com/history.htm>
7. DEMO_net. (2006). Deliverable 5.1: "Report on current ICTs to enable Participation"
8. Duhon, B., Patel, J., & Tucker, R. (2005). What is ECM? Retrieved 2007/10/15, 2007, from <http://www.aiim.org/about-ecm.asp>
9. Fensel, D. (2001). Challenges in Content Management for B2B Electronic Commerce. uidis, 00, 0002.
10. Fensel, D. (2003). Ontologies: A Silver Bullet for Knowledge Management and Electronic Commerce. Berlin Heidelberg: Springer.
11. Fensel, D., Hendler, J., Lieberman, H., & Wahlster, W. (2003). Introduction. In D. Fensel, J. Hendler, H. Lieberman & W. Wahlster (Eds.), *Spinning the semantic web: bringing the World Wide Web to its full potential* (pp. 1-25). Cambridge: MIT Press.
12. Fisher, M., & Sheth, A. (2004). Semantic Enterprise Content Management. In M. P. Singh (Ed.), *Practical Handbook of Internet Computing*: Chapman & Hall/ CRC Press.
13. Koulolias, V., Karamagioli, E., & Xenakis, A. (2006). The Gov2DemOSS eParticipation Platform: A New Era Tool for eDemocracy Implementation. In P. Cunningham & M. Cunningham (Eds.), *Exploiting the Knowledge Economy: Issues, Applications, Case Studies*. Amsterdam: IOS Press.
14. Maier, R. (2005). Modeling Knowledge Work for the Design of Knowledge Infrastructures. *Journal of Universal Computer Science*, 11(4), 429--451.
15. McKay, A. (2006). *The Definitive Guide to Plone*. 426.
16. McKeever, S. (2003). Understanding Web content management systems: evolution, lifecycle and market. *Industrial Management & Data Systems*, 103(9), 686-692.

- 
17. Mennie, A. (2001). Government and Technology Partnerships (GTIS) Technology Brief: On-Line Consultation Technologies: Government Telecommunications and Informatics Services, Public Works and Government Services Canada
 18. Paulsen, M. F. (2002). Online Education Systems: Discussion and Definition of Terms. Retrieved October, 3, 2002.
 19. Powel, W., & Gill, C. (2003). Web Content Management Systems in Higher Education. *Educause Quarterly*, 43--50.
 20. Prideaux, R. (2004). Knowing When You Need a CMS: A CMS won't do your work, but it can help you get it done: This article is the first part of a three-part series on content management systems (CMS) at www.techsoup.org.
 21. Rothfuss, G., & Ried, C. (2001). Content Management mit XML. Berlin/Heidelberg: Springer-Verlag.
 22. Schneider, D., Synteta, P., & Fr  t  , C. (2002). Community, Content and Collaboration Management Systems in Education: A new chance for socio-constructivist scenarios. *Proceedings of the 3rd Congress on Information and Communication Technologies in Education*, 175-184.
 23. Staab, S., Schnurr, H., Studer, R., & Sure, Y. (2001). Knowledge processes and ontologies. *IEEE Intelligent Systems*, 16(1), 26--34.
 24. Tambouris, E., & Gorilas, S. (2003). Evaluation of an e-democracy platform for European cities. In *Electronic Government, Proceedings* (Vol. 2739, pp. 43-48).
 25. Warren, P. W., & Davies, N. J. (2007). Managing the risks from information - through semantic information management. *BT Technology Journal*, 25(1), 178-191.
 26. Wilson, T. D. (2002). The nonsense of 'knowledge management'. *Information Research*, 8(1).

Appendix A: List of Content Management Systems

A comprehensive list of CMS (Web-CMS) is available under the following links:

- http://en.wikipedia.org/wiki/List_of_content_management_systems
- <http://www.cmsmatrix.org/>
- <http://www.cmswatch.com/>
- <http://www.opensourcecms.com/>

The following table provides a list of the most-known CMS:

<i>Name</i>	<i>Platform / Devel. Environment</i>	<i>Latest stable release</i>	<i>Specification / Licence Model</i>
Apache Lenya	Java, XML, Apache Cocoon	1.2.4	Apache License
b2evolution	PHP	1.10.2 "Florida"	GPL
BLOG:CMS	PHP		GPL
blosxom	Perl	2.0	MIT
Bricolage	Perl	1.10.3	BSD
Civic Space	PHP	0.8.3	Freeware
CMSimple	PHP	2.9	Affero
Community Server	ASP.NET	2007	commercial
CoreMedia CMS	Java	CoreMedia CMS 2006	commercial
Cyclone3	Perl, XUL, JavaScript, C, Java	3.0	GPL
Daisy	Java, XML, Apache Cocoon	2.0.1	Apache License
Dokuwiki	PHP	2006-11-06	GPL
Dokumentum	Java	5.3sp4	commercial
DotNetNuke	ASP.NET	4.6.0	BSD
Drupal	PHP	5.2	GPL
Django	Python	0.96	BSD
e107	PHP	0.7.8	GPL
EM3 iOn	Java	5.4	commercial
eZ publish	PHP (PHP4 Only)	3.9.2	GPL
FatWire	Java	ContentServer 7.0.2	commercial
Fedora	Java	2.2	Educational Community License

FileNet	Java	ContentManager 4.0	commercial
Immediacy	.NET	5.3	commercial
Infopark Fiona	CMS Java, Ruby on Rails	6.6	commercial
Ingeniux Management System (CMS)	CMS XML, .NET, COM	5.5	commercial
iSmart Create	ASP.NET	3.851	commercial
Jadu	PHP and .NET	2.0x	commercial
Jalios CMS	Java/J2EE	5.7	commercial
Jalios Starter Edition	JCMS Java	5.6.1	commercial, medium cost
jAPS - java Agile Portal System	Java, XML		GPL
Joomla!	PHP	1.0.13	GPL
KnowledgeTree Document Management System	PHP	3.3.1	KPL (custom)
Komodo CMS	PHP	4	commercial, medium cost
Lifelink ECM	J2EE	9.7	commercial
Lyceum	PHP		GPL
Mambo	PHP	4.6.2	GPL
MediaWiki	PHP	1.11.0	GPL
Microsoft Office SharePoint Server	.NET	2007	commercial
Midgard CMS	PHP (Midgard framework)		LGPL
Morello	.NET & J2EE	5.6	commercial
Movable Type	Perl on mod_perl	4.01	Freeware
Nucleus CMS	PHP	3.23	GPL
Nuxeo CPS	Python	3.4.3	GPL
Nuxeo EP	Java	5.1.1	LGPL
OpenACS	TCL AOLserver	5.1.5	GPL
OpenCms	Java	7.0.1	LGPL
phpCMS	PHP	1.2.2	GPL
PHP-Fusion	PHP	6.01.11	GPL
PHP-Nuke	PHP	8.0	GPL
phpWCMS	PHP	1.3.3	GPL
phpWebSite	PHP	1.1.0	LGPL

PhpWiki	PHP		GPL
Plone	Python	3.0	GPL
PmWiki	PHP	2.1.27	GPL
PostNuke	PHP	0.764	GPL
Quick.Cms.Lite	PHP	1.2	GPL
RedDot CMS	Windows	7.5	commercial
Rhythmyx	XML, J2EE	6.0	commercial
Scoop	Perl on mod_perl	1.1.8	GPL
SilverStripe	PHP	2.0.0	BSD
SiteFrame	PHP + Smarty	5.0.2	Creative Commons
Sitekit CMS	.NET	7.18	commercial
Slash	Perl on mod_perl		GPL
SPIP	PHP	1.9.2	GPL
Socialtext	Perl		commercial
Stellent	Java, IDocScript, XML	10g	commercial
TandemServer	ASP.NET	2007.09	GPL
Textpattern	PHP	4.0.5	GPL
TGS Content Management	PHP	0.2.5r3	GPL
TikiWiki	PHP	1.9.7	LGPL
Traction	Java	3.7	commercial, medium cost
TeamPage	Java	3.7	commercial, medium cost
TWiki	Perl	4.0.4	GPL
Typo	Ruby on Rails		MIT
TYPO3	PHP	4.1.2	GPL
Vignette Content Management	Java	7.3.1	commercial
VYRE	J2EE	4.2.1	commercial
WebGUI	Perl on mod_perl		GPL
WebHat	PHP	2.0	commercial
WordPress	PHP	2.3.0	GPL
XOOPS	PHP	2.2	GPL
XOOPS Cube	PHP	2.1.2	GPL

The DEMO_net Consortium consists of:

■ County of North Jutland - Digital North Denmark	Coordinator	Denmark
■ University of Leeds	Coordinator	United Kingdom
■ Örebro University	Partner	Sweden
■ University of Koblenz-Landau	Partner	Germany
■ Fraunhofer Gesellschaft zur Förderung der angewandten Forschung e.V.	Partner	Germany
■ Institut für Informationsmanagement Bremen GmbH	Partner	Germany
■ University of Macedonia	Partner	Greece
■ Institute of Communication and Computer Systems	Partner	Greece
■ Copenhagen Business School	Partner	Denmark
■ Aalborg University	Partner	Denmark
■ Fondation National des Sciences Politiques	Partner	France
■ Technical University of Košice	Partner	Slovakia
■ Consiglio Nazionale delle Ricerche	Partner	Italy
■ University of Bergamo	Partner	Italy
■ Yorkshire and Humber Assembly	Partner	United Kingdom
■ European Projects and Management Agency (EPMA)	Partner	Czech Republic
■ Napier University	Partner	United Kingdom
■ University of Iceland	Partner	Iceland
■ University of Helsinki	Partner	Finland
■ Institute of Technology Assessment, Austrian Academy of Sciences (ITA)	Partner	Austria
■ University of Southern California	Partner	U.S.A.

DEMO_net contact information:

■ **Strategic Research Coordinator: Professor Ann Macintosh,**

University of Leeds, Tel.: +44 (0) 113 343 5806, E-mail: A.Macintosh@leeds.ac.uk

■ **Dissemination Leader: Dr. Efthimios Tambouris**

University of Macedonia, Tel.: +30 2310 464 160 (167), E-mail: tambouris@uom.gr