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Web Applications Content Management System

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Content management systems (CMSs) are World Wide Web platform software, developed by communities of web programmers, to develop a website and enable web contents management such as animations, videos, text, audios and image. CMS has made web development very easy and fast, even for a person with little or no knowledge of web programming. The choice of selecting the right CMS is important, because there are different types of CMSs designed and developed for different purposes.

The methodology used in this project is the Drupal software. Drupal is one of the best and most used CMSs to develop website and managing web contents. Using Drupal gives this project credibility about the challenges encountered while using this CMS and how the challenges were solved.

During the project a sports website was developed using Drupal. Using Drupal is flexible as it gives possibilities to develop any type of website, manage its contents and customize the website themes.

This project has helped to simplify the basic features to help in selecting a CMS to meet the desired need of an intended CMS administrator and users using Drupal as a case study. Also, the challenges of maintaining a CMS become easier with this project.

Keywords	Content Management Systems, Drupal, web, internet, computers.

Contents

1 Introduction

There are hundreds of CMS software that are up and running, but they all work differently. Hence, this project using Drupal as a case study, has helped in simplifying the features a proposed CMS user needs to know to help them make a correct choice selecting a desired CMS. Also explained in this project is the purpose of employing the use of a CMS as to the types of website that a proposed CMS user's desires, which is used to help streamline the correct CMS to choose from. The general challenges encountered, how to notice and handle the challenges when using any of the CMS are also explained.

Management of information is a vital aspect of information technology thus managing of information is as important as gathering it. Data can be processed, transformed into information and can be broadcasted through several media platforms. The world-wide web media platform, which is a broadcasting platform displays processed information and the information displayed on this platform is referred to as web contents.

Among several digital media platform technologies, which are employed in presenting contents, the worldwide web has taken centre stage in the information and media industry by managing and distributing contents as well as displaying these contents on a single computing platform. The web is one of the new media and it has expediently been able to embed many multimedia into it, thereby challenging the conventional media to its acceptability and flexibility. The most dynamic websites have immense multimedia technologies embedded in them. Thus the need to use a content management system arises.

CMS (Content Management System) are software that are used in managing digital and web contents. They are all web-based software and they give different experiences and services as to managing digital contents. Some allow multimedia integration while some limit and control the number of multiple media they can take. They also give different services, controls and users managements. The web and internet technologies on which the CMS operates, are old and they have evolved with time.

This chapter gives an insight into how web, internet, media and information processing technologies have evolved with time. One of the pronounced breakthroughs was turning around media broadcast from a single conventional media platform to being a multimedia

platform and how they have developed to accommodate CMS to manage web contents. First the history of the internet and other technologies that support web applications, managing web contents and how they evolved over the years since their inception.

1.1 History of the Internet

The internet has gone through several phases of development, starting from a small idea, visions and implementation to something achievable. Up till date the internet is still evolving. There are several inventions that have led to the actualization of the internet and have brought changes in several fields, such as telecommunications, commerce, manufacturing and media. These inventions have helped in modifying the way these fields operate, the traditional way of operations of these fields gave space for machines and helped to define the industrial, business and communications revolution.

The postulation and invention made by Hans Christian Oersted, a Danish scientist, who demonstrated the association between magnetism and electricity. Hans postulation was that electric current generates magnetic field, this hypothesis leads to the invention of a Galvanometer in 1822, Electromagnet in 1825, using these electronic inventions the first Electric

Telegraph was developed by Carl Gauss and W.E weber at the university of Göttingen, Germany in 1825. The development of the electric telegraph continues, and in1837 Samuel Morse developed a widely used single wired electric telegraph with fast signal compared to the multiple wired European telegraph. [1, 8.] Telegraph gives rise to the mass communication technology, with this technology people, could pass messages almost immediately over a long distance.

In 1866 in the quest to make a formidable communication link between northern America and Europe, in order to have a transatlantic Telegraph. A submarine telegraph cable was laid in the Atlantic Ocean. The cable was laid from Valentia Bay, Ireland, to St. John's Newfoundland, and spanned distance of approximately 4,000 kilometres. The cable core was made up of twenty-seven interwoven copper wires surrounded by an insulating layer of gutta-percha. It also had an outer sheath of woven iron strands covering the core. [1, 10.]

In 1951, a new ground was broken when Claude Shannon an electrical engineer in Bell Telephone Laboratory outlined the principle of transferring information through noisy

channels. It was in his theory called “A mathematical theory of communication” where the term “bit” was first introduced to represent the mathematical unit for information. [1, 30.]

In the late 1950s to 1960s, competition between the Soviet Union and the United States spurred the invention of the satellite. In 1957, the Soviet Union launched Sputnik the first man-made satellite weighing 184 pounds, to space sputnik 2 was launched same year. This made the USA to embark on massive funding on technological research in conjunction with the academics, scientists, engineers and researchers, which give birth to ARPA (Advanced Research Projects Agency) in 1958 for exploring computers and information processing.

National Aeronautics and Space Administration (NASA) was later created from ARPA to handle space exploration. It was part of the privately funded aspect of ARPA that Larry Robert a computer scientist who proved that computers far away from each other could exchange messages with his invention, by connecting his computer in Boston through a phone line with another computer in California. This technology was named ARPAnet. Larry came up with a working principle (Interface Messaging Processor) sketch, of the ARPAnet showing how messages are routed from a source to their destination. This marked the beginning of the internet.

Paul Baran a computer scientist who worked for the United State of America military in 1962 came up with a concept that the government of the United States needed to set up a distributed communications system that could withstand a nuclear attack. In his presentation he came up with reasons on how information could be sent over many routes instead of one pathway that is used in sending information from one destination to another. This idea brings about the internet concept known as redundant routing and his idea of distributed communication give birth to packet switching.

A similar idea came up in Joseph C. R Licklider in his writing, a psychologist who later joined ARPA.In 1963 he proposed a network that can allow people to connect and communicate together through their computers across geographical spaces. It was also within the late 1950s to 1960s that the modem (modulator-demodulator), which is an important device in the internet world, was developed. It was built in 1958 by communi-

cation engineers in the Bell laboratory. In the 1960s, Ted Nelson, a great thinker, theorized and suggested that documents stored on computers can be linked together. His theory give rise to hyperlinks and hypertext used on the World Wide Web. [1, 33-62.]

1.2 History of the World Wide Web

The history of web is dated back to the 1990s. where the web was introduced to the populace and for commercial usage. Basically, the web was confined to some communities such as top universities, research laboratories and was not made public.

In 1991 software architecture for the world-wide web and the first GUI browser was completed by Tim Berners-Lee called “World Wide Web” (WWW). The English-born Tim Berners-Lee a physicist who joined Centre Européan pour la Recherche Nucléaire (CERN) in the effort of improving real-time- data acquisition system, started out by asking CERN to fund the development of his idea of a shared information space, the hypertext system which he proposed in 1989.This idea leads to the development of the web of hypertext documents with which people can communicate with each other with the help of a computer.

Inventions are born out of solving problems. Tim Berners-Lee’s idea was developed out of the need to solve the problem of exchange of data due to the difference in encoding and networking the data. It was with this problem of compatibility he developed the web so that exchange of data can be easy and compatible with different languages and operating systems.

From 1991 to 1994 WWW grew in awareness and people started reorganizing its potentials. Tim Berners-Lee’s idea took another turn due to the running out of funds to continue his project at CERN (Centre Européan pour la Recherche Nucléaire). His idea was introduced to the internet communities to see how they can make the web idea become better, this particular proposal gave birth to different browsers, which enables people to read and navigate hypertext documents on the WWW. Several browsers were developed due to this open proposal such as Erwise, Midas, cello and ViolaWWW.

Other applications seen on the web today were developed when the WWW was thrown open to the public for dynamic development. Lots of programming companies and programmers took advantage of this, to key in to Tim Berners-Lee’s idea such as the web

having animation and audio aside the initial text format. That was the work of Sun Microsystems which was founded in 1982.After Tim Berners-Lee's idea, all other components of the web have been developed to make the web more powerful and user-friendly such as the web laws and copyright law, other programming languages that run or can be used in developing the web.

In 1993, a graphical browser called the Mosaic Web browser was developed by Marc Andreessen at the National Centre for Supercomputing Applications (NCSA). Also in 1993, the Inter Network Information Centre (NIC) at the U.S department of Defence assigns Domain Names to the collection of addresses of computers connected to ARPAnet.

In 1994, a law was passed by the United State Congress "The national communications competition and information infrastructure Act" that allows for telecommunication companies to provide equal and available services to any person willing to pay for the service. In October 1994, Tim Berners-Lee gave directives to form the World Wide Web Consortium to foster standard and interoperability. This consortium persuaded institutions, researchers, and academics, to discuss and revolutionize the web. The same year the first international World Wide Web conference was held in Geneva, Switzerland where topics on different bowsers, software, web security, multilingual text, web privacy and web search were deliberated on and solutions were proposed. By 1998, seven of this conference have been held. [1, 162-164.] The 26th World Wide Web conference was held in Perth Australia from 3rd to 7th April 2017.

The history of developing the internet and the web has been a good example of how ideas, visions and competition turn into realities, these achievements and ground-breaking inventions paved way for international network for commerce, dissemination of news, surfing the internet through World Wide Web. The World Wide Web and the internet as an aspect of communication technology have made the world a global village.

1.3 Internet Technologies

The Internet like a tree, has a trunk, branches and leaves. The branches are smaller clusters of connected computing devices within an area, country or any location, the leaves are computing devices attached to the branches and the Internet is the tree trunk, which connects the branches. The leaves get their nutrients from the branches via the tree trunk and then the leaves grow and become green, in this context Internet supplies

a network to the branched computing devices so they can communicate with other similar branches sharing the same trunk.

The Internet is a huge and popular computer network in the world. It can be technically referred to as the network of networks and the process of networking computers and other devices electronically, in order to make communication, sharing of information, software and hardware between these connected devices easy. The process of connecting several computers together is referred to as computer networking. Computers connect and access each other by connecting to servers, belonging to an Internet service providers (ISPs), this ISPs serve as gateways to the Internet.

ISPs is a company that makes available Internet services to their subscribers for a fee. ISP connects small groups of network computers which can be referred to as regional networks to a major high speed network within a country called a backbone network and these backbone network are connected to other countries' backbone networks which forms a huge and formidable network called the Internet. [2,30-33.] ISPs can provide wireless and wired connectivity using any of the access technologies such as Digital Subscriber Line (DSL), cable, WIFI, Fiber To the Home (FTTH), Worldwide Interoperability for Microwave Access (WiMAX) and cellular. [2,41-50.]

The World Wide Web is a collection of documents called web pages; these web pages are stored and can be accessed, from a computer called web servers. A webserver can host one or more web applications or servers and they store web pages on their hard drives. These servers are always connected to the Internet for easy accessibility to the web pages with a computer or other devices that allows access to a web.

Apart from the webserver which is very important to this topic and report there are other types of servers with different functionalities such as application server, catalogue, communication, computing, fax, file, game, mail, media, database, proxy, print, sound servers. Some of these servers work independently while some work with other servers for example the web server and the database server can both be used on a dynamic website. Most websites are now multimedia websites with different servers supplying them contents.

As stated above, the web server is a host and the host includes desktop computers, and mobile computers connected to the Internet. The word "host" originated from the fact that

these computing devices allow software applications to run on them, thereby hosting applications. The host can also be referred to an “end system”. The host can be divided into two categories: clients and servers. Literally clients are indirectly connected to the server via the ISPs such as our Personal Computers, Personal Digital Assistants and servers are referred to as a machine that stores resources or information for further distribution. These resources could be data in a database server, web pages in a web-server, or emails in a mail server.

Both client and servers have programs/applications that run on them and they communicate and provide services to each other over the Internet. [2,37-38.] Apart from accessing the contents of webpages, it is also proper to highlight that there are several activities that are done via the Internet such as sending and receiving electronic mails, and Instant Messages (IMs).

1.3.1 Computers Communication Over the Internet

There is a structured layer model used in representing the protocols on the Internet. This model simplifies how computing devices can process and send packets (data) to each other without interference and delays over the Internet. It is a global network model designed by the Organization for Standardization (ISO).

This model is called OSI (Open Systems Interconnection) reference model. This model has seven layers, Application, Presentation, Session, Transport, Network, Link, and Physical Layers.
The OSI model is still in use only that it has been simplified to what is now called the TCP/IP model. The TCP/IP model terminologies and protocol are the same with the OSI model only that it becomes simplified and efficient by merging the layers in to four. Application, Transport, Internet and Network layer.

Table 1 The OSI Reference model with seven layers and the TCP/IP model with four layers

Application	Application
Presentation	
Session	
Transport	Transport
Network	Internet
Data Link	Network interface
Physical	

As showed by table 1, the OSI's Application, presentation, session layers are merged into TCP/IP's Application layer while the OSI's Datalink, Physical layers are merged into TCP/IP's Application layer. The OSI's Network layer is now the Internet layer in the TCP/IP model. Transport layers remain unchanged in both models. Both the OSI and TCP/IP model have protocols that guide the activities of each layers in them and the collection of these protocols is called the Internet protocol stack.

The internet protocol stack shows and tells what happened when a destination host receives packets and how it sends packets (source-host) in the Internet. It tells what protocol(s) is or are used and at what stage of the model the protocol springs to action and what services are provided at each stages of the model layers. A protocol layer can be implemented in a hardware or software or on both at the same time. These protocol layers are present in both the source host and the destination host, and they work such that messages or packets are encapsulated down through the layers in the source host to the network and decapsulated up the layers in the destination host.

The application Layer is available in a multiple end systems (both the source and destination host) which eases the exchange of packets of information between application layers in these multiple-end systems. This layer has many protocols such as HyperText Transfer Protocol (HTTP) which help in delivering web documents, Simple Mail Transfer

Protocol (SMTP) which helps in the transferring of email messages, and File Transfer Protocol (FTP) which helps in the transferring of files between end systems.

The transport Layer makes sure application-layer messages are transported between applications end points with the help of its TCP (Transmission Control Protocol) or UDP (User Datagram Protocol). It also makes sure there is a speed match when sending messages between end points.TCP in this layer breaks long messages into smaller segments, and also organizes, maintain a congestion message control mechanism. Transport protocols function in the end systems not in the network router.The transport layer packet can be referred to as segment. [2,224.]

The network Layer contains the IP protocol and other routing protocols. This layer makes sure that datagrams which are network layer packets move from one host to another. This layer provides the service of making sure the transport layer's segment be delivered to the transport layer in the destination host.

The Link Layer, is saddled with the responsibility of traversing datagram through several links from the source to the destination. Examples of link layer protocols are WiFi, Ethernet, and point-to-point protocol. The link layer packets can be referred to as frames.

The physical layer moves bits within the frame from one host to another. The protocols in this layer depend on the transmission medium such as twisted copper wire, single fibre optics of the link thus Ethernet has several physical protocols, one protocol for fiber, another for twisted pair copper wire etc. [2, 76-79.]

Apart from connecting and easing communication between computing devices, the Internet can also be seen as a service provider to applications such as instant messaging, VoIP (voice over IP), electronic email, web surfing, video streaming, peer to peer file sharing, remote logging and many more. These applications operate and work on hosts and they are connected to other hosts using the same or related applications with the help of the packet switches. One of the aims of developing applications that run on our computing devices are to share data, and for this to happen, these applications should be compatible. The hosts attached to the Internet provide an Application Programming Interface (API) which sets the rules to which data are shared between hosts via the API

sockets. There are different sockets on the Internet that is why when developing an Internet application, one of the Internet's service designed for the application type has to be chosen.

It is also important to look at the technologies that connect remote computers and host together. These connections are made possible with the help of the access networks and the network core they connect computing devices together all around the world. Access networks consist of the telecommunication technologies ranging from household telephone line appliances, modems and wired telephones, to base stations and they are used in connecting to the Internet via an ISPs.

Local wired telephone infrastructure, dial-up modems are used in connecting to the Internet. Digital subscriber lines and cables, is a broadband connection for residential apartments, this technology is more prominent in Europe and it is better than the dial up Internet access, in speed and services.

Television Internet cable using an existing cable television infrastructure with the help of coaxial cables as amplifiers to provide network for households, this network technology uses an external modem for connection with the television company that provide the cable Internet access. Fiber-to-the-home uses optical fibers instead of coaxial cable or twisted paired wires to connect homes. This technology provides high transmission rate for home Internet.

Ethernet is the most used technology for cooperate and higher institution networks, Local Area Network(LAN) is used to connect hosts to the edge router.The first router in the access network is a refer to as edge router. WIFI provides a wireless Internet connections and there are two types of wireless Internet access. There is the Wireless Local Area Network(WLAN) and Wide Area Wireless Access Networks(WAWAN). Wireless Local Area Network(WLAN) works in such a way that there is an access point that provides the wireless service and the users connected to the wireless access point have to be within a few tens of meters of the access point while the Wide Area Wireless Access Networks(WAWAN) make use the phone cellular infrastructure to provide access to base stations that are tens of kilometres away.

There are also some important technologies under physical media such as twisted-pair copper wires which are mostly used for residential Internet access, because of its low bit

rate transmission, people have to opt for fiber-optic technology. Fiber optics can support huge bit rates. It is used for long distance links, secured, free from interference. There are also the terrestrial radio channels, they require no physical wire, they transmit signals in electromagnetic spectrum thus carry signals to long distances.

The Satellite Radio Channel which consist of communication satellite that links two or more ground stations. There are two satellites involved in this technology they are Geo-stationary Satellites which is permanently stationed above the earth surface and Low-Earth Orbiting satellites is closer to the earth surface, rotates round the earth surface and communicates with ground stations. However as good as these access networks technologies are, they have draw backs such as interference, multipath fading, path loss.

In the Core of network system, the major aim is to make sure data moves from one host to the other via network of links and switches. There several types of communication links with different physical media such as copper wires, coaxial cable, radio spectrum, fibre optics. When one computing device wants to send data to another computing device, these data are packaged and are called packets.

Just like postal mail a packet contain header as it address. In the header, there is an address which tells the packet destination. When a packet arrives at a router (helps in distributing and forwarding the packets) in the network, the router checks the packet for its destination and with the routers forwarding table which is a map of destination addresses the router prepares the packet to it appropriate outbound link. There are two processes that makes sure this happens, they are circuit switching and packet switching.

Circuit switching provides an end to end connection between two or more host. Thus, for these host to communicate and share data a circuit has to be reserved. Packet switching on the other hand uses store and forward transmission meaning that the switch receives all the packets by storing them at its input before it starts transmitting the packets of course, this causes delays however packet switching is efficient in that it allocates link use on demand.

Some of these technologies have been upgraded while some are obsolete and no more in use. Some have drawbacks such as slow services, mode of operation, transmission rate, downloading rate. Notwithstanding they have helped in connecting devices to the

Internet and they have helped shaped the Internet world by connecting people and businesses together. [2, 30-60.]

1.3.2 Working Techniques of the Worldwide Web

Web application can be access via a browser such as Firefox, Internet explorer, safari, google chrome. These browsers are used for surfing the Internet. The web servers host web applications. The web browser can be called a web client; it is used to communicate with the webserver and they both use protocols for easy communication. There are several protocols the web client uses but the most popular one is the HyperText Transfer protocol or HTTPS, which is a secured version of the protocol used by mostly commercial sites that deals in secured transaction. There is a process, a computer gets a web page from the server, but first an overview of what formulates the whole server.

Servers basically are hardware and computers with data, they are connected to the Internet and they should be able to handle traffic such as processing data request sent to them from other computers. Servers are host, so they have OS (Operating System) running on them. The OS running on the servers have web services. If the OS is windows, it is likely that IIS will be it web service and if it is Linux the web service is likely to be Apache.

Several coding languages are deployed in running the web server such as HTML, PHP, PERL, ASP, C, C SHARP etc. and these languages help to process any request send to the server. CMS also run on these servers, which helps without having to know how to program with the languages listed above or how they work. The illustration below states how world-wide web connects to the server using protocols as a means of communication which is the working techniques of the world-wide web.

Scenario:

Computers communicate with each other over the Internet using IP addresses. Here is a scenario where a computer is connected to an Ethernet cable connected to an Ethernet switch, which is then connected to a router. The router is connected to an ISPs.The DNS (Domain Name System) server is inside the IS Providers network. since computers access each other via IP addresses which are rather too long for the Internet users to

remember but with the help of DNS which keeps directory of Domain names and translate them into IP addresses and vice versa. Domain names are easy to remember. The connection and interaction of a computer trying to fetch a web page is grouped into two phases:

PHASE ONE CONNECTION:

When a computer is connected to the Internet, it need to initiate a DHCP (Dynamic Host Configuration Protocol) in order to obtain an IP address with other information from the local DHCP server. During this process, the computer gets its IP address, the IP address of its DNS Server and the default gateway for forwarding its IP (gateway router). A networking components have been initiated with this process and the computer can now surf the Internet.

PHASE TWO CONNECTION:

When the URL (Uniform Resource Locator) string (for example www.joy.com) is entered into the web browser. A DNS query message, which contain the URL string entered into the web browser, is sent with the DNS IP address gotten from PHASE ONE connection via the gateway router to the DNS server. The computer IP address is also attached to this query, so that when the address is resolved by the DNS server it can send the response back to the computer that made the query.

When the URL string gets to the DNS server's database which interprets, check the URL string and find the DNS resource record that contain the IP address for the url string, then the DNS server generate a reply message including host name-to-IP address mapping which is sent through the router to the Ethernet switch then to the computer.The computer then extract the IP address of the server where the URL string is domicile, from the DNS message. Then the computer is now ready to connect to the URL string server.

The web browser initializes a TCP connection with the server, once the initialization is done, both the server and the browser processes access TCP via their socket interfaces. The TCP in the computer must perform a TCP synchronization with port destination, port 80(HTTP). This synchronization message contains the computer IP address; the MAC address of the gateway router are forwarded to the URL string network via the router.

The message is received by the port dedicated for the TCP connection between the URL string HTTP server and the computer.

A TCP synchronization acknowledgement message is sent back to the computer dedicated socket. The socket is now connected. The computer browser then generates the HTTP GET message, which contains a URL request to be fetched. This message is written into the socket and it is sent to the URL string network through the dedicated port and socket. The server at the URL string receives and reads the HTTP GET message from the TCP socket and in return generates HTTP response message which contain the requested page content in it body to the TCP socket an it is returned back to the socket interface of the computer. The computer then uses the client (front end) software installed on it, to read and extract the html page from the body of the HTTP response message and the web page is displayed to the web browser. [2,531-536.]

2 Content Management Systems

Content management system (CMS) are web development frameworks, and they are being developed by communities of web programmers and designers with the purpose of developing and managing a website and its contents.These frameworks make available the platform where web contents can be presented, edited, shared and used by several people. Thus, the choice of selecting the right CMS is important, because there are different kinds of CMS and they come with different purposes, technicalities and problems.

These CMS are designed and developed such that non-IT professional from all works of life and of different ages across the world will be able to develop their own websites to meet their needs and desires. These non-IT professionals do not need to know the basics about web development and programming, with these CMS, they can be able to develop their website with ease. All that is required from them is to learn how to use the tools on the CMS software and they are ready to develop their websites and also manage the contents on the website.

The CMS users or somebody planning to use any of the CMS, need to know the right CMS to use to suit their purpose. CMS have lifted the burden of coding websites to what I called “drag and use”. The frame works are there, predefined functions, themes and

application that are ready to be used, also most of these content management systems gives the freedom to customize or develop themes, modules (functions) to use for a website, which requires knowing how to program on the web or having knowledge about web programming.

As easy as these CMS have made web development easier so are the problems encountered using them but with the help of the CMS' community of programmers there is nothing to worry about, because they are always there to help with any difficulties encountered by the users of their CMS. There is more to developing a website, by making sure the website and its contents are dynamic, in other words, having a robust and dynamic websites with good contents goes a long way to define how attractive the website will be appealing to the users of the website. The more attractive and better a website is, the more users and patronages it gets.

2.1 Types of Web Contents

It will be good to know what contents these CMS supports which is a head start to knowing the type of CMS to choose from or work with. It is amazing to know there are standards for any type of contents on a web page. There was once a time when web pages are just text without images and videos, they are just static with large chunk of text, which are so boring, as the web evolves so does it contents, the need to attach and publish contents, such as images and videos arises as well as managing them.

Right from the design of these CMS the designers will have to outlined what content will be supported by their frame work. However, most CMS supports contents such as both static and animated text, images and videos. Another factor that determines the content on the webpages of a website is the purpose of the website, which determines the type of content that will be on the site.

Entertainment Websites is a group of website type. The purpose of these type of website is to provide amusement, recreation and relaxation. In this kind of website group, the contents will be videos, animation, and audio.

Intranet website is an organizational information system which can be accessed through browsers. This requires password and it is not accessible to the public. For example, Helsinki Metropolia University of applied science tuubi portal which can only be accessed

by the school workers and students. They allow sharing of data, transaction process, file upload and easy communication within an organization. The kind of contents will be text, images.[A1]
[A2]
E-Commerce website is a business to consumer, business to business group of site. Most of this type of sites' aim is to sell products and services, and link chain of businesses together. The content of this kind of websites will be images, videos, text.

Information website is a type of websites which is used in creating awareness and it is a vast type of site. [5,10-12.]

CMS allow it users (administrators) which are the owners of the sites developed from CMS to have total control of the website. Thus, the administrators have the power to add contents to his or her website and also manages all the affairs of the website. There are two ways to generate content using CMS, CMS allows generating and developing own personal content such as uploading your own videos, pictures, writings and all sort of allowed contents on a site or using a module call the aggregator which is a default and pre-installed module on most downloaded Drupal software used in getting syndicate contents from other website with the RSS (Rich Site Summary) feeds.

2.2 Content Management Systems Services to All Other Professions

CMS have help to bring the web programmer, designer and all people from different walks of life that need the services of the web together, giving them the power to own and control their websites and its contents. Companies both profit making and non-profit making, now have a new way of presenting their products and ideas. They have moved from the traditional means of presenting their ideas, services and products to the web platform, which has made web one of the best media platform to do business. The burden of time wasting transaction of business has been removed and people do businesses without delays. Professionals, entrepreneurs from all walks of life are employing the services of CMS, for business, leisure, political and social purpose. Financial institutions, airlines, government parastatals, online shops have also started employing the use of CMS.

Explaining further, in the business world, there are lots of competition and what makes one business stand out from the others is the customer service. Customer service is

making sure your customer get what he or she wants and on time. This can be achieved with the help of the web platform's content management systems. The world is a global village therefore business and service can be done with different people, of all works of life all around the world.

Employing the use of CMS for business or businesses is a step that makes the business standout, furthermore, rendering services has to be professional. How a website and its contents look like or presented on a website will determine patronage the owner of the website will get. CMS gives the power to enhance businesses and services to a desired level or achievement.

Finally deploying CMS to help in business and services will bring about availability, commitments, satisfaction and of course income between people of all works of life, business owner and customers.

2.3 Types of Content Management Systems Software

There are hundreds of CMS, and they have different purposes and functionality, however amongst them there are few that are used more frequently and they have strong community of programmers that keep updating and inventing new ideas and functionalities for their various CMS systems. Most of these CMS are free open source applications but they have some advanced packages and chains of products, that charges planned fee to use them. Some of them have clouds storage space they sell or rent out to their users. Virtually all these CMS have developers' communities and forums where discussions about everything ranging from usability, flexibility, availability and security of the CMS. This community have programmers who are responsible for updates and for security patches of the CMS.

Most of these CMS official website specifies that their CMS are secured. Nevertheless, any system can be considered secured if it has not and never been attacked. As long as there are human deficiencies and error factors, there will always be loopholes or vulnerabilities.

Table 2. Purposes of some CMS with the type of frame work programming language used in developing them.

CMS	FRAMEWORK TECHNOLOGY	PURPOSES
Joomla[7][8]	PHP framework	Used to develop any kind of site and online application
DotNetNuke[9]	.NET framework	Used in developing different website and intranets.
TextPattern[10]	PHP framework	It has a browser -based interface in over 40 languages and used for any type of websites and content publishing.
Umbraco[11]	ASP.NET framework	It is used for developing media sites and it has an enterprise package for developing a commercial website.
ModX[12]	PHP framework	Good for marketing websites with a robust support and storage facility to withstand heavy users traffic
Word press[13]	PHP framework	Used to develop blogs and any type of websites.
RefineryCMS[14]	Ruby on Rails(Rails)	Used in developing websites and it available in 30 languages
TinyCMS[15]	PHP framework	It is does not use databases, it storage mechanisms are simple text files thus it does not support many pages however it is extremely fast and easy to use. That is why it is called Tiny.
Magnolia[16]	Java framework	It is an enterprise CMS.for developing commerce and business sites. It allows its users to publish contents from their smart phones and tablets. It has different layout to choose from, for your contents.
Liferay[17]	Java framework	It is an open source enterprise frame work,for developing a robust business and commerce website

Ametys Liferay[18]	Java framework	Used in developing social websites, business and real time blogging, a shared business tool web applications such as schedule calendar, document sharing.
Ph7CMS Liferay[19]	PHP framework	This is used in developing dating and social network websites.

Table 2, shows that CMS can be used to develop virtually all types of websites thus CMS is the new software technology for web development.

Table 3. The number of active users of several CMS, their year of establishment and how secured they are.

CMS	**Year**	**users**	**Developer Community Supports**	**open source(free)**	**secured**
Joomla[7][8]	2005	27,000,000 downloads	yes	yes	yes
DotNetNuke[9]		750,000powered website	yes	yes	yes
TextPattern[10]			yes	yes	yes
Umbraco[11]	2003	401,858 active installation	yes	yes	yes
ModX[12]	2004	13,892 users	yes	yes	yes
Word press[13]	2005		yes	yes	yes
RefineryCMS[14]	2004		yes	yes	yes
TinyCMS[15]			yes	yes	yes
Mongolia[16]					
Liferay[17]		1,800 Enterprise customers	yes	yes	yes
Ametys CMS[18]		Over 3 00000 users	yes	yes	yes

According to the table 3, the developer Community Supports column shows that most of these CMS have community of programmers that help with upgrading, updating and also helping users on how to go about using the CMS. These community of programmers are on standby and they use the CMS official website to attend to their users, subscribers. Some use google plus, GitHub to share files and updates and to help check bugs. Some even use social media such as tweeter and Facebook for feedbacks and help.

These CMS make their money from their chains of products and packages they sell to their users. They allow the use of their CMS but for extra functionalities such as some advance functionalities, themes, more storage system, add-ons for a website comes with charged fees or they give trial version which last for a particular duration of time.
Table 3, shows that most of these CMS are open source application that can be downloaded for free and most of these CMS have been in existence for a decade, which means that they are growing and there are still rooms for improvements.

2.4 Drupal

Drupal is a free downloadable software used in web publishing. It is one of the thousand software for people to publish contents online such as blogs, news, photos, products, documents, events and more. Drupal has been around for more than a decade, since year 2000 and it is being upgraded by a huge and formidable community of developers and these developers are volunteers.

People at Drupal make their money by selling services, themes, modules and more to Drupal users. Modules are files containing functionalities and they are written with Hypertext pre-processor (PHP). Some of these themes and modules are free and while they are making their money via sales made on Drupal platform they also keep the Drupal project up and running.

Drupal was created by Dries Buytaert.He is still the leader of Drupal till date. Drupal is being used by people of different career background, experience, age, business, Non-profit organizations and governments.

Drupal has many built in features, with just a click, and without writing a code allows it users to do more with the tools in developing their desired websites. It gives the user a total control of their website and it is cost free, nonetheless at some point money might be involved, perhaps when buying modules or themes. It allows it users to also develop their own themes or modules. [3,2-5.]

2.4.1 Working with Drupal.

Drupal software is free to download and use from Drupal official website. It has several features to choose from, giving it users the feel of designing their own ideal website. However, there are other designs, themes that can be download for free and some have price tags on them. [3,3.]

After downloading the Drupal files, the file is extracted to a preferred computer and as stated in the previous chapter, that Drupal just like any other CMS are been downloaded on a computer. During the installation of Drupal on the computer, it will ask for details of the installer who will be the Administrator/owner. Also, details such as the administrator name, password to be used, site name to be used, email address for feedbacks, database name and type to be used with the CMS.

All these details are important for security reasons and for the proper management of the site by the owner/administrator. Having both the administrator name which is also the username and the password set during the installation session. Thus, this credentials will be used to login to the downloaded and installed Drupal frame work software to start developing a website and its contents. [3,26-48.]

2.4.2 Features of Drupal

There are common features that can be found in any Drupal version. These features have been developed, updated and upgraded through several versions of Drupal. Drupal like every CMS make use of access control mechanism for authorization to control and secure any Drupal powered CMS websites.

What this means is that there is an administrator who can be the owner, or IT personnel of a company that manages the website. The administrator will determine what happens with and on the website. The administrator accepts users, customers, fans signups, feedbacks and response and he or she will also be responsible for updating the website remember, Drupal gives its owner or users' the total control over their website.

Drupal allows getting content from any source provided the source gives the permission to use their contents meaning Drupal is not responsible for copy right infringement. The administrator is responsible for that, he or she checks if it is allowed to copy a content

from a source or not. The administrator also give other users or owners of other CMS the permission to copy or not to copy his or her own contents (materials).

Drupal allows it users to customize their own themes although, there are some themes that belongs to Drupal, free to download and use, and there are some that are not free they come with fee charges. Drupal allows it users to create their own theme and put it up for sale.Drupal gives hints of new and upgraded modules (functions), security patches and it also gives access to updating them for free. Also, Drupal has a robust community of programmer that helps its users with any problem related to using Drupal CMS applications.

Drupal, makes it possible for it users to create media contents. These media contents convey information related to the website as regards the services rendered by the website contents such articles write up, videos, images, to back the services up. It allows the sharing of contents on any of the social media such as Facebook, twitter and many others.

Drupal gives it users the freedom to determine how the content on a website will be positioned, how the front page will look like and the subsequent pages on the site because Drupal has several blocks (layout) that can be chosen from, to use in the positioning of contents on a website. Drupal makes it possible to create roles for the users of a website for example a team of web programmer in a company can be assigned roles in managing the company's website. It is like creating a department with task for managing and accessing the website.

Drupal official website is an information bank for Drupal users, with this official website Drupal is easy to use. The team of developer at Drupal are all engaging and are always there to help grow the Drupal community and help other Drupal users with whatever issue they have using Drupal. This is not only possible in Drupal alone, all other CMS have community of developers that help to develop their various CMS.Information and documentation about new modules (function) can be found on Drupal official website, these modules are documented such that the documentation will state what function the modules are meant for, the date of release, previous version, the reason for having the new module.

2.5 Managing Content

Giving a user an outstanding experience and impression during and after visiting a website does not require extraordinary procedure or much effort other than as content manager, he or she has to be creative also know what and how he wants his content to be managed and presented. There are somewhat skills and logics needed when managing contents. When managing contents, users of the web need to be considered during the website's development planning.

As specified in the previous section there are different contents that the CMS accommodates. As flexible as these CMS are, managing their contents are important, and also as easy as CMS are to get or generate content so it is easy to get into trouble because these contents are gotten from many sources. Drupal like most of these CMS uses user permission control, to allow or deny contents post, in order not to get in to trouble of copy right infringement.

Some companies have an in-house software programmer that helps in monitoring and publishing their web content while some outsource this job to an external programmer or the CMS developer to help manage the contents on their website and some users do manage their contents by themselves. It all depends on the user's (company or individual) priority or desire.

2.6 Choosing the Correct Content Managements Tools

Processes are required in any system, with this fact choosing the right CMS requires processes and with any processes there is always a planning stage. Choosing the right CMS. The processes can be done in several ways depending who is the owner of the website, the most likely scenarios are IT personnel's having a meeting with a proposed owner of a site to determine what his desired website will look like or an individual which could be anybody also aiming to employ the services of a web platform for his or her own purpose will think of how he or she wants his or her website to look like.

Firstly, outlining what will be the aim and achievement of the new website. Specifying the contents that will be present on the website, such as the logo, the slogan, the name of the website, mission statement, and the services the site will and should perform.

There is a software engineering diagram called the use case diagram that can be used in specifying the service of the website, use case helps with the diagrammatic analysis of relationship between the web functionalities and it users.

Next is the users experience, how can the user of a website have good experiences through the users' interface. Grouping the contents in a CMS is also essential because it brings about orderliness and clarity of the website. Most of these CMS give the opportunity, to customize a website to suit it owner and to give the users of the website developed from this CMS the feel and the wonderful experience while visiting the website. These experiences ranges from sizing and positioning the web content, text formatting, image size and positioning, background colour for easy clarity, drop down menu, bread crumb for easy navigation.

A brief and closer analyses of how these processes affects the website. Browsing through a website should be fun with the navigation system of the website. So, making a website navigation system to be complicated might be a turn off for it users and imagine if it is an ecommerce website like a shopping site the company will lose customers using a complex navigation layout. For example, Drupal has what is called "the bread crumb" which are hypertext words which shows where a user has visited within a website and the user can navigate to the previous places he or she has visited in the website. This helps the user of the website to retrace where he or she has visited on the site and it also eases users' movement around the website with ease.

Proper presentation of the web contents such as the text is very important. It has to be bold and the colour of the text should depend on the background of the site but the main success of these is that the users of the website should be able to read clearly the text without stress or strain to the eyes. Most of these CMS gives the opportunity to choose text type and resize them.

Background colours come with some logic in web development and users interface. Colours depicts a lot and the users' target matters a lot in choosing a background picture and colour. Most website use colours or background pictures that are clear in order for the users of the sites to be able to read clearly the text on their websites.

More so, when considering a target group for example, a children educative website, it will be nice to have colourfully, bright background images and colour, while the colour are bright and colourful the text on the site needs to be visible for the children to see.

Making sure there is consistencies in the layout, patterns, navigations, back ground image, colours, texts, image size throughout the whole website, is advisable. Therefore, the website users will not get bored or get tired while surfing through the website because the website has been well presented. This can be likened to the experiences someone get while travelling through a smooth and straight road or a bumpy road.

Most of the CMS are secured according to their individual official websites. However, security of a system should be tightened, most especially a financial, e-commerce websites needs to be secured to avoid all sorts of theft, hacking while using the website for transaction. So, a company can hire an IT security expert to help secure it website.

Once all these are discussed and decided on, will help in searching for the right modules and themes to use for developing a desirable website. Next step is to search for the right modules to download on the CMS to achieve and create a desirable website. The final stage will be deciding on the hosting of the CMS website whether a free hosting company or a payed one, this depend on the owner and purpose of the website. This will be discussed on the cost of managing a website in the next chapter.

3 Sustainability of Content Management Systems

Web and web applications comprises of three major components Presentation, functionality and contents. These are the three components that decides which Content Management System to use and it also depends on what the owner of the web wants on his web. Some CMS are good for presentation while some gives the combination of presentation and functionality**.**

There are several types of Content Management System that are been actively used but they all have limits and purposes. That brings us to the question of what kind of Content Management system to use for a particular site and for what purpose.

3.1 Securing Content Management Systems

Most of the Content Management Systems are secured according of their official website. There is no crime in having multiple security system set up, to protect a CMS developed website and its contents. Security is one of the important aspect to inquire when looking for the right CMS to use and it starts from the beginning of the website planning.

Before delving in to the security of CMS using Drupal as a case study, looking into what brings about threat to CMS security. Most websites today are developed and put up directly or indirectly for business purposes. Most businesses now take their services, conveniences and ease of doing business to the web platform in order to satisfy their customers and CMS have business powered CMS to cater for internet transactions.

Drupal has Drupal enterprise that helps it users to set up a commercial driven website. Like Drupal most CMS also have this kind of capacity to develop a commercial website. Drupal commerce is a customized commerce frame work developed by one of the main developer of Ubercart.Drupal commerce contain sub modules that uses features of online store thus it is used in for running online store. These sub modules are commerce and commerce Users Interfaces, payment and payment UI, customer and customer UI, cart modules. [6,351.]

Under the Drupal access control, the Drupal gives an option that when collecting sensitive materials over the Internet, sensitive materials in this context. It could be credit card number or any money transfer or financial transfer materials can be done using the secure page module which allows specifying Drupal path that should be accessed, only through HTTPS.Drupal has several financial and business modules that takes care of the transaction or financial aspect of their users for example there is a module called commercial shipping and commercial stock modules which is used on Drupal's powered commercial shopping website to calculate shopping rates of goods and while the other module is used to keep tabs on the quantity of stock have left and gives alerts when the stock of goods left is about to finish.[6,402.]

When checking the official website of these CMS, all these modules are believed to be secured and they are being upgraded and updated to newer versions. All these transactional modules give birth to security threats from a competitor, hackers, online thieves and scammers that might want to steal a company's assets. Assets such as employee

contacts, company product recipe, customer credit card number and some things valuable to the company or business process.

There is also an Internet war fare such as espionage. Espionage is one of the greatest cyber space crime, this happens when putting and presenting product for sales online and there are huge patronage and customer base through the website, with a financial turn over. Then competition sets in, with rivalry, competitors and enemies tries to pull the product or website down, defame or steal the website owner valuable assets such as customer data.

Thus, there comes the need to have a strong website with backups and updates if not the rivalry group or person might strike hard, by hacking the website and database, and steal or manipulate the website and database to their own advantage. According to most of the CMS official website, these CMS are secured. These CMS, their modules, themes are developed by communities of developers and they are being upgraded and updated at all time.

Most of these CMS allow the administrator to authorize and assign roles to the users of a website this will enable the administrator to monitor what each users do when using the site. The administrator can be the IT security personnel of a company or any individual that own a website developed by a CMS. This is a controlled access from the front-end interface of the CMS website. Constant updating and upgrading the CMS version and security patches can give the attacker tough time in trying to learn about the new version to look for vulnerabilities.

3.2 Cost of Running Content Management Systems

Costing is done before the website is developed and there are several costs incurred when a CMS' website is up and running. These costs are inevitable; however, they can reduced be depending on the how the running of the website is planned. Security and upgrading are very important when planning for web costing because a website is as good as useless if it is not secured and updated thus securing, updating and upgrading a CMS website starts from the website development stage.

3.2.1 Cost of Hosting

Hosting of a website is important because that's how a website can be accessed. As a CMS owner, there are two options available for hosting a CMS' website, the first one is out sourcing the website hosting, to a web hosting company and the second one is to host the website on a personal computer or dedicated server. The former option also comprises of set of dedicated computers connected together as servers, kept in a secured and well monitored environment.

When out sourcing the hosting of CMS website, the server in this method can be either a physical server or virtual server. These two methods have both their pros and cons and this will be discussed with respect to cost and security.
Websites files are stored on the hard drive of a web server and this web servers are being run and monitored by the web hosting companies however a web server can also be a small personal computer located in a room or office space.

The web hosting companies' help in hosting websites, CMS developed websites inclusive, they have all the facilities to host a websites for a fee and they have different packages to cater for how big the website is and how frequently the website will be or is accessed. In this method employing an IT security personnel to help in checking the web hosting company, whether they have good technical support, the type of database system they use, do they have good updating, upgrading and security plan, ample disk space, data transfer rate, and reliability is also necessary.

Using the web hosting services is easy because there is no need to worry so much about security of the website however that does not mean the website cannot be compromised but to some extent the website is still secured. Apparently, with this method, the security burden of the site is on the web hosting company. Only the services of hosting and securing a website will be paid for.

The amount paid for these services varies with different websites, there are some factors like how big is the size of the website file, what type of contents and services the website will render determines how much money, to be paid to the web hosting company. So, a lot of money is involved with this method, huge amount has to be paid to secure and host the website.

The second method is to host the website on a personal computer at home or in an office space has a lot of disadvantages than advantages. This method has so many bottle necks as to it configuration. Starting from the setting and configuring the firewall to allow web server to connect to port 80.making sure there is a high-speed Internet connection to the server, a Domain Name System (DNS) host name for the home Internet must be secured, getting a static IP address for the personal computer. All these setting and configurations requires an experienced person. If this server is not properly configured and it can be attacked or manipulated by hackers to send spam mail. Thus this act could lead to the website been blacklisted and will not be able to be accessed. This is similar to denial of service.

More so, this kind of method requires an IT security personnel that will help in monitoring the security, updating and upgrading of the server. This is costly because the IT personnel will be on a pay roll and it is more difficult monitoring the security of the server. However, it can be difficult if intending to secure a server as an individual with no IT security knowledge or background.

It will be advisable to use this method with a manned IT security personnel most especially if the website has grown to a big website, with a lot of important data to manage and receives a lot of traffic. This method is always prone to vulnerability due to both human and computer errors. During upgrading there might be errors or mistakes such installation of software that is a spyware or malware vulnerable, mistakenly deleting application files, executing malwares from the client which is a web application that access the server, software and hardware errors and break down.

There must be twenty-four hours, seven days of Internet services on this computer to avoid Denial of Service problem. The computer must have a lot of memory space to accommodate the updating and upgrading of the CMS', these factors enhances speed, performance and accessibility of the CMS website. The personal computer must be protected from some physical damage such as theft, flood, and power outage, all these are extra cost for this method.

The advantage of this method is that the individual has total control of the website and its data. There is a sense of assurance that the data is with the owner not at the mercy of a web hosting company or on a server with the hosting company that might get attacked.

The individual running this method must well knowledgeable on IT security as to what security soft wares to run on the personal server and how easy to update these soft wares and it security patches, recovery plans, must be able to install several multi-level security system and monitor their behaviours to decipher any form of attack. He or she must also know a lot about the frame work the company site is operating with in order to check and checkmate any form of attack from an attacker that also have a knowledge of how the frame work works.

Cloud based system server, is different from other servers because it is a virtual server not a physical server. It can also be attacked like the others. Most of the web hosting companies and CMS have this cloud hosting facilities for their users for a fee. This method of hosting is good because the website data is stored in a cloud so it reduces physical set up of hardware and in the case of theft, environmental or electrical disaster of the physical server the data on it are still retrievable because they are stored on a cloud for backup. It is also flexible because it allows the sharing of files with a secured channel within an organization.

These three methods can be used concurrently such that company's customer contacts and product files can be hosted on personal computer at the company's headquarters and may be product prices and asset files can be stored on a cloud server and the contacts of the employee and employers can be stored with a web hosting company.

In conclusion a website must be hosted in order to be accessed, therefore when running a CMS' website with any of this method of hosting, cost will be incurred, the different comparison stated above with these hosting methods is not all about cost only because using any of the methods, cost will still be incurred for either services or personnel or both, but what is most important is to have a secured website with a nice and memorable users' experiences whenever they visit the website.

3.2.2 Cost of Employing Information Technology Personnel

Employing Information Technology (IT) personnel to help with updating and upgrading the website. Most big companies employ IT experts comprises of a software engineer and IT security expert in manning the company's website. These competent professionals will be able to oversee the management and security of the website.

Be it per term or full term payment, the IT personnel will be paid and this cost is incurred by the company however there are other CMS website owners that might do or want to everything by themselves but as the company grows and the need to have a good dynamic and robust website, that needs updating and upgrading arises, then also the need to employ an IT or IT security personnel is indispensable. The IT security expert will help in overseeing the security aspect of the website such as helping in forestalling the efforts of attacks and also help in response and recovery issues relating to the website and the company's host and database system.

3.2.3 Cost of Upgrading

As a website increases in its contents files such as videos, images, database as well as functionalities the more server space it will need for proper and fast loading of the website when accessed by users. Time is money while doing business or rendering web services, thus delays in loading of a website or denial of service can be annoying and can result to the users getting tired of the website services which also affects the business and service presented on the website. Therefore, the website users might migrate and do business with another company running and offering the same kind of online product and services.

The solution to this is to increase the size of disk space assigned to the website by the web hosting service provider and if it is a personal company or individual server they must make sure the server that runs their web application has a large memory space to accommodate the content files as they increase in size. The operating systems, security, any other software that enables the server to run properly also need upgrading and updating which comes with a cost. Newer versions of security and other soft wares are released and they are put up for sale so the IT security personnel have to purchase them to upgrade the security system of the server.

Also, when using a cloud base services and the memory space allocated to a company's website is used up due to contents, database and functionalities upgrading, then the need to increase the memory space arises and that comes with a bigger fee. No matter the kind of host company or method of hosting used in running the CMS website there will always be a cost incurred. Relying on the CMS security is good but it is better when using multiple security system most especially when a websites has developed to be a very big website.

3.3 Efficiency of Content Management Systems Software

Most CMS are efficient but some are more efficient than the other and that makes them standout. There are so many major qualities that is present in all the CMS that makes them efficient. These qualities have made them still very available for users to use them and trust them.

Having an efficient content management systems software lies with defining the purpose of having the CMS. Efficiency in this context is the fulcrum that balances cost and services, that is maximizing the cost spent on setting up a web content management software and getting the value for the money spent. Having the correct CMS website that can be reliable and upgradable means a lot in that when there is a reliable and trustworthy service, the demand for that service will increase and this yield to dynamism and competition.

CMS have to be efficient in that they have to stand the test of time and reinvigorate themselves to a new demand. The web developers of this content management system need to be commended as they are always striving to bring dynamism into the CMS they handle. A CMS or CMS website that does not have the capacity to grow with the demand of it users will not be patronized. Efficiency of a website is a process that starts from the beginning of the design of the website using CMS.

Users are very important when discussing about efficiencies. They are the last on the consumer chain. Hence their satisfaction is very paramount, by making sure they are able to enjoy the services rendered by a website or CMS. Most users want to interact with their preferred website, so knowing the users' targets wants and needs are essential, this will increase the services to render to them and this also increases efficiency. Therefore, with this the content will be stream lined to meet what the targeted users wants and these contents need to be correct, updated and reliable.

Efficiency grows with the increase of users, the demand for new services, this will be determined if the CMS can be able to deliver on the new demand. A good example is having a CMS that can be globally accessible, CMS that has option of several language whereby people of different race can be able to understand your website presentation

and what services the website is rendering. Thus, selecting a CMS to help deliver new demands is good.

An efficient CMS should have the function of allowing the CMS owner to be able to link with other social network users in form of marketing their product and services. This is most common with news and blog websites they always like to link up their news and blog to attract people to their website from the other social media websites. Making sure the administrator and users, are able to use the CMS software to generate, and present legible and understandable web contents to their users.

Most of these CMS come with their default setting for contents. However, they give room for adjusting the setting so that the administrator of the CMS website can customize the default content to make it presentable to the users of their websites. A CMS should be mobile responsive. Most recent websites are mobile responsive, allowing their users to view their favorite website via small and handheld electronic devices just like using their home desktop or personal computer on a small device. That brings out the efficiency of a website where the users of a website can also access their website conveniently using their PDAs and other mobile devices.

The users must know how current a content is and it source, this function is available in most of the CMS and that is a good way of giving the users the latest and reliable contents therefor increases efficiency of the website and its contents. For example an e-commerce website having a payment functionality, a customer have the right to know and trust the payment method before they interact with the website.so sources of the payment method is important for them to trust the payment facility, otherwise they will never interact or patronize with the website.[5,150-151]

4 Conclusion

The goal of this project is to provide guidance on the suitable CMS to use in developing and managing of a website with its contents. On this concluding part of this project most of these features highlighted are needed to help guide in selecting a preferred CMS. Having use a couple of these CMS as well as the challenges encountered while using them.

On an average, the minimum years of establishing most of these CMS is ten years and they are still in existence. Although some of them are not functioning any more perhaps due to some reasons or the other. While some are not been updated from time to time.

Most of these CMS are unique and they are designed for particular purposes. Thus, there are some important features to look out for when selecting a CMS regardless the complexity of the CMS. Using Drupal which I worked with as a case study which falls under a semi-complex CMS status and very powerful which can be used to develop different kind of websites and to generate contents.

Drupal and majority of these CMS have good frame works for proper grouping of content types. Thus, with proper contents grouping frame works, web administrators will be able to arrange it contents properly and the users of the web developed by this CMS will be able to access these content types with ease.

Drupal CMS updates for modules and themes are easy to download and applied immediately. However, this makes it tempting to download more modules and themes. The reality is that the more module downloaded for use on a CMS website the bigger the file of the CMS will get which might slow its uploading when accessed, and the owner of the website will have to deal with high cost of hosting and getting more memory space to sustain the large CMS file generated.

Drupal has a default and several consistent website layouts to choose from. It gives room to customize web contents and websites layout. There are settings in most of these CMS where the CMS administrator can customize web contents and its navigation links and buttons to be consistent for proper presentation of the web contents. These contents are assigned to block of layout for proper positioned and presentation when the website is hosted. This helps the web users to navigate through the website without any difficulties.

Drupal like most of these CMS have good navigation process such as bread crumbs in, menu, links for proper navigation around contents. This is one of the users' experience a good website need to have, there is nothing more fun as the experience for users of a website or CMS to be able to navigate and locate a content on a website with ease which also saves time.

The major similarities with these CMS is the power given to the web owner to take total control of managing their website and its contents starting from managing the users that register to the website, what contents the users are allowed post, the services they seek from the website, assigning roles to the users, administrator control, customizing the website theme, replying feed backs and follow ups. However, this total control can be abuse if not careful, that does not mean that the default standard will be compromise but the owner that has a total control, such as the adumbrative control might be tempted to overdo things with the CMS such as designing a poor looking website with unnecessary modules and customized theme, disconnecting users by not replying to users complains and feedbacks, not accepting sign up request from users.

Majority of these CMS, Drupal inclusive have the multilingual facilities such as changing of languages of presenting contents which is good at least different people across the world can access my website in their own country language aside English language which most of the CMS have as a default language.

Most CMS offers additional services such as security, hosting and storage facilities. They have chains of other CMS or advanced version of a CMS for example Drupal has Drupal Enterprise which is an advanced CMS and it comes with a fee. They also have products that comes with a fee, trial and discount their users. For example, Cloud database to help monitor and secure databases and valuable contents.

When working with preferred CMS such as Drupal there are several challenges encountered. These challenges and other types of challenges are also in existence with the other types of CMS. However, these challenges vary based on the complexity of the CMS.

One of such challenges is that on the official website of most of these CMS It was made to believe that the use of a CMS is easy to learn and use almost immediately but the reverse is the case. After downloading and running CMS on a preferred computer, it takes couple of weeks to months to be able to work and understand the users interface. I encountered this challenge when running and working with a Drupal CMS. It took me a month to learn and how to use the tools on it to develop a website and generate contents.

Another challenge is the downloading aspect of these CMSs. There are requirements that are needed for some of the CMS to operate optimally such as the type of database

software to use with the CMS.Without these requirements some of this CMS will not work properly and these CMS stylishly forces you to buy database space that supports the CMS. Some of these CMSs also makes it users to install a trial version software without notification, and afterwards compel the users to pay, just to upgrade and allow them to use a complete or advanced version of the CMS, or to use more of their modules and themes.

Proper caution is needed when trying to manipulate the CMS files that is used in customizing theme in order not to delete or overwrite the main source file. It is advisable to duplicating and rename the file before working with it to develop a customized theme.

Understanding the newer version becomes difficult. Drupal like most of these CMS are been upgraded and every newer version of the CMS comes with it complexities and it takes time to get use to them likewise new modules and some modules and functionalities in the older version might not be compatible with the new update. Mostly the user interface is changed and makes it difficult to locate favourite tools and sometimes the name of the particular tool is changed the most used tools of the user in the older version.

CMS have change the face of Web development over the years and they have made web development so easy and they made it possible to generate all kinds of web contents. However contrary to the made believe that after installing a CMS software developing a website and managing a content is immediately is false. How to use the software tools then developing a CMS website, generate contents and managing the users of the website, all these takes time to learn, but it worth the time devoted to learn how to use the CMS.

Afterwards it easy to use and other CMS also have general structures such that it can be easy to adjust to a new or other CMS. In the course of this project, I noticed that not all the CMS work the same way. Although they share some similarities with their structure and basic tools. But they differ in the functionalities and the services they rendered. Some are just for blogging which means they can only accommodate text and images as contents while some are complex and are used for developing several types of advanced websites. However, this depend on the purpose of the choosing a CMS.

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