

Main Requirements of Content Management System and Evolution Criteria in the University Environmental : Case Study of MARZ System of King Abdul-Aziz University

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Summary

In this paper, we shall survey the main requirements from any Content Management System (CMS) and the main essential features of the CMS as well as the actual process of evaluating the CMS. After that, we shall define the key criteria which support a proper evaluation of Content Management System with special attention on what is developed and implemented in King Abdulaziz University (KAU) that is named MARS. The CMS will be defined by some key criteria like: technical requirements, usability, web-friendliness, performance, security, built-in applications and support. Furthermore, this paper may act as a guideline in determining the best solution to meet specific CMS requirements especially for the types that is customized based on the customer requirements similar to that is implemented in KAU.

Key words:

CMS, RLO, Document Management (DM), Knowledge Management (KM), Record Management (RM), Electronic Content Management (ECM) and Web Content Management (WCM).

1. Introduction

Content Management is defined as the collection of policies and technologies that guide and enable corporations to contribute, manage, and share their structured and/or unstructured information. On other side, Content Management Systems (CMS) are described as data repositories that may also contain authoring, sequencing, and content aggregation tools, with an objective to simplify the creation and administration of online content. Originally developed and used by the newspaper industry and adapted in the mid-1990s to manage large volumes of content required for robust websites, CMS incorporate a workflow process and manage information based on search and retrieval criteria [1-3]. CMS can support content being created once (content components or RLO) and used many times. An example is the image that is used in several different newspaper articles targeted at different audiences.

Normally, the usability of content management software is subject to a rather subjective evaluation. Experienced users may easily become acquainted with the operation of

new software systems. Untrained editors, however, face difficulties with complex user interfaces and should, therefore, be included into the selection process. Concerning the range of functions of the content management system it is expedient to draw up a cost-benefit equation also taking the future challenges into consideration. Also, on the market for content management systems the "all-in-one device suitable for every purpose" is still a utopia. Every content management system has its strengths and weaknesses and, of course, its price. Moreover, many functions are advertising gimmicks which are either properly functional only in a well prepared presentation or altogether unsuitable for everyday use [3]. Therefore, the list of desired functions should be realistic and always consider the project budget. Important functions like the separation of layout and content, the possibility to generate content with a so called "WYSIWYG editor" (what we see is what we get) or to include multimedia contents in the CMS are offered by any content management solution. Further functions to ease the editors' work should be specifically selected and not arbitrarily ordered following the motto "the system should do anything". Furthermore, the client ought to take into account that the corresponding functions are configurable and offer a rights management to make them available only for certain users. A user interface overloaded with functions hardly ever used may overstrain the editor and result in operating errors. Concerning the functionality it is also necessary to clearly differentiate between front end and back end functions. Indeed, requirements like web accessibility, discussion forum or site recommendation may be supported by the content management system but are only realized in the template, the front end of the web site [4,5]

For the selection of the content management system it is recommended to take the intended functionalities of the Internet and Intranet pages into account. If a web site is to be configured web-accessible the CMS must be able to produce a valid HTML code. This function is a clearly definable criterion whereas the general requirement "web

accessibility” constitutes a complex aspect of the conception and the development of Internet sites .Finally, special emphasis should be put on the issues documentation, training, support and software service. These aspects indicate whether the content management system is professionally developed. Concerning the aspects support and software service, concrete information about time and effort should be requested by the CMS vendor [4]. The corresponding costs are normally based on a certain percentage of the license fees and are levied annually. Also, the reaction time can be defined or even determined as a must-have criterion for critical Intranet or Internet projects.

With an increasing complexity of the planned Intranet or Internet project additional functions of the content management system are inevitably required and need to be defined. These functions include tools of workflow management which allow defining and processing workflows in the CMS. Also, the issues archiving, revision control and logging are essential for extensive projects. Security requirements, for example revision-

secure data storage, should be specified and put down. The aspects of user and rights management should be taken into consideration. What types of users and user roles are required? What are the classical authorizations processes like? Answers to these and similar questions have to be found internally and, consequently, may be introduced to the requirement specification as must-have criteria. Additionally, it should be defined whether existing user directories (LDAP server, Active Directory) are to be integrated into the content management system [6]. Fig. 1 illustrates the components that comprise a typical content management system, illustrating the basic nature of content "chunks" or components and a process for the combination of content. Essentially, content is created in a format that is compatible with the content repository system. A digital presentation format enables the users of the content to search and view the content chunks. Content users typically do not revise the content but alert the creators if there is a need for revision.

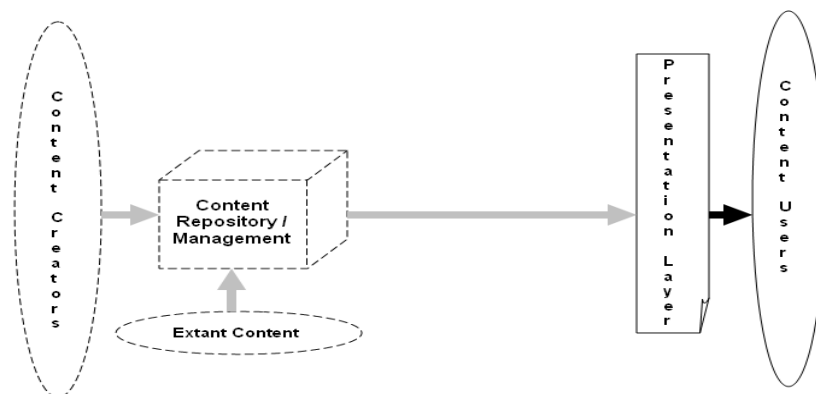


Fig.1 CMS Components Structure

In simple terms, content management can be defined as a process of creating, collecting, organizing, categorizing and structuring information resources of any type or format so that they can be saved, retrieved, published, updated and re-purposed in any way desirable. Content Management encompasses a broad spectrum of areas such as document management (DM), knowledge management (KM), records management (RM), electronic content management (ECM), web content management (WCM), etc. In general, the term content management is used in connection with web pages that can be maintained by a browser. Content management gained importance during the explosion of Web sites in mid 1990s. Initially, many institutions used to provide information resources to their users through their static websites (HTML websites). But as the size of the site increased, they started feeling difficulty in managing and updating all the information

resources (contents) in that way [7]. In the context of digital environment, the content could include: Text, Links, Graphics, Pictures, Sounds, Videos and Data. The key functions for every CMS as shown in Fig.2 are content creation, management, publishing and presentation.

Among all the above types of contents, the textual and data contents are in abundance in most of the organizations. Organizations may deal with a wide range of textual and data contents. This can be categorized as: simple pages, complex pages, with specific layout and presentation, dynamic information sourced from databases, training materials, online manuals (policy & procedures, HR, etc), general business documents, thousands of pages in total and finally extensive linking between pages Content Management System (CMS) contains the terms content and management

(administration) that imprecisely refer only to a system that administers content. Such a system could be a blackboard and a piece of chalk, or it could be something like Wikipedia, or an online auction house such as eBay. In all these cases, content is administered; at times even for a large number of participants as in the case of the last two examples. These participants play a major role with the CMS, on one hand as the administrators, and on the other hand as users. A CMS is a software system used for content management [8]. It offers a way to manage large

amount of web-based information that escapes the burden of coding all the information into each page in HTML by hand. A CMS takes content from inception to publication and does so in a way that provides for maximum content accessibility and reuse and easy, timely and accurate maintenance of the content base. The idea behind a CMS is to make these files available on Intranet, as well as over the web.

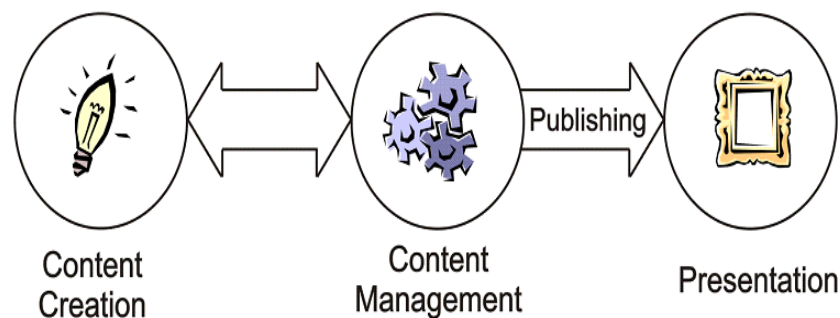


Fig.2 Basic Functionality of a CMS

2. Essential Features of Content Management System

Although till now, there is no one can accurately tell which web content management system is right for an institution without a close examination of the specific needs, there are seven essential features that any web content management vendor should provide given as follows [9,10]:-

2.1. Flexibility; The web content management system should fit well and adapt to the existing website or newly chosen redesigned site architecture. Flexibility in providing proper tools for the content contributors to do their job is of utmost importance. In addition, flexibility of the content management system itself is important to avoid the creation of a secondary bottleneck. While a web content management system might facilitate updates made today, the type and scale of updates may change tomorrow. If the web content management system is inflexible, then a secondary bottleneck arises in making changes to the web content management system itself.

2.2. Scalability; If the system is being deployed for a single department today, and a campus-wide deployment is likely in the future, ensure the system can easily scale up to meet the growing institutional needs. Perhaps even more importantly, make sure the system is scalable to fit the wide diversity of content contributors across the institution – from the most technical to those who may

only be comfortable using a word processor. And finally, make sure the system is scalable to embrace new technologies as “the next great thing” comes along. Systems designed around an open standards approach (rather than a proprietary structure) will help ensure this.

2.3. Priced to fit; Most website content management systems are “one size fits all”. This is a potentially troublesome situation, particularly during a pilot program, where our need might be redefined later on. Ensure that the initial costs and the long-term costs are priced to fit our actual needs. Additionally, pay only for what we need today by making sure the system is priced to grow as we scale up with more users.

2.4. Quick implementation; Each day we wait to implement is a cost and a lost opportunity to our institution. Additionally, the longer the implementation process continues, the more likely we are to incur cost overruns.

2.5. Browser-based; this reduces the need to install and maintain additional software on the client’s machines, and allows changes anytime from anywhere. If done well, the system should also enable content contributors to browse directly to the web page they wish to edit and update it in the context of the entire site.

2.6. Multi-user functionality; It should be easy to implement and add new users, add users to groups, so the

groups can be easily attached to editing rights on particular areas of the site. A hierarchical role-based system with a flexible workflow approval process is a must.

2.7. Easy-to-use; the best content management system is the one that's embraced and used by those who are trained to use it. Choose systems that work best in the unique environment of higher education. Stay away from systems that were designed by engineers who focused on the needs of ecommerce or news/media sites (typically high-end database driven systems). Look for systems that fit-in with the diversity of people and assets that make up your institution.

3. Choosing a Solution that Fits Customer Needs

The best solution is one that fits the institution's needs. A needs assessment identifies the requirements of an organization [11,12]. Then, solutions are evaluated for fit based on how they meet the requirements. The main requirements that should exist in CMS are given by the following six items:-

3.1. Needs Assessment; The needs assessment includes: institutional requirements, site requirements, staffing requirements, technical requirements, and implementation requirements. Each of these areas contains questions which depending on the answers will guide the evaluators to certain features and ultimately the best solution.

3.2. Institutional Requirements; these requirements can be classified according to the following:-

- How much content really needs to be updated and how often? It's important to evaluate not only what's currently being updated, but also what really needs to be updated in order to achieve the goals of the institution.
- How many content contributors need to use the system? The content contributors are the authors and editors of the content itself. Because a web content management system can allow non-technical contributors, staff, faculty, and even students should be considered across all departments.
- Do these content contributors need the ability to make updates anytime, from anywhere? If so, then a browser based solution will be required.
- Will the content contributors' changes require approval before posting to the site? Workflow with authorization is necessary when an institution deems that a

reviewer or editor and possibly others must approve the work of a content contributor. In fact, a multiple level authorization process might be necessary to consider different types of approval: editorial, design, and administrative. The approval sequence should allow for intermediary work and revision on the part of those in the approval chain. Alternatively, the submitted page would be disapproved and returned to the originator or prior reviewer, with the process starting again in a recursive manner.

- What is budgeted and how critical is the cost?

3.3. Site Requirements; this requirement is intended to the following items:-

- Does the solution need to be incorporated into a new site design? Does it need to fit in with existing site architecture, or a legacy cache of static pages?
- To what extent can the existing site be altered? Some solutions will require major modifications to existing site designs, or migration to a proprietary database back-end that can be both difficult and expensive to migrate into, and out of in the future.
- If the institution is currently redesigning the website, will the web content management system fit with your desired new architecture, or will it require your structure to fit into its preferred structure?
- For how many separate websites (physical or virtual) is the solution needed? This is important to determine the up-front costs associated with most web content management systems.

3.4. Staffing Requirements; this requirement is oriented to the following points:-

- Who are the content contributors responsible for the website content? It is likely that these people will not have a high level of web editing expertise. The system should work for the lowest level of technical knowledge.
- How much staff training time and expense can be afforded? The costs and time of training can be significant with a complex system. If people aren't properly trained, the system will not be used, and the system will ultimately fail.
- Does the existing staff have the expertise and the time available to implement and maintain the solution? This is critical when evaluating a web content management solution that is offered as a software solution deployed and maintained on the clients servers. These systems typically require a great deal of ongoing technical support from the purchasing organization.

3.5. Technical Requirements; this requirement cover the following points:-

- Does the solution need to be hosted on an internal server or could it be hosted on the vendor's server? There are a variety of web content management systems available that must be hosted on the client's servers, and then there are some that can be procured as a service or hosted on the vendor's servers, and there are a few that can be deployed either way. The next three questions are tied together.

- Will the solution service multiple locations and multiple servers?

- Does it need to be non-proprietary or platform independent?

- With which operating system servers and hosts does the solution need to work?

These questions are most important when evaluating a content management system that is a software solution. A hosted application, or a hosted server solution, minimizes these technical requirements.

3.6. Implementation requirements; this type of requirement is concerned with the following points:-

- Is the solution needed for a departmental or enterprise level implementation? If departmental, then long term, does the solution need to migrate to include the entire campus?

- How quickly do we want it to be deployed? Some systems can be implemented in weeks where others take several months – or longer! The more changes required to our site and system, the longer the implementation. Also, the longer the training period, the longer it will take to be up and running.

4. CMS Evolution Process

Selecting and implementing a content management system (CMS) is one of the largest IT projects tackled by many organizations. There is no 'one size fits all' solution: no two organizations have the same requirements. Therefore, there is no single best list of requirements for a content management system [13-15]. So, there is need of identifying the requirements of the organization before starting actual evaluation of the CMS. In the process of requirements identification, all the stakeholders - users, authors, etc. - should be involved. A general checklist of requirements can be prepared, which can be used by any type of organization, small or large; profit-making or non-profit making, etc. Since there will be a huge list of requirements for a CMS, structured investigation methods should be used to ensure that the list of requirements is

both manageable and sufficient. Any organization can use this checklist for their purpose as it is or after modifying some of the requirements depending upon their needs. The requirements list can be structured in following sections:

- Product Overview; in which basic information about the product such as technology used, status of the product, total number of installations, etc. are necessary before choosing it. Regarding KAU CMS which called (MARZ), it designed for serving the educational operation in general or KAU in specific way this target make us considered the following points:

- ◆ The system should be able to be developed and applicable, so we chose a technology that verifies it called "ASP", where this technology allows us to make web application to access it from anywhere anytime. This technology is characterized as ease to integrate with server's devices, other applications, ease of use, develop, apply, deals with programming tools and support many programming languages.

- ◆ Ease of use; any web application has a wide base of people using it. So, our application should be ease to use , attractive interfaces and ease to find what you search or do and high performance to don't feel boring or to spend more time to accomplish your job so we considered the previous things is main requirements.

- Creation & Publishing; This request deals with the process of web content delivery including content, creation, approval, publishing and quality control. The content creation is the most important point in MARZ development, so we use some modules during contents creation like:

- ◆ URL rewriting technology to make the content link is readable

- ◆ Twitter module to publish the contents of type news at KAU 'twitter page

- ◆ Keywords module to make the main words in content are linkable to increase the number of Anchor text that helps search engines to find this content and raise our website order, we joined the content creation with the website menu in the same page and we can reuse the same content into many places through its link for easing of content creation and publishing.

There are many points we put it into consideration to verify many features like: easing, integrating, publishing given by the following:-

- ◆ We can create content using different ways like: write it in html code , copy it from MS word and we can write it directly in design mode and offers several tools to improve our content like change fonts, add photos , alignments, add tables, fonts color and CSS styles.

- ◆ We created content that appear in KAU template
- ◆ Metadata field is required filed in content creation to help the search engines to access this content.
- ◆ Required title to express about content.
- ◆ Offers many modes to review our contents and see the final shape before publishing.
- ◆ Control with content if we want to publish it after adding or just add it

- Content Presentation; This request describes the presentation of content and accessibility features of the CMS. Here, we mention the various phases of the content presentation as follows:-

- ◆ We present all contents in KAU template as unique design
- ◆ Ease to access: we can find content through direct link or from icon on main page or from side menu which its levels doesn't over 3 levels.
- ◆ We will see contents with all its effects "Anchor texts, fonts' options, flashes, pictures, title at top of the content".
- ◆ We create readable URL.
- ◆ We can get content statistics like last update date, number of visitors, quick links to important sites link to KAU home page.

- Content Retrieval; This request deals with the retrieval features in terms of metadata, navigation and Searching depending on standards of metadata and description to indexing content by search engines.

- Technical; This request summarizes the technical aspects of the CMS product including compliance, security, reporting and monitoring.

- Interdependencies; This request deals with interdependencies with internal and external systems, to ensure seamless planning, implementation and management. Our CMS integrated with multi independent systems like "Time Sheet , Consults management and researches system "

- Built-in Applications; As per the requirements of Today's web; many applications are required to be integrated with the CMS. Our CMS contains many subsystems which is very important and reusable by KAU staff like 'subject system, awards system .etc '

- Support and Training; this request deals with ongoing product technical support as well as staff training and support.

Firstly: regarding to the product overview; it can be further categorized in sub-sections of requirements as follows:

- ◆ Basic Information; Here, following facts can be checked like: Product name, Company/Organization name, Company/ Organization Web Page, Product Web Page, Company description, Product description, License, etc. Our product name is MARZ developed locally in KAU organization with the following website: <http://marz.kau.edu.sa>,

- ◆ Technology used in the Development; Here, the technology used to develop the software and required for installation and running of the product should be checked. Here, one fact is very important regarding the required software- whether they are proprietary or open source software [16,17]. To develop the MARZ system, we use the following two software techniques named: ASP.net and SQL Server. Firstly, ASP.net was used based on its facilities that given below:-

- ASP.NET drastically reduces the amount of code required to build large applications.
- With built-in Windows authentication and per-application configuration, your applications are safe and secured.
- It provides better performance by taking advantage of early binding, just-in-time compilation, native optimization, and caching services right out of the box.
- The ASP.NET framework is complemented by a rich toolbox and designer in the Visual Studio integrated development environment. WYSIWYG editing, drag-and-drop server controls, and automatic deployment are just a few of the features this powerful tool provides.
- Provides simplicity as ASP.NET makes it easy to perform common tasks, from simple form submission and client authentication to deployment and site configuration.
- The source code and HTML are together therefore ASP.NET pages are easy to maintain and write. Also the source code is executed on the server. This provides a lot of power and flexibility to the web pages.
- All the processes are closely monitored and managed by the ASP.NET runtime, so that if process is dead, a new process can be created in its place, which helps keep your application constantly available to handle requests.
- It is purely server-side technology so, ASP.NET code executes on the server before it is sent to the browser.

- Being language-independent, it allows you to choose the language that best applies to your application or partition your application across many languages.

- ASP.NET makes for easy deployment. There is no need to register components because the configuration information is built-in.

- The Web server continuously monitors the pages, components and applications running on it. If it notices any memory leaks, infinite loops, other illegal activities, it immediately destroys those activities and restarts itself.

- Easily works with ADO.NET using data-binding and page formatting features. It is an application which runs faster and counters large volumes of users without having performance problems.

Secondly we use SQL server database since it characterized with following: Microsoft SQL Server is a multi-component database management system taking advantage of many features of the underlying operating system. Obtaining a breakdown of its workload by categories such as users and applications requires a non-standard approach. The reasons that let us use SQL servers are:-

- Automating DMF Policy Enforcement
- Manually Enforcing Policies in SQL Server 2008
- Verifying DMF Policy Compliance
- Creating a Distributed Management Framework Policy
- Declarative Management Framework in Microsoft SQL Server
- SQL Server's Declarative Management Framework (DMF)
- Declare security and best practice policies and then apply them to database server.
- Change Data Capture in Microsoft SQL Server

- ◆ Status; Status means the year of introduction of the product, versions of the software, current versions of the software, frequency of updating, number of downloads, number of installations, active developer website, etc. MARZ has been produced since year 2006, it was updated many times and it contains some of subsystems everyone has a different version like Content admin ver 2, time sheet ver 3, twitter integrate ver 1, ... etc, and it has more than 40 sub system

- ◆ Installation; the time and skills required for typical installation is checked with the available human resources in the organization. The process of this job is:-

- Software requirement analysis; regarding this step MARZ system is prepared to serve KAU requirements so we collected KAU needs and started thinking and analysis in that scope how we can build system verify these needs and able to develop or improvable and meet any future needs

- System analysis and design; here after we determine KAU needs and drew an imagined picture for MARZ we start to design its phases and all inputs and outputs for each phase

- Code generation; The next step is beginning to implement our system that need to use a web application platform supported suitable programming languages helps us to build that system and strong DB to store our data so we decide to use ASP.net and SQL server

- Testing; after we developed the system we test it and check all subsystems, try to limit the problems or modifications so we launch the system internally for testing and receive the suggestions by KAU users before put it online.

- Maintenance; upon the pervious step we solved and developed the required modifications or suggestions and launch the system online for all users.

Secondly: regarding the Creation & Publishing; this section explains the main functionality of CMS. A good CMS should ensure that the process of content creation is easy. Sufficient authoring tools should be integrated with the CMS to ensure that all web content has appropriate approval, etc. This section can be further divided into following sub-sections of requirements:

- ◆ Content Creation/Authoring; One of the reasons for an organization to choose CMS is to try to avoid the bottlenecks caused by having only a few people skilled in the art of HTML. The expectation of a CMS is that it will allow staff with little or no HTML authoring knowledge to add content to the site. This is the functionality required by the authors (content creators) using the CMS. Without an effective authoring process a CMS can't succeed. The content creation is the most important point in MARZ development so we use some modules during contents creation like:

- URL rewriting technology to make the content link is readable

- Twitter module to publish the news content at KAU ' twitter page

- Keywords module to make the main words in content are linkable. we joined the content creation with the website menu in the same page for easing of content creation and publishing

- We can reuse the same content into many places through its link

- Metadata field is required filed when content creation to help the search engines to access this content

◆ Content Review; this is critical when managing the creation of content by multiple authors. This functionality ensures that all the content has appropriate approval and content is accurate and appropriate. The aim of this process is to enable a piece of content to be created, and then automatically forwarded to another person for review and /or for approval to publish. This process is known as the workflow process. The workflow process involves Workflow approval, Workflow Management and Notification. MARZ applies workflow methodology with the contents which need this like research system not with all contents

◆ Content Publishing and Repurposing; this functionality is meant to streamline the publishing process and facilitate online review and approval. The publishing engine of the CMS takes the content, stored in the repository, and generates the final pages. There are two approaches to the way in which content is served up into the browser: the first of these serves static pages and so only requires the use of a web server. This is also referred to as static rendering . The second approach is through the dynamic creation of pages. The system selects as appropriate display template and then assembles the elements of the page from tagged components in the repository before presenting the page in the browser.

◆ Content Version Management; every time a piece of content is checked out of the repository even the most minor of changes (e.g. a spelling mistake) will result in a new version number being created. A long document that is being created by a number of authors can therefore quickly build up a very long list of versions, and identifying intermediate versions can be difficult. Version management enables a website or an Intranet to be rolled back to a specific date and time.

◆ Content Metadata Tagging; metadata is at the heart of CMS and the way that is implemented in a CMS has a very significant impact on the extent to which content can be found and reused. Each piece of content need to have metadata attached before it is added to the repository. In the context of CMS, there are following broad categories of metadata:

i) Content metadata provides a way of identifying documents that may contain relevant information. This is

usually what most people think about when the word metadata is mentioned.

ii) Descriptive metadata enables the type of document to be identified. In this way a search can be limited to web content, streaming video, etc.

iii) Administrative metadata identifies the relationship of the document to the business context. These metadata include, for example, the person and department owning the document, the date when the document is checked for relevancy, etc.

Metadata field is required filed when content creation to help the search engines to access this content and we follow the standards to fill the metadata field like (its size, sufficient description) and we use the previous categories in our metadata.

Thirdly: regarding the presentation; The purpose of this section is to ensure that information and services are presented in a standard style and they present a professional image by maintaining control over the look and feel of the site. This section can be further divided into following sub-sections of requirements:

◆ Templates; Templates are used to separate the design from the content. It may be predefined, and/ or customizable to control the visual presentation of content items. We use a standard template that KAU template, and it characterized with good appearance.

◆ Customization and Personalization; the information being provided by the CMS can be tailored to a particular user. For this, CMS uses logging/tracking tools. Similarly specific information can be provided to specific users through these tools. Besides the information, the look of the page can also be personalized.

◆ Multilingual Support; for the globalization of the website, multilingual support is indispensable. CMS should provide the content and information in Language other than English also. MARZ system support Multilingual

Fourthly: regarding the content Retrieval; the purpose of this section is to ensure that the users are able to quickly and successfully find what they are looking for with minimum effort. This functionality can be achieved via metadata, via search and via navigation. MARZ system helps to ease finding the contents by the following methods:

- 1- Sitemap for KAU site.
- 2- Searching tool in KAU contents only

3- Metadata for every content required when content creation.

4- The limit of navigation is 3 levels to can access any content easily and quickly.

◆ Metadata Generation; as stated earlier, metadata helps in finding information from the repository. Metadata can be generated automatically at the time of creation of the content, or can be assigned by the author or any other person even after the creation. MARZ assigned by the author or any other person even during the creation

◆ Search Features; the search function may be a part of the CMS or it may be a third party engine. It is very necessary to provide comprehensive search facility across the website, multiple sites or sub sites to support content retrieval. For this CMS may use automatic indexing, keyword generation, and full-text indexing. It may support the use of Boolean operators and proximity operators, etc. This feature has been verified through adding a search engine in all web pages; this will facilitate the search process on any information and extract it from any page of the site pages without returning to the main page or certain page.

◆ Navigation Structure; The site structure helps in navigation. Contents may be organized in sections and categories. The depth of categorization has an impact on the retrieval of information through navigation method. MARZ has sitemap for KAU website and arranged site menus in to places above and side of the page

Fifthly: regarding the technical; the purpose of this section is to ensure that the CMS complies with industry standards, to provide support for the development, testing and deployment, security, etc. This section warrants checking the requirements under following sub-headings: ASP.net and SQL features

◆ Compliance; CMS should comply with the industry standards so that the system is robust and integrates with existing platforms and applications. It should support standard based development tools (e.g. XML, XSLT and other open standards). It should also support different browsers and other productivity applications.

◆ Reliability and Performance; CMS should provide a reliable and stable web site with a proven capability. It is very important to check the number of users the CMS can handle at a time. Response time i.e. speed of operation is very important.

◆ Audit trail; The CMS systems should have this feature. It should keep track of all the changes, which occurs in /or with the content, after approval for publishing until the content items are removed from the CMS.

◆ Content Aggregation and Syndication; To syndicate the site is to make the Content Items from the Web site assigned to the Front page Component available for syndication via a distributable file. The Syndication Component is used to publish a Newsfeed of site's Public Content Items, which have been published to the Front Page in the Front-end of CMS. It should support for both inbound and outbound syndication.

◆ Content Migration; Content Migration is exporting the existing web content along with structure and content links into a new CMS with minimum effort and reworking. At the same time the associated content records (metadata) can also be exported.

◆ Security; CMS provides role based security (based on roles as defined in the CMS) across all templates, contents, services and repositories. It should provide ability to override the once set security.

◆ Content Repository; CMS should provide support for a content repository of a wide range of common content types: structured content (database data, MS- Excel spreadsheets, etc.), documents (MSWord files, PDF, RDF, HTML, etc.), presentations and media (MS-PowerPoint files, image files, sound files, video files and other rich media files), etc.

Sexily: regarding the interdependencies; The purpose of this section is to ensure that the CMS is capable of exchanging information with other organizations and ensures seamless exchange of information across internal systems as well as external systems, and integrate with existing process and infrastructure. This section warrants the study of requirements under following headings:

◆ Interfacing with External Systems; this functionality is mean to exchange information with other organizations (sites), and enable being part of a portal environment with other online service providers. To achieve the above goal the CMS should provide an Application Programming Interface (API) and architecture to connect and interact with external systems. Ability to integrate with external search engine is also desirable.

◆ Interfacing with Internal Systems; The ability to integrate with Lightweight Directory Access Protocol

(LDAP) directories is desirable for CMS, in particular information from underlying directories that may be used for workflow routing and notification. Similarly ability to integrate with other products such as MS-Office, Lotus Notes, etc is also desirable.

seventhly: regarding the Built-in Applications; to cope up with the requirements of today's web, many applications are required to be integrated with the CMS. Besides, Discussion Forum, FAQ management, Data Entry, etc. are other applications which may be desired with the CMS. Now a day many finance related applications are also available to be integrated with the CMS such as Inventory Management, Pluggable Payments, Pluggable Tax, Shopping Cart, etc. MARZ system in KAU having the following sub systems that serves all staff, employee and students of the university.

- E- Management system
- E- Services - Staff
- Staff Particulars
- Academic Services for Academic Staff ODUS
- Decision Support System
- Memos and Resolutions
- Faculties' Academic Affairs System
- E- Services - Students
- Virtual Class Rooms(CENTRA)
- Electronic Management Education System
- Academic Services for Students ODUS
- Academic Services for Postgraduate Studies
- My Page
- Doctor Portal
- University Bulletins
- Academics' Personal Websites
- Phone directory
- KAU SMS Service
- Mobile SMS System
- E- Mail
- University Bids
- Transaction Feedback
- KAU Job Vacancies

Eighthly: regarding the Support and Training; This section is concerned with checking whether the CMS is supported by manuals, tutorial and training (free as well as commercial), developer community, online help, public forum, public mailing list, third-party developers. MARZ is supported by manuals and training, developer community, public forum, public mailing list, third-party developers. We have KAU forum and MARZ guides to help MARZ users how to use.

5. Actual Process of Evaluating the Content Management System

Evaluating content management systems can be an overwhelming task. However, with a structured approach to our evaluation, things can be much easier and less intimidating. Here are eight characteristics that a good CMS should have and MARZ verify it successfully [18-20]:-

- Intuitiveness: easy to understand and use; CMS should have a GUI (Graphical User Interface) that's easy on the eyes, doesn't have overly complicated options, and offers simplicity in its administration interface. A good interface means that tasks pertaining to creating and managing our content will be quicker, saving us a lot of time and increasing our productivity. We should also look at it from an end user's perspective: if we're building a content management system for a client who's not "technology-savvy" and we choose a solution that requires a Ph. D. in computer science, it's less likely that they'll be able to use the system (thus, defeating the whole purpose of a CMS, which is to empower its users).

- Flexibility and Ease of Customization; When taking into consideration a content management system make sure that we're not obligated to use their design templates. A large quantity of CMS solutions allows us to customize our own design without major restrictions. If our CMS forces us to choose a fixed and unalterable design template, then we're stripped of creative license and our website will look like everyone else's.

- Extensibility via Plugins and Modules; A good CMS will allow us incorporate helpful site features into our site by letting us extend the default configuration with plugins. Plugins/extensions/modules (their terminology varies between different platforms) make a difference in terms of enhancing our site's ability to provide our site users with useful options for interfacing with our site. Look for a CMS with a powerful Application

Programming Interface (API) in case our need to write our own extensions. Make sure that the CMS we're considering already has a huge list of plugins. Though our might not need plugins right away, it's important that this is available to us, later down the road.

- **No Need for Programming Knowledge;** If we're more "design-oriented" than anything else, make sure we select a CMS where we won't need to have extensive programming abilities to publish and maintain our site. There is a wide selection of CMS's that have WYSIWYG editors, letting us edit content without the need for code. Having to edit text through HTML markup can be time consuming and takes us away from other aspects of our managing and building our site. Complex sites, however, can require a CMS that will let us type in some code, edit files with extensions such as .php, .css, .html, and make changes without that need for a third-party source code editor.

- **Optimized for Performance and Speed;** Taking into consideration the speed our pages load on the browser, and how fast our site can make a connection to a server, is vital. Choosing a CMS that is bulky will drive away visitors rather than bring them in. By visiting examples of live sites, we'll be able to gauge somewhat how fast pages load. Keep in mind that we can increase the load time of our site by choosing a good host, and adding plugins that cache/compress/minify feeds, CSS, JS and also caches our database objects.

- **Security;** Adequate security for our site is very important and must be in place in order to protect our content. There are CMS's that allow us to install specific plugins and edit files/permissions in order to increase security levels. Make sure our choice a management system that offers modules to protect the integrity of our site. We can also protect our site by selecting a CMS that allows us to easily assign a different username and password to each user. This will let us view and control what each user has access to.

- **Documentation and Community Support;** Nothing's more frustrating than trying to figure out how to do something, and not have references online that we can take advantage of. One way to ensure that we won't be running into this problem is by reading through the documentation of your candidate CMS's. Also, a quick Google search will tell us how popular and well-documented a content management system is. The availability (or lack thereof) of support from users of the system can be a deal maker or deal breaker. When users

are active and proud of being part of the community, we not only have access to individuals that are more familiar with the system, but also, we can be assured that the project will be developed continually. Nothing's worse than investing your resources and effort on a dead (or soon to be dead) project.

- **Emphasis on Web Standards and Best Practices;** Content Management Systems developed under web standards guidelines and best practices will ensure that we won't get burned later down the road. When applications are designed with best practices in mind, we can be assured ultimate cross-browser compatibility, lean-and-mean code, and ease of maintenance. Look for content management systems that promote the use of web standards, and those that put it at the forefront of their development and design philosophy.

6. Conclusion and Future works

Selecting the best solution to fit an institution's needs requires answering many internal questions that determine some key requirements of a system. There are many other factors, in addition to cost, that the evaluator must consider. It is easy to fall into the trap of overspending if these questions are not answered. The seven essential features any system should include are: Flexibility, Scalability, Priced to fit; Quick implementation; Browser-based; Multi-user functionality and Easy-to-use. Look for systems that fit-in with the diversity of people and assets that make up the institution. So, in King Abdulaziz University, the software engineers have been developed a local Content Management System named MARZ. This system is a software platform that let the users of King Abdulaziz University (KAU) manages the contents and looks of a site through an easy use administration panel. It makes websites: easy to create and keep updated by using customization techniques such as themes or templates it, also allows the look & feel of the website to change without affecting its contents. Through user friendly interfaces, non-technical members of the university can take ownership of the contents of the corporate site. MARZ assists in supporting the KAU website and enhancing the educational process of KAU. Building MARZ system depends on using ASP.net and SQL Server. ASP.net was used for its facilitation in development and application. MARZ uses SQL Server as a Database Management System that is characterized of its huge database content size and high security level as well as too safe operation levels. MARZ system has been running successfully well in KAU for four years. During this period, there are a lot of developments have been achieved that include: creating and publishing the contents (news,

files, researches) plus activating the research system and creating the courses module as well as the development of the academic staff websites. Most importantly, we should remember that Web Content Management is a framework that includes people as much as it provides technological solutions. The best content management system is the one that's embraced and used by those who are trained to use it. Moreover, the return on investment of any new technology is zero if no one accepts or uses it. The future CMS development will come up with improved technologies for: Reuse of content; Quick content creation and publish without any time delay; Integration of various internal applications – Integration; Improved corporate and client communication; Integrating external system and content - Content Aggregation & Syndication; Multiple access and transmission.

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