

Content Management System Implementation Efficiency and Value

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<p>Nowadays websites has significant importance and makes strong impact of the company's business. They are widely used to deliver services and information, manage transactions, and facilitate communications. Websites are company's business card.</p> <p>Businesses are currently seeking alternative software tools which can help them to improve their performance and online services. There are two appropriate solutions to this problem- Content Management System and HTML editors. Both development tools have implications for design, maintenance and distribution of corporate information.</p> <p>The objective of this report is to analyze and compare the website implementation processes in terms of an open source content management systems and HTML editors generating static web pages. The project focuses on creating a comprehensive comparison, which deals with the specific requirements of small to medium businesses only. Thus, providing a clear understanding of the current trends within the HTML editors and the open source CMS.</p> <p>This is a comparative literature research. The process includes systematic reviews, source concept mapping and conducting a web-based survey. Therefore the implementation of the project is divided into three main stages with different tasks and activities.</p> <p>The result of these studies is a systematic analysis and comparison based on the website implementation process of the both software tools from business perspective, summarizing which tool is more beneficial for business.</p>	
<p>Key words Open source, Content Management System, HTML editors, website implementation</p>	

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Vocabulary

Hyperlink	Reference to a document followed automatically
Open source	Set of principles and practices on how to write software
Palette window	Computing window used to access all of the tools needed to create and edit a document
Scripting language	Programming language to control software applications
Software application	Program designed to help the user perform a particular task
Stagnant content	Static content
Web application	Application that is accessed via a web browser

Abbreviations

B2B	Business-to consumer
B2C	Business-to-business
BSD	Berkeley Software Distribution
CMS	Content Management System
CRM	Customer Relationship Management
CSS	Cascading Style Sheets
DHTML	Dynamic HyperText Markup Language
FSF	Free Software Foundation
GNU GPL	GNU General Public License
HTML	HyperText Markup Language
ICT	Information and Communication Technologies
IDE	Integrated Development Environment
OS	Operating System
OSCMS	Open Source Content Management System
OSD	Open Source Definition
OSI	Open Source Initiative
OSS	Open Source Software
PDF	Portable Document Format
PHP	Hypertext Preprocessor
SEO	Search Engine Optimization
RAD	Rapid Application Development
XML	eXtensible Markup Language
W3C	World Wide Web Consortium
WAP	Wireless Application Protocol
WYSIWYG	What You See Is What You Get

1 Introduction

Websites are an integral part of a company's operations. They are used to actively promote products, deliver services and information, manage transactions, and facilitate communications. The company's business, within the context of small to medium business, currently faces the daily challenge of managing websites and their content efficiently.

In today's world of rapid development, there is numerous different development frameworks used to design, create and maintain websites which can fulfill a large range of a company's business needs. The website implementation tools can be divided into two categories: off-line, e.g. Dreamweaver ("static" HTML editor) and on-line, e.g. Open source Content Management Systems (OSCMS). Both development tools have implications for design, maintenance and distribution of corporate information; have different advantages and aims to support the implementation process.

When deciding to develop a new website companies face with a challenging choice: to have a static website developed or to approach an OSCMS. The right decision can enable company to save time and money, to improve communications, strengthen business relationships, and increase revenues. The final decision will help to provide the scalability, flexibility, and enterprise system interoperability necessary to enhances e-business technologies and maintain an electronic presence of a company over the Internet.

In this report I will try analyze and compare the implementation process of an OSCMS and HTML editor's web site and the business benefits of their use. Through the analysis and comparison I will try to answer the following questions. Which is the faster development framework? What are their main advantages and disadvantages? Does the use of an OSCMS can be more beneficial for a company's business than HTML editor? To be able to find answers of these questions I will use my previous work experience with the both tools and I will try to learn and familiarized myself with the general concepts of the both development frameworks.

This is a comparative literature research. In theoretical part there will be explanation of the main concepts and definitions of Open Source, CMS, and HTML editors as well as the implementation paths of the development frameworks.

The thesis is organized as follows. In Chapter 2 are discussed Open Source Software (OSS) definition, different types of licenses and the Open source model.

Chapter 3 introduces Content Management System (CMS) definition and history. Also are presented classification of the different types of systems, current trends and implementation process of CMS website. The chapter includes what content management is and its life cycle in order to give better understanding of CMS.

Chapter 4 discusses what is HTML and different types of HTML editors. Also describes development process of website using HTML editor.

In Chapter 5 are analyzed and compared, based on the research results, development paths of the both software tools, their main advantages and disadvantages and business benefits from their use.

Chapter 6 summarizes the results from the previous chapters and possible further related to the topic.

Previous research has been done about OSS related to its definition and development model. Main statements of these researches are that OSS model is increasing its popularity and is a very effective way to collaboratively develop software with fast take-up and improvement cycles (D'Elia, 2009).

The CMS and especially OSCMS is relatively new phenomenon although it has been witnessed a significant growth and increased its popularity during the recent years. Still there are not enough literature materials and researches related to this topic.

Correspondingly the source material is somewhat limited when it comes to find out some specific comparison between OSCMS and other development frameworks. Most of the materials are referencing to a few main articles related to CMS.

2 Open source software

2.1 Introduction

During the recent years open source has gained remarkable growth and worldwide popularity. Open Source Software (OSS) includes as yet grassroots projects with unclear functionality and reliability, requiring much time for installation and maintenance, and exclusively used and reliable applications that cannot be regarded as inferior in quality to commercial applications. Solutions as the main Linux distributions, OpenOffice package, the popular Apache Web server, MySQL, and the Firefox Web browser, without doubt, are examples of excellent OSS, which can be used completely professional.

Linux is one of the most emblematic OSS projects which simply changed the software industry's perspectives. As a student at the University of Helsinki, Linus Torvalds decides to write its own operating system. Not long after he publishes the source code of his project for free on the Internet and like this involves thousands of people into the Linux project around the world. Nowadays Linux holds 88.60% of the Operating System (OS) Family market shares (Top 500, 2009). Also according to the official statistics Linux powered five of the ten most reliable internet hosting companies in the end of December 2008 (Mutton, 2009). Inspired of the rise of Linux, many companies and individuals begin to run open source projects and open source code of existing projects. Vivid examples are Netscape Navigator, which is reborn in Mozilla and subsequently in Firefox and many others. (Open Source Project Tasks, 2009)

The report deals with certain types of open source software; open source content management systems. Therefore, it is very important to present in details the OSS definition.

2.2 Definition

There are two basic fundamental concepts for which are especially important to be clarified and not misunderstood with each other:

- Free Software

- Open Source Software

Also it is important to define that program is analogous to the software concept. Software often means more than one program, but as in this case number has no meaning for the term itself, it can assume that the concepts for program and software are completely identical.

2.2.1 Free Software

The definition of free software is created by the Free Software Foundation (FSF) and it is usually called Four Freedoms. The corporation was the first which consolidates states that software (program) is free if only users can have:

- The freedom to run the program, for any purpose
- The freedom to study how the program works, and adapt it to your needs. Access to the source code is a precondition for this
- The freedom to redistribute copies so you can help your neighbor
- The freedom to improve the program, and release your improvements to the public, so that the whole community benefits. Access to the source code is a precondition for this. (FSF, 2004)

It is important to note that in the definition above there is no requirement to state that the software must be free in terms that we don't have to pay for it. In this context "free" refers to software freedom.

2.2.2 Open source software

Open source software is a secondary definition, designed to avoid the problem of double meaning of the word free. However, the two concepts are not completely identical. The fact that we have access to some real code does not always give us the legal right to modify it, for example. Sometimes (even if they have that right) is possible with license or agreement to be placed some conditions to determine how to use, to modify or to distribute such software. Insofar as can stand rules to restrict the idea of freedom and such software cannot be called free.

To avoid any discrepancy was established a definition for open source software by the organization Open Source Initiative (OSI). The corporation was founded by Bruce Perens in 1998 and year later he wrote the Open Source Definition (OSD). The OSI is very important be-

cause manage the OSD and it is the community-recognized body for reviewing and approving licenses as OSD-conformant. (OSI, 2009)

OSD is used to determine whether or not software can be considered as an open source, software licenses and the restrictions on it. In Table 2.2 is presented the open source definitions as it appears on the OSI official website.

<p>1. Free Redistribution</p> <p>The license shall not restrict any party from selling or giving away the software as a component of an aggregate software distribution containing programs from several different sources. The license shall not require a royalty or other fee for such sale.</p>
<p>2. Source Code</p> <p>The program must include source code, and must allow distribution in source code as well as compiled form. Where some form of a product is not distributed with source code, there must be a well-publicized means of obtaining the source code for no more than a reasonable reproduction cost preferably, downloading via the Internet without charge. The source code must be the preferred form in which a programmer would modify the program. Deliberately obfuscated source code is not allowed. Intermediate forms such as the output of a preprocessor or translator are not allowed.</p>
<p>3. Derived Works</p> <p>The license must allow modifications and derived works, and must allow them to be distributed under the same terms as the license of the original software.</p>
<p>4. Integrity of The Author's Source Code</p> <p>The license may restrict source-code from being distributed in modified form <i>only</i> if the license allows the distribution of "patch files" with the source code for the purpose of modifying the program at build time. The license must explicitly permit distribution of software built from modified source code. The license may require derived works to carry a different name or version number from the original software.</p>
<p>5. No Discrimination Against Persons or Groups</p> <p>The license must not discriminate against any person or group of persons.</p>
<p>6. No Discrimination Against Fields of Endeavor</p> <p>The license must not restrict anyone from making use of the program in a specific field of endeavor. For example, it may not restrict the program from being used in a business, or from being used for genetic research.</p>
<p>7. Distribution of License</p> <p>The rights attached to the program must apply to all to whom the program is redistributed without the need for execution of an additional license by those parties.</p>

<p>8. License Must Not Be Specific to a Product</p> <p>The rights attached to the program must not depend on the program's being part of a particular software distribution. If the program is extracted from that distribution and used or distributed within the terms of the program's license, all parties to whom the program is redistributed should have the same rights as those that are granted in conjunction with the original software distribution.</p>
<p>9. License Must Not Restrict Other Software</p> <p>The license must not place restrictions on other software that is distributed along with the licensed software. For example, the license must not insist that all other programs distributed on the same medium must be open-source software.</p>
<p>10. License Must Be Technology-Neutral</p> <p>No provision of the license may be predicated on any individual technology or style of interface.</p>

Table 2.1: The Open source definition (OSI, 2009)

The OSI aims maximum to get closer to the definition of the four freedoms of the Free Software Foundation. However, when we talk about open source software, we primarily put the spotlight on the availability of source code to reuse the code, while the definition of free software as a philosophical worldview focuses primarily on freedom as morality and perception.

Any free software is required to be open source software at the same time, but what is sufficient for software to be an open source is not always enough to be called free software. This is a small but significant difference. (Continent, 2007)

2.3 Licenses

Software licenses for open source software grant rights to users which they would not have because of the copyright law. These include rights to use, modification and distribution. There are several licenses for OSS, which are approved under the Open Source Definition. While the OS presents way in which unambiguously to make a software code publicly available, the licenses of open source software allows authors carefully to regulate the access to software.

Licenses for open source software define privileges / benefits and limitations, on which person must comply in order to use, modify or distribute open source software. Software products include the open source product, whose code is publicly owned and products are distributed under a license for open source. Summarizing all mentioned above, the licenses are vital to the open source development and distribution. (GNU Operating System, 2009)

There two categories of open source licenses, permissive (i.e. Berkeley Software Distribution (BSD)) and restrictive (i.e. GNU GPL) licenses. Figure 2.1 present the use of these licenses according popularity.

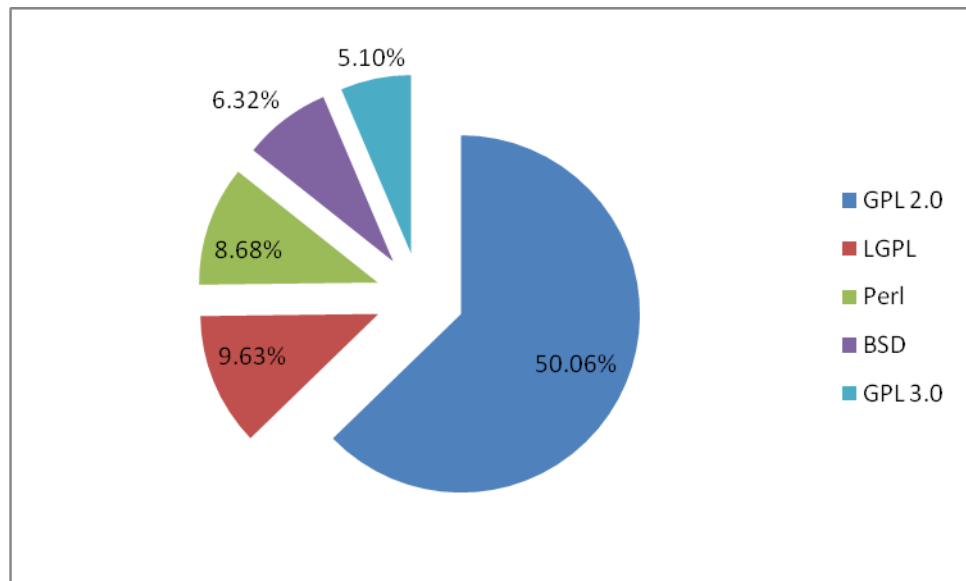


Figure 2.1: Top 5 Open Source Licenses in use (Black Duck Software, 2009)

The most familiar and widespread license as shown in Figure2.1 is the GNU General Public License (GNU GPL). GNU GPL is a typical free software license. It uses extremely intelligent copyright law to force people who have developed a modification of open source software or software that is associated with free software to cast the appropriate modification or software under the GPL. Main reason for the license to be so widely used is that most of the open source software is compatible with it. (GNU Operating System, 2009)

2.4 The Open source model

Open source is a development model, used to create software within volunteer’s communities. It differs from the traditional software development model because it is distributed for free and it is shared through liberal licenses.

The model of open source can provide a lot of business benefits. It allows many companies and individuals to interact in a product, thus achieving results that none of them would have acquired if they worked alone. When users want certain changes or correct errors that can happen very quickly because everyone has the opportunity to work on a problem, rather than waiting the software vendor to make it.

Another major strength of this business model is based on the ability of the market itself. As open source products typically run free, the companies behind these projects and can produce sufficient quality product with a good reputation, is relatively easy to acquire a large share of any market by quite complex and far reaching networks created by users themselves. So, no need to spend money on network and reduces the cost of promotion and advertising. In fact, Open Source business model relies on the transfer of costs from the price of the product to support services such as systems integration, training, maintenance manuals and documentation. Open source product can be installed on an unlimited number of computers as it does not require payment of licensing fees. (OSI, 2009)

3 Content Management Systems

3.1 Content management

CM is often confused with document management. The rise of document management in information systems in recent years then followed the evolution of content management. We describe the management of documents and content for the reader to observe boundaries and understand the area addressed in the thesis.

A document is a unit of content that can be identified and handled as one entity, viewed as information that relates to a particular topic. The documents are poorly structured for use by humans. Document management means the creation, organization, use, handling and disposal of documents for organizational. The electronic document management, these activities are carried out using information technologies and software applications.

Content management (CM) is systematic and structured process of supply, creation, processing, management, presentation, processing, publication and reuse of content (Rothfuss, 2001). Content management is characterized by a variety of tools and methods for collecting, processing and delivery of content of various types. It can be said that document management is a subset of CM. CM also contains content that cannot be considered or recognized as a document due to the use of various technologies. Components and associated metadata allows management workflow and the creation of aggregations which are collections of existing content (documents or parts thereof). Templates define the components, scripts and static content (company logo, navigation panels) which are combined to create web content. (Boiko, 2002)

3.2 Content life cycle management

CM goal is to provide information necessary for the user in the context of an action: for example, consulting the catalog of products for a decision wisely, searching for information about drugs by a doctor for a prescription composition. CM role is to optimize communication between person and person-consumer information creates information (in the context of an action or a process). But communication is the ultimate goal: communication catalyzes this process, and brings business process.

Viewed in this way, content management technologies to facilitate: 1) collaboration and 2) integration with other applications and work processes:

- Collaboration means that content is available in a form suitable for the stages of creation, verification and use. Also this means that access control is flexible enough to ensure the work of a group of users, each with multiple roles and rights in CM;
- Integration is similar collaboration, but in terms of the computer. The degree of integration (access rights) varies exterior applications. (Boiko, 2002)

Content life cycle can be divided into stages. In the literature can be found divisions with varied number of steps, but describing the same process: Three are "major part" of a CMS: 1) collection, 2) management (workflow, approval, versioning, and repository), 3) publication. (Boiko, 2002)

These approaches have the basic premise of CM tools: access control system version control, editing, workflow, technological preparation of the working process (staging), personalization and localization.

Content life cycle includes the following steps:

- Create-Create content to users, content conversion to other formats, support the creation of data (metadata);
- Management-Content management by users in a repository, version control, content access control (rights to read / write);
- Integration-The ability of users accessing content in several formats and from multiple repositories; merges content with other applications and work processes. If documents within an organization are managed by a system, other multimedia elements, then the integration of the

CM provides a general interface, shared access to multiple repositories for users and applications. Moreover, integration capacity can meet and work processes;

- Negotiation-Opportunities for profit or recovery of content; for a commercial publisher that would mean the use of technological components to sell content on the Web.
- Distribution. Publish content in multiple forms for internal use (within CMS) and external (WAP, HTML, XML, PDF, etc.). (Burlaka, 2006)

Change in time brings change the level of complexity, granularity and diversity reached by the subject content. In a document management system, the object itself is understood the document content and metadata associated with it. CMS article in website is composed of several units: author, title of the article, separate chapters. The needs are real and complex: the content objects are objects composed of other objects or represent an aggregation (query) for several objects.

A complex document of an organization can be generated from multiple content objects taken from different locations. CM technologies must offer the possibility of working with such objects.

The volume of information that is more than content is impressive and totally unmanageable, only part of managed content is represented as composite objects and flexible. Medium sized companies are facing complex and heterogeneous types of content managed by multiple a system in which metadata is described differently. The need to integrate content and processes has increased with the transfer of these processes on the Web. (Mooney and Baenziger, 2007)

3.3 Definitions

There are several definitions of the term "content management"; often they represent the views of some analysts influenced by the marketing policy of the organizations in which they operate. Companies such as Gartner, Forrester, Giga, Meta Group, defines their own perspective of the content management as: ... a complex blend of functionality, including acquisition, management, assembly, Review and approval, publication, preservation and protection of information for the needs of Internet, intranet or extranet of an organization. (Burlaca, 2006)

Other more general definition is that the content management set of tasks or processes to manage content from appearance until archiving. (McKeever, 2003)

In fact, CMS is more a concept than a product or technology. A concept that includes a number of processes that will form the foundation of next generation websites the content will be managed by its authors but not by technicians. The main goal of CMS is to integrate and automate processes that contribute to increase efficient and effective dissemination of information on the Internet.

3.4 History

CMS history begins with the invention of writing, the creation of Portable Document Format based on paper, the assembly of multiple pages in books, meeting books in libraries mass printing of books because of the occurrence of car typing, cataloging books (arrange alphabetically by author or title), the classification of books into categories (by topic area, etc.). Content management can be regarded as a general solution to the problem of creating content (for manufacturer), and the provision of content (for the consumer, user). Content management consists of transmitting content according to the right person at the time and cost appropriate.

Although CMS can also describe a manual process work, we use this term to describe software that assists people in the creation, management, transmission and navigation content. Table 3.3 presents the most significant events in the CMS history. (Burlaca, 2006)

Year (approx.) event	Note the events that marked the development of CMS:
1975	CM on mainframes: electronic publication
1984	CM on personal computers: desktop publishing
1990	Using Client-Server technology
1995	CM Web: web publishing

Table 3.2.: CMS chronology of the history (Burlaca, 2006)

Electronic publishing has accelerated exponentially creating content. Thus, in the late '80s occurs "information overload", a situation aggravated by the emergence of personal computers, which did not permit use centralized control.

In the early 90s, personal computers began to be united network that favored the emergence of centralized applications built on the principles of client-server. This gave the opportunity to restore control over electronic content, occurred following documents era management.

The situation began to change in the mid '90s with the growing popularity of the Internet. The Internet already contained by the year '89 million web pages, and has become a serious business. Document management went out of fashion, providing content management web site. But the euphoria of Information and Communication Technologies (ICT) has gone with the collapse of NASDAQ and dot.com sites in 2000. He returned to the mixed solution that contained the usual documents (on paper) and electronic (web content) with emphasis on wireless devices, streams audio / video and other forms of electronic content. The pace of implementation of electronic commerce solutions B2C (business to consumer) decreased instead of increased interest in automated communication content in electronic business XML B2B trading networks. Currently there are several variations of content management, based on the same principles but with different purposes:

- Web content management
- Knowledge management
- Document management
- Digital Asset Management
- Records Management (Mooney and Baenziger, 2007)

3.5 Classification of content management systems

A clear concept of CMS is hard to define; many products claim to be complete CMS solutions. Perhaps most important is that most of these solutions involved in the management of sites experiencing control problems of content publishing process. As a result, an impressive number of organizations or individuals have developed their own CMS solutions. Some of them decided to start marketing its products through direct sales or letting (providers of software services: Application Service Providers). (Burlaca, 2006)

However, considering their origin, it is possible to define some general classes of CMS. Table 3.3 below provides a list of the general approach underlying the development of a CMS.

Type	Understanding	Example
Proprietary	Software provider copyright and patents, redistribution or modification is prohibited	enVision, Composite, Kentico CMS
Open source	Software, under a license that meets the Open Source Definition	Drupal, Joomla!, WordPress
Supported open source	Semi-free software, not free but comes with permission for individuals to use, copy, distribute, and modify for non-profit purposes	LogicalDOC, Alfresco, Magnolia

Table 3.3: Types of CMS (Free Software Foundation, 2009)

During the recent years OSCMS seems to increase their popularity. According to Jordan Willms nowadays it is hardest “to convince the boss why Drupal is better than others open source CMS” rather than trying to compare OSCMS and proprietary CMS. Most remarkable evidence is that Drupal won the inaugural Hall of Fame Award and the Best Open Source PHP CMS Category in the 2009 Open Source CMS Awards. (Open Source CMS Award, 2009)

One the most important advantages of OSCMS is that there is no licenses fees compared to the proprietary one and that significantly can reduce the company’s expenses. Despite the fact that supported open source CMS offers proprietary and open source versions of their products still cannot be compared to the OSCMS.

3.6 Open source CMS

Unlike commercial solutions, open source CMS sites does not attempt to incorporate features "hip" to become more popular but focuses on the community of users who need to clearly defined content management. OSCMS has many other advantages such as:

- it is easy to change the appearance of any particular page, do not affect the appearance of other pages
- it is easy to add to website a new page by copying and correcting the file with an existing page
- website will run on any server hosting, even with the most disabilities
- website can be viewed locally, without installing additional software
- a small number used by software components makes it difficult to hack the system

Combining the financial and system benefits makes OSCMS preferable business solution.

(Bonfield and Quinn, 2009)

3.7 CMS development path

Nowadays it is rather difficult to think about corporate well organized and beneficial website without the Open Source Content Management System. The use of OSCMS excludes necessity of the constant reference to services of programmers or designers, reduces requirements to possession of specific Internet technologies of the person editing a website, and also essentially accelerates process of modification, website development.

OSCMS is not only a control tool for content, but also the environment of visual working out of sites doing process of working out fast and effective. The system provides a powerful and convenient interface which allows users to change design, structure and functionality of a website in a visual mode, without demanding skills of programming or possession of web technologies. (Boiko, 2002; McKeever, 2003)

The CMS website implementation is very easy process and IT background or strong knowledge are not needed. Content management systems solve the problem of turning content into information and information into knowledge. Content Management Systems are not just a product or a technology. CMS is defined as a generic term which refers to a wide range of processes that underpin the “next-generation” of medium to large-scale websites. (Michelinakis, 2004)

4 HTML editors

4.1 Hyper Text Markup Language

Hyper Text Markup Language (HTML) is one of the greatest inventions in the World Wide Web history. The first version of HTML was developed by a member of the European particle physics laboratory, Tim Berners-Lee in 1990. HTML is used for describing the structure of web pages. The language consists of different elements. Each element has three different parts-tags, some attributes and the actual content. The HTML element helps to organize and distinguish the content. HTML tags tell the browser information about the structure and characteristics of formatting web pages. Each tag contains a specific instruction and is in angle brackets <>. Most tags consist of opening and closing parts and affect the text enclosed within. An example of the HTML code is presented in Figure 4.2. (W3C, 2009)

```
<html>
<body>
<h1>My First Heading</h1>
<p>My first paragraph</p>
</body></html>
```

Figure 4.2: HTML code example

The HTML concept is:

-HyperText is a method which allows users freely to “move” around on the web. That is possible because of a special text called hyperlinks which connect the pages.

-Markup is what HTML tags do to the text inside them. They mark it as a certain type of text (headings, paragraphs, lists etc).

-Language that has code-words and syntax (HTML Tutorial, 2009)

Stand alone HTML is a static language but in the code can be included other scripting languages such as JavaScript. When a script is loaded to the static code it is transformed to dynamic. Dynamic HTML (DHTML) is a term used to describe HTML pages with dynamic

content. DHTML has three components- Cascading Style Sheets (CSS), HTML code itself and scripting language. Figure 4.3 shows an example of DHTML.

```
<html>
<body>
<h1 onclick="this.style.color='red'">Click Me!</h1>
</body>
</html>
```

Figure 4.3: DHTML code example

4.1.1 Valid HTML code

There are certain rules on how HTML must be written and structured in order all types of web sites to be accessible over Internet. In 1996 the World Wide Web Consortium (W3C) formalized special requirements and recommendations on the use of CSS with HTML in order to provide syntactically correct documents. All the requirements and standards can be found on the official page of W3C.

The validation is done by the W3C Markup Validation Service. The validator checks the code for errors and after that provides a report which defines if the code is correct or not. (W3C, 2009)

4.2 Types

HTML editor is a software tool for developing web pages. The editors are divided into different groups according to their features and purposes. There are only three major groups of editors: text, object, WYSIWYG (What You See Is What You Get) editors.

Text editors

Text editors or so-called code editors are intended to structure the main text of the object with syntax highlighting support. It has different tools such as source and version control, link-checking, code checking and validation, code cleanup and formatting and spell-checking

which allow faster and sufficient editing of the HTML code. The most popular editors are Notepad, TextPad, and Note tab. (Wikipedia, 2009)

Object editors

Object editors allow editing of the source text of objects in much better and organized mode than the Text editors. This is possible because of the use of palette windows with which the text-based parameters can be easily changed. With the object editors is possible to edit one text object or whole group of objects at the same time. Popular object editor is Adobe Go-Live. (Wikipedia, 2009)

WYSIWYG HTML editors

WYSIWYG HTML editors can greatly facilitate the routine work of publishing content. They provide an editing interface with the actual outlook of the page in a web browser. One of the main advantages of the editors is that they do not require any HTML knowledge. The editors have many features such as built-in functions and ready templates which makes creation of web page very fast and easy. Support CSS, JavaScript, and various server-side scripting languages and frameworks. One of the most popular WYSIWYG editors is Dreamweaver. (Wikipedia, 2009)

4.3 HTML development path

A static website is a set of static HTML-pages. Under static website is understood a website in which there are no interactive functions. Static development website process is very simple and fast. Usually for the implementation of a static website are used tools such as Dreamweaver or other HTML editors like FirstPage. Each page is created manually, remains and loaded on a server. When it is required to change the maintenance of such page, the editor manually will change it and again loads on a server. The pages in a static websites are connected through Hyperlinks which helps the website to load faster. (Gosney, 2004)

A major problem with the static websites is that once the content is created it rather difficult to be updated. The updates can be done only by someone with good development skills and strong knowledge of HTML. Once a static website is already published, it will not change until

the next edition hard and there is also the risk of file overwriting code and the possibility of important non-content areas like security code of the site getting corrupted. (HTML Tutorial, 2009)

Generally static websites are mainly used by small companies because they are simple to host and develop. They don't require a lot of expenses if the content of the website doesn't need to be updated very often.

5 Development tools analysis and comparison

Open Source Content Management Systems and HTML editors are preferable software tools for managing and distributing website content. Both tools have implications for design and website implementation. Table 5.4 present the use of OSCMS and HTML editors.

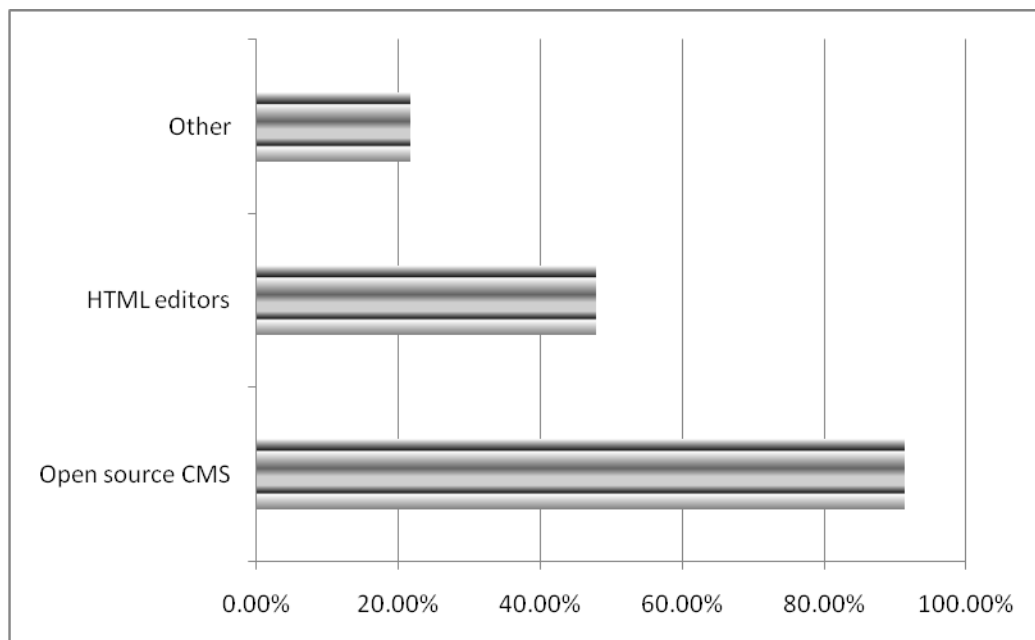


Figure 5.4 Use of OSCMS and HTML editors

According to the data from Figure 5.4 OSCMS is dominating tool for managing website content. Once content is created on OSCMS website can be easily updated later. Also the tool has the possibility of re-using content to generate multiple pages. Compared to OSCMS, HTML editors, in terms of static website, don't include that kind of possibilities. When content is created on static page is very difficult to be update. That is one of the main reasons OSCMS to be preferable tool for managing the content.

OSCMS and HTML editor's website development processes have implications. In Figure 5.5 are presented the following processes of website implementation in which are same for the both tools:

- General flexibility-1
- Editorial ease of use-2
- Overall functionality-3
- Stability-4
- Performance-5
- Security-6
- Work flow functionality-7
- SEO-8
- Social media-9
- Integration features-10
- User management and permission features-11
- General ease of use-12

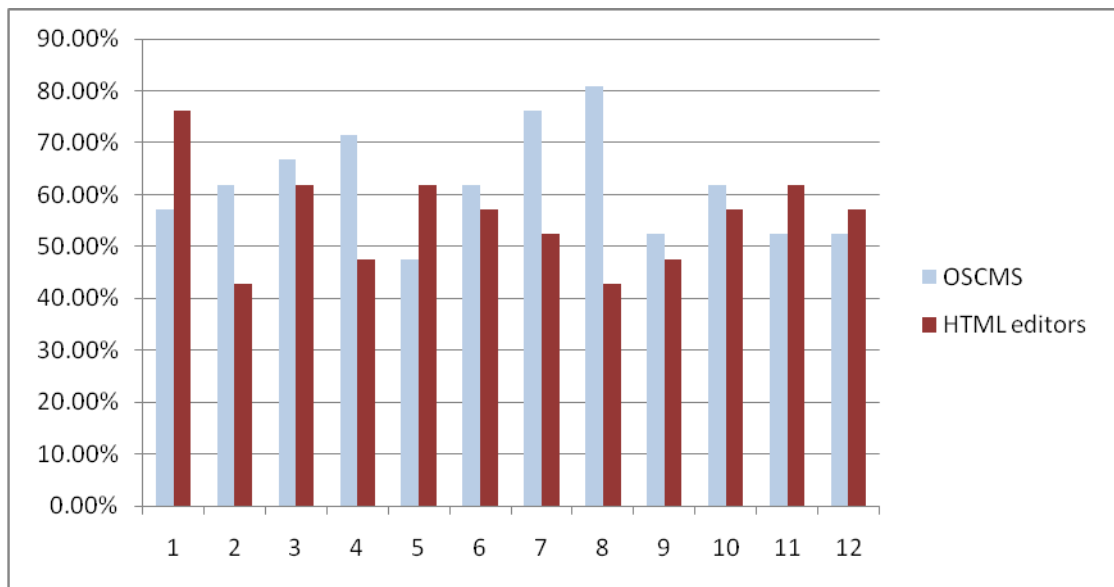


Figure 5.5: OSCMS and HTML website development processes

Comparing the data results OSCMS have better overall process performance than HTML editors. OSCMS offers stable and secured platform supported by well integrated features. The system has good overall functionality and flexibility. One the most important qualities of the system are possibility for Search Engine Optimization (SEO) and social media services. Problematic part of OSCMS website configuration is the user management. Although the system seems to be secured ineffective user management often lead a lot of systems into being com-

promised. Despite all good facts OSCMS website implementation process is quite complicated. However, OSCMS website is able to provide qualified online services, to save time and money, to improve communications which means that it is beneficial for company's business. HTML editor's development process is fast and simple. Unfortunately that is not enough to provide efficient final product-website that can fulfil the business needs.

Based on the survey result the main advantages of OSCMS are process efficiency, quality control and improved Customer Relationship Management (CRM). The main HTML editor's disadvantages are content and flexibility limitations. In Figure 5.6 is shown the overall satisfaction with the OSCMS and HTML editors.

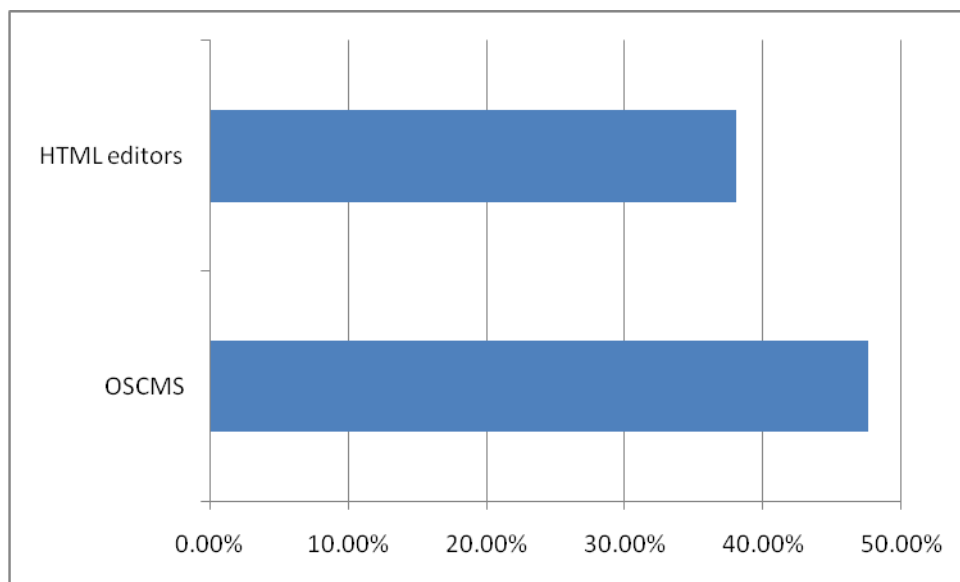


Figure 5.6: Overall system satisfaction

According to the data from the figure OSCMS users are more satisfied with the software tool.

6 Conclusions

Main activities during this project were collecting and analyzing sources. To analyze the sources, with the help of my supervisor, I used the concept mapping technique. Concept mapping represents knowledge in graphs. The technique is used to generate ideas, to design a complex structure (such as long texts) and to assess understanding or diagnose misunderstanding. The sample of the resource concept map is presented in Appendix A. Other important activities were implementing a web based survey and collecting survey data. A sample of the survey is shown in Appendix B. The collected data is presented in Appendix C.

Research was carried out to find about the implementation process of website and business benefits in term of OSCMS and HTML editors. Survey was conducted to gather the work experience with the both development frameworks of professional web developers.

The comparison was based on implementation process of the frameworks from business perspective. The objective of this report was not to select a winning tool. Rather, the aim of the comparison was to show the suitability of each piece of software from a business perspective, based on a set of business requirements. This objective was achieved by introducing the meaning of content within businesses, emphasizing the importance of open source licenses and providing a comparison of between OSCMS and HTML editors.

Total of 23 developers out of planned 30 answered the survey. The survey response rate is 76.6%, generally very high. The number of interviewed developers is small but this actually it has more accurate measurements. The differences between the development process of OSCMS and HTML editors and their main advantages and disadvantages are compared in the statistical figures.

6.1 Main results of the research

Content management has become an important area with the advent of the Internet and, therefore, the informatisation of society. Open Source Content Management Systems have been built on market demand: companies needed tools for publishing information. The crucial role of IT in daily work of organizations need internet use (Internet addiction) and, therefore, the industrial importance of CMS led to this area of academic interest. The research shows that among the small and medium companies OSCMS is much more preferable software for managing website content.

A criterion for completeness of content management solution is its flexibility, granularity with which objects of different types of content are managed on the stages of content management. The success of OSCMS is determined by the compatibility of the content in the system integration with other applications and work processes.

The trend of diffusion and adaptation of Web-space and other areas is an important factor in integration. In order to "supply" these applications with content, content management technologies must support a distributed infrastructure.

The value of OSCMS depends on the efficiency of implementation of innovations in information technologies. Today the emphasis is on ease of integration with other applications, so OSCMS will be able to interact with other modern services and applications will not become isolated and ineffective tools. Scientific Interest presented the idea underlying the approach of OSCMS and priorities resulting from the application of the methodology in the development of OSCMS sites.

6.2 Future research

The survey for the research included main development statements discussed in this thesis but it soon became apparent that the number of questions was too small and did not cover the entire implementation steps of the OSCMS and HTML editors due to the limited time framework.

By using this report as a base it is possible to study further more about CMS, OSCMS and HTML editors. The comparison can become more clear and detailed if it cover the usability and users point of view.

Further can be researched dynamically generated web sites and compared to the CMS and OSCMS one.

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Appendices

Appendix A: Source Concept Map

Code	Concept
<p>C1 Open source CMS</p>	<ul style="list-style-type: none"> • Open source content management systems are a powerful source of website and web content management tools. • The use of CMS tools in biomedical informatics is growing; however, the landscape of available tools is complicated and diverse. • Use and development of CMS application plug-ins enables customization of a CMS. • Content management is a rising discipline supplying constantly developing new tools and an increasingly sophisticated theory and methodology. • Content management and the open source software tools provide solutions for the services that information units must provide in the digital environment
<p>C2 Open Source</p>	<ul style="list-style-type: none"> • Open source describes practices in production and development that promote access to the end product's source materials—typically, their source code. Some consider it as a philosophy, and others consider it as a pragmatic methodology. Open software is a phenomenon which is called to revolutionize business models in the software industry. • The freedom to run the program, for any purpose • The freedom to study how the program works, and adapt it to your needs. Access to the source code is a precondition for this • The freedom to redistribute copies so you can help your neighbor • The freedom to improve the program, and release your improvements to the public, so that the whole community benefits. Access to the source code is a precondition for this
<p>C3 Website imple-</p>	<ul style="list-style-type: none"> • The Usage Lifecycle describes how far a person has progressed in using web application • The lifecycle is particularly relevant to web-based software because the product is inextricable from the service. The product <i>is</i> the service

Appendix B: Survey Sample

mentation lifecycle	<ul style="list-style-type: none">• A system development process can follow a number of standard or company specific frameworks, methodologies, modeling tools and languages. Software development life cycle normally comes with some standards which can fulfill the needs of any development team. Like software, web sites can also be developed with certain methods with some changes and additions with the existing software development process.
C4 HTML editors	<ul style="list-style-type: none">• HTML editors attempt to display the Web page as it will show on the browser. They are visual editors, and you don't manipulate the code directly• The HTML editors view is achieved by embedding a layout engine based upon that used in a web browser. The layout engine will have been considerably enhanced by the editor's developers to allow for typing, pasting, deleting and moving the content. The goal is that, at all times during editing, the rendered result should represent what will be seen later in a typical web browser.

Appendix B: Survey sample

Relative strengths and weaknesses of CMS and HTML-editors website implementation

Overall description

This survey focuses only on the website development process of open source Content Management System (CMS) and HTML-editors (generating only static web pages).

Used abbreviations:

SEO-search engine optimization

CRM-customer relationship management

1. Which of the following do you use to manage website content?

- Which of the following do you use to manage website content? Open source CMS (e.g. Drupal, Joomla)
- HTML code-based editors (e.g. Visual Studio, Dreamweaver)
- Other

2. Level of experience

	Newbie	Intermediate	Advanced	Power developer
CMS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
static HTML	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

3. Please, rate the CMS website development process

	Very Good	Satisfactory	Unsatisfactory	Very Bad
General flexibility	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Editorial ease of use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Overall functionality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Performance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Security	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Work flow functionality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
SEO	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Social media	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Integration features	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
User management and permission features	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
General ease of use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. Please, rate the static HTML website development process

	Very Good	Satisfactory	Unsatisfactory	Very Bad
General flexibility	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Editorial ease of use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Overall functionality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Performance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Security	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Work flow functionality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
SEO	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Social media	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Integration features	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
User management and per- mission features	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
General ease of use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5. Please, mark the CMS implementation facts

	Strongly agree	Somewhat agree	Somewhat disagree	Strongly disagree
Fast creation of new functional website	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Require too much customization	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Framework makes it easy to extend its capability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Easy to develop large complex website	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Easy to maintain or upgrade	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Available features to improve functionality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ease of finding development support	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

6. Please, mark the HTML implementation facts

	Strongly agree	Somewhat agree	Somewhat disagree	Strongly disagree
Fast creation of new functional website	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Require too much customization	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Framework makes it easy to extend its capability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Easy to develop large complex website	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Easy to maintain or upgrade	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Available features to improve functionality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ease of finding development support	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. Please, mark the advantages and disadvantages of CMS and HTML

Note: Possible type of answers-none, advantage, disadvantage

	CMS	HTML
Process efficiency	<input type="text"/>	<input type="text"/>
Quality control	<input type="text"/>	<input type="text"/>
Marketing benefits	<input type="text"/>	<input type="text"/>
Improved CRM	<input type="text"/>	<input type="text"/>
Content limitations	<input type="text"/>	<input type="text"/>
Limited flexibility	<input type="text"/>	<input type="text"/>
Expensive design	<input type="text"/>	<input type="text"/>

CMS

HTML

High Maintenance costs

8. Please, write in your opinion other advantages or disadvantages of CMS and HTML



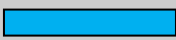
9. Please, rate the overall satisfaction with the both software tools performance

	Very dissatisfied	Somewhat dissatisfied	Neutral	Somewhat satisfied	Very satisfied
CMS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
static HTML	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Appendix C Survey Response Summary

Total Started Survey: 23

Total Completed Survey: 23 (100%)

1. Which of the following do you use to manage website content?		
		Response Percent
Open source CMS (e.g. Drupal, Joomla)		91.3%
HTML code-based editors (e.g. Visual Studio, Dreamweaver)		47.8%
Other		21.7%
	answered question	23
	skipped question	0

2. Level of experience					
	Newbie	Intermediate	Advanced	Power developer	Response Count
CMS	13.0%	47.8%	34.8%	4.3%	23
static HTML	8.7%	56.5%	21.7%	13.0%	23
	answered question				23
	skipped question				0

Appendix C: Survey Response Summary

3. Please, rate the CMS website development process					
	Very Good	Satisfactory	Unsatisfactory	Very Bad	Response Count
General flexibility	38.1%	57.1%	4.8%	0.0%	21
Editorial ease of use	33.3%	61.9%	4.8%	0.0%	21
Overall functionality	23.8%	66.7%	9.5%	0.0%	21
Stability	19.0%	71.4%	9.5%	0.0%	21
Performance	33.3%	47.6%	19.0%	0.0%	21
Security	19.0%	61.9%	14.3%	4.8%	21
Work flow functionality	14.3%	76.2%	9.5%	0.0%	21
SEO	14.3%	81.0%	4.8%	0.0%	21
Social media	33.3%	52.4%	14.3%	0.0%	21
Integration features	28.6%	61.9%	9.5%	0.0%	21
User management and permission features	28.6%	52.4%	14.3%	4.8%	21
General ease of use	42.9%	52.4%	4.8%	0.0%	21
	answered question				23
	skipped question				0

Appendix C: Survey Response Summary

4. Please, rate the static HTML website development process					
	Very Good	Satisfactory	Unsatisfactory	Very Bad	Response Count
General flexibility	4.8%	76.2%	14.3%	4.8%	21
Editorial ease of use	19.0%	42.9%	33.3%	4.8%	21
Overall functionality	4.8%	61.9%	28.6%	4.8%	21
Stability	23.8%	47.6%	28.6%	0.0%	21
Performance	9.5%	61.9%	23.8%	4.8%	21
Security	4.8%	57.1%	33.3%	4.8%	21
Work flow functionality	14.3%	52.4%	23.8%	9.5%	21
SEO	0.0%	33.3%	23.8%	42.9%	21
Social media	0.0%	23.8%	47.6%	28.6%	21
Integration features	0.0%	57.1%	38.1%	4.8%	21
User management and permission features	4.8%	61.9%	28.6%	4.8%	21
General ease of use	14.3%	57.1%	23.8%	4.8%	21
	answered question				23
	skipped question				0

Appendix C: Survey Response Summary

5. Please, mark the CMS implementation facts					
	Strongly agree	Somewhat agree	Somewhat disagree	Strongly disagree	Response Count
Fast creation of new functional website	47.6%	52.4%	0.0%	0.0%	21
Require too much customization	5.0%	55.0%	30.0%	10.0%	20
Framework makes it easy to extend its capability	42.9%	42.9%	14.3%	0.0%	21
Easy to develop large complex website	33.3%	52.4%	14.3%	0.0%	21
Easy to maintain or upgrade	38.1%	42.9%	19.0%	0.0%	21
Available features to improve functionality	33.3%	52.4%	14.3%	0.0%	21
Ease of finding development support	33.3%	57.1%	9.5%	0.0%	21
	answered question				23
	skipped question				0

Appendix C: Survey Response Summary

6. Please, mark the HTML implementation facts					
	Strongly agree	Somewhat agree	Somewhat disagree	Strongly disagree	Response Count
Fast creation of new functional website	14.3%	61.9%	14.3%	9.5%	21
Require too much customization	0.0%	75.0%	20.0%	5.0%	20
Framework makes it easy to extend its capability	0.0%	76.2%	19.0%	4.8%	21
Easy to develop large complex website	9.5%	52.4%	19.0%	19.0%	21
Easy to maintain or upgrade	4.8%	61.9%	23.8%	9.5%	21
Available features to improve functionality	4.8%	66.7%	19.0%	9.5%	21
Ease of finding development support	23.8%	66.7%	4.8%	4.8%	21
	answered question				23
	skipped question				0

Appendix C: Survey Response Summary

7. Please, mark the advantages and disadvantages of CMS and HTML						
	CMS			HTML		
	Advantage	Disadvantage	Response Count	Advantage	Disadvantage	Response Count
Process efficiency	100.0%	0.0%	21	75.0%	25.0%	16
Quality control	85.7%	14.3%	21	81.3%	18.8%	16
Marketing benefits	95.2%	4.8%	21	81.3%	18.8%	16
Improved CRM	90.5%	9.5%	21	80.0%	20.0%	15
Content limitations	13.3%	86.7%	15	5.3%	94.7%	19
Limited flexibility	13.3%	86.7%	15	5.3%	94.7%	19
Expensive design	16.7%	83.3%	12	11.1%	88.9%	18
High Maintenance costs	7.7%	92.3%	13	0.0%	100.0%	16
	answered question					23
	skipped question					0

Appendix C: Survey Response Summary

8. Please, write in your opinion other advantages or disadvantages of CMS and HTML

CMS might contain many features that are not required for current project. HTML is easier to use, but somewhat limited

CMS is the new HTML

CMS needs less expenditure and less man power.

no SEO in HTML

answered question	4
skipped question	19

9. Please, rate the overall satisfaction with the both software tools performance

	Very dissa- tified	Somewhat dissatisfied	Neutral	Somewhat satisfied	Very satis- fied	Response Count
CMS	4.8%	14.3%	0.0%	47.6%	33.3%	21
static HTML	0.0%	28.6%	28.6%	38.1%	4.8%	21
	answered question					23
	skipped question					0