
LIS Perspective of Web-Content Management : An Overview

Pratibha A Gokhale

Dhanashree A Date

Abstract

Content management technologies have been existing to cater to needs like records management and document management. Inclusion of Web-content in library repositories has necessitated current technological tools to be redesigned. A new content management technology focussing on the management of web-content is seen in the light of LIS. For the present paper, the phases of WCM implementation are factually checked against the findings of a pilot survey conducted for select 15 libraries of Mumbai. Survey findings indicate a definite shift in the activities of handling content. WCM features are juxtaposed against these activities to highlight the WCM benefits. Considering the expenses involved, the article suggests on exploring the Open Source Systems by testing the online demos available.

Keywords : Web-Content Management, Content Management, Web-based Library

0. Introduction

A Library is the first institution or a body of its kind to 'organise' the knowledge. Towards this the body has evolved into different models to hold information. National libraries for instance, took up the responsibility to treasure and disseminate information of national importance and heritage. Academic library models strongly supplement the educational information to students and academicians. The archives and museum libraries are a model treasuring cultural information and thereby preserve history. The role played by these models no doubt includes information dissemination, but the element of 'custodianship' stands out to be of prime importance.

With change in times, every socially responsible body needs to review roles and objectives of its own existence. Library as an institution has also changed enormously in its objectives. Briefly speaking, it has seen a transition from its role as an 'ornament' of the 17th Century to custody of a wealth of information of the 18th Century. 19th Century library was an internally organized body of information. A tool for education with efforts on resource sharing in the 20th Century, it transformed into a virtual knowledge center in the 21st Century with the advent of Web.

Traditionally library developments were aligned and expected to meet the informational requirements of the geographical area within which it is situated. Today networking and electronic access has entrusted a global responsibility on libraries. The established models of library institution are losing their identity. In other words, information accessed on the Web does not help differentiate between a museum library collection or a public library collection as it used to be when a user physically entered a museum library building or a public library. No other techno-cultural factor has precipitated the identities of libraries as much as the 'Web'.

A '24x7', 'single point', 'remote' query and access, 'across' formats is by far the expectation of today's library user. Traditionally a good library is judged by its good shelf collection. Today, information 'access' rules over 'ownership'. A library is judged by the relevant seamless 'access' it provides to its users across the Web. It is imperative for libraries to have a powerful Web-presence with a high interoperability between the different players of information and systems. This need for a Web-presence has led to a

shift in the roles of library professionals. Roles today extend from a passive catalogue display of library holdings to an 'online interactivity' with users. 'Interactivity' involves give and take. The 'give' aspect is associated with 'dissemination' of information and has been practiced by librarians all along. It is in the 'take' element where the shift of role is more obvious in the online era. 'Take' includes the acceptance of content from the users for publishing it onto the Web. Till very recently, Web content creation and publishing was the sole responsibility of the Webmaster. Today library receives content from multiple sources and are ushered with the responsibility of 'accidental' publishers. Some examples of content published by libraries on the Web include library catalogues, library profile, and user contributed content like say a digital thesis.

It is evident that e-publishing is becoming a preferred choice of publishers. It brings multi-fold advantages to the publishers like, cutting of publishing time and the middle-man delivery, thus making it possible to publish the most recent information directly to the end-user almost immediately. E-publishing turns out economical in the longer run, once a one-time investment in systems is done and infrastructure is in place. The trend of Web publication across the globe today, will have alarming effects on library in terms of content management. According to OCLC Library & Information Center Report[1], to date, approximately 700,000 Web resources have been catalogued in the WorldCat. There are 40,000 WebOPACs around the world. Other bibliographic databases, encyclopedias, numeric and full-text data could number 250,000. Informatics India, India's leading e-journal aggregator alone has hosted 10000 journals online. Taylor & Francis has hosted 9000 e-journals and 5000 e-books.

Digital publishing has proliferated the content on Web. Not only are the information models blurring, but there is a blurring of roles between various information players. Authors also publish. Publishers are also aggregators, thereby the creators of new information. Ease of tools both, to create and to publish content on the Web, from distributed points, and in varied formats, has led to an often quoted term 'information overload'. Here today and gone tomorrow – this volatility has added new spatial and temporal dimensions to content. The multi-dimensional characteristics of content on the Web have entailed numerous technological challenges on library professionals ranging from creating and capturing content, to organising and disseminating it. The founding techniques of information organization preached and practiced by the schools Library & Information Sciences (LIS), viz- classification, cataloguing and indexing still hold value. Traditionally libraries managed records, documents and structured data. With the advent of Web, libraries are involved in Web content management. Elements like metadata and taxonomy are required to describe and capture the ever increasing unstructured and volatile content. With increased system dependency of content, the issue of interoperability has become vital. To achieve interoperability is to have established standards which touch all stages of content life-cycle – from creation to archive.

Various individual efforts are taken by libraries to achieve management of Web content. To name a few – 'Genesis' of CDS /ISIS is a tool for database publishing. 'Open Journal Systems' (<http://pkp.ubc.ca/ojs/>) is a journal management and publishing system. 'Electronic Resource Management' by Innovative Interfaces controls subscription and licensing information for licensed resources such as e-journals, Abstracting and Indexing (A&I) databases, and full-text databases. Such implementations need integration and convergence of technologies. Otherwise the advantage of 'managing by technology' is lost due to manual interventions required in invoking the techniques.

'Web Content Management' (WCM) systems are an off-shoot of traditional content management technologies like the Records Management (RM) and Document Management Systems (DM). Traditional content management systems are designed to manage offline content. Also they do not have the functionality of authoring or in other words, the creation of content. WCM systems basically emerged out of the need to manage the content that is exclusively targeted for publishing on the Web. They offer functionality to streamline front-end process of managing content like well-defined workflows and templates, together with back-end processes to include standardizing, staging, storing and delivering

content. It promises the advantage of a user-friendly solution to help non-technical people to participate in publishing and managing the Web content.

References[1] of WCM implementation to libraries are found in the two case studies of Berlex Laboratories (BL) and Fisher Controls International (FCI). BL has maintained a corporate library to acquire, organise, and, distribute information sources. FCI organises variety of documents like research papers, articles from research institutes, lab reports, equipment test reports and hazardous materials interpretation files. The new WCM system allowed them to set up 25 databases, including seven web-enabled databases. In addition to enterprises, Universities abroad are seen in the forefront of implementing WCM. Econtent Xtra Newsletter, Jan.10, 2003[2] has published the information of implementation of WCM system called FileNET developed by FileNET Corporation. The implementation sites include various university libraries, like the Columbia University, Southern New Hampshire University, and Bucknell University. The newsletter mentions that these universities primarily benefit in creating, updating, and expanding the capabilities of their Web sites.

In this Web era, to study WCM implementation in the Indian libraries seems to be most opportune. Technological implementations like these will change the way libraries work. When it comes to organising and managing content, librarians are endowed with the skills of classification, cataloguing and indexing. How to align these skills with emerging technologies and thereby exploit librarians to effectively work with co-information professionals should be the drive.

1. What is Web Content Management ?

CM is a generic concept and its range of content management approaches includes Record Management (RM), Document Management (DM), Digital Asset Management (DAM), Enterprise Content Management (ECM), WCM and Knowledge Management (KM). So CM is an umbrella term under which all these categories are specialised sub-sets. Understanding the precise differences between these terms however is very difficult as vendors have incorporated a mix of features in their CM tools which thereby overlap functions. WCM is being widely used to cover a variety of software functionality to manage 'web content'.

Many definitions of WCM exist, but each is different depending upon the scope and applicability of the system features. Ovum[3] defines WCM as 'a set of tasks and processes for managing content explicitly targeted for publication on the web throughout its life from creation to archive. Ovum adds that the role of WCM is to manage components on the web – Internet, Intranet, Extranet or all three, and the web sites therein have three generations as under, in that order, namely –

- Static sites – also nicknamed as 'Brochureware'.
- Dynamic sites
- Transactional sites – aimed at business-to-business (B2B) exchanges

According to Forrester Research[4], "Content Management is a combination of well-defined roles, formal processes, and supporting systems architecture that helps organizations contribute, collaborate on, and control page elements such as text, graphics, multimedia, and applets."

This definition highlights the heterogenous nature of content which is managed by a WCM. Consider the phrase 'control page elements' in this definition. It clearly focuses on managing content that has been specifically created for delivery over web.

If one draws a spectrum as below, and puts DM on one end and WCM on the other, CM would be in the center, which can include little of DM and, with increasing digitisation, a more of WCM tasks.

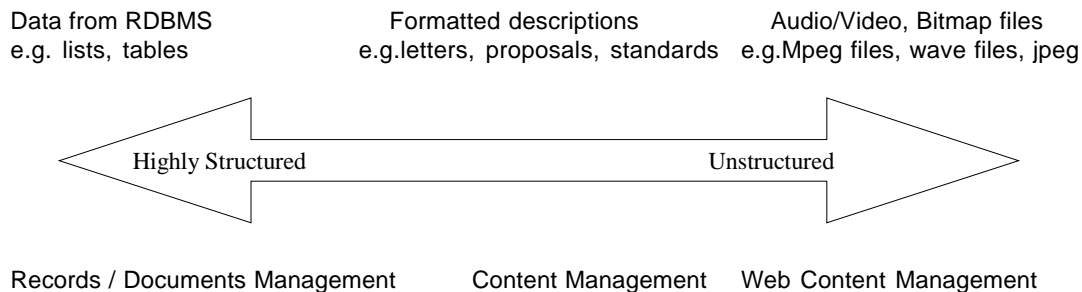


Figure 1 – Spectrum of Content Management

1.1 Features and benefits of WCM

As mentioned above, CM solutions have varied objectives and accordingly fluctuate in the features incorporated in their systems. Some specialise in e-commerce, some in enterprise content management, some in document management and some exclusively in web content management. On an average, the following features are generally found in WCM solutions today. Workflow, Authoring, Version tracking and Publishing are some of the core functions. Other standard features include formatting, labeling, indexing and archiving. Optional content management features are personalisation, internationalisation (including localisation) etc.

- Anytime, anywhere web-publishing - Manual updating of frequent changes in the web content is not consistent and reliable. WCM eliminates this problem.
- Faster updating – WCM slashes time required in implementing and monitoring site changes or re-designing the site. Non-technical users can add or modify content without waiting for web-professionals to come for help thus ensuring timely accurate information to relevant users.
- Easy scaling of web-site – WCM helps to keep pace with the organisational growth.
- Audit trail and user authentication - WCM tracks changes made by whom and when. It also restricts editing by unauthenticated users.
- Efficient work-flow management - Content can flow from various contributors on a web-site. With WCM, processes like approvals, rejections, updations are automated.
- Automated Scheduling - Calendering allows content providers to determine when the content is presented on the site and when it is removed. This ensures that data-sensitive information is available only when relevant.
- Self-Service Authoring - Content providers need not be technically sound. They can readily prepare and automatically post content on the web using pre-built design templates.
- Customization - Processes more beneficial and suitable to the organisation can be customised into a WCM solution.
- Personalisation - Content providers can customise the look and feel of the interface, of the content delivery as per the user's role, requirements, preferences, or previous behaviour.
- Internationalisation – WCM helps adapting to the global requirements with features like choice of language, or posting alerts as per global time zone synchronisation regardless of author's location. More information can be made available in multiple versions and in a timely manner.

- Localisation – WCM helps in adapting content to the local culture, currency and business rules. Locating content closer to the user can improve network performance.
- Multimedia - Content such as video or film programming may need modification (dubbing or subtitles) to add value for local markets. WCM offers this feature.
- Cross referencing – WCM captures and links inter-related sites and informational resources for a comprehensive search on user queries.

A study of literature gives an insight into three main areas where WCM has benefited the most They are financial gains, increased information efficiency, and ease of use. Cost saving on labour seems to be a prominent gain according to most works like NOF[5], McClusky-Moore[6], and Arnold[7], referred for this study. Lite[8] and Howard[9] calculate gains in terms of the return-on-investments(ROI) in space, materials, employee productivity and increased sales.

Hackos in her book 'Content Management for Dynamic Web Delivery'[10] mentions about the ability of CMS to store a relational repository which is non-repetitive data storage with powerful data manipulation. Literature by White[11], McClusky-Moore[12], Hackos[13], Nakano[14], Ericson[15] and every other literature on CM describes the CMS ability of standardised information publishing, interoperability, content authorisation, integration of external resources, version control and personalisation.

CMS enable non-technical users (content contributors) to publish new information onto a site without HTML or programming knowledge[16]. Editorial tools like Word Processors or Text editor help eliminate technological dependency. Kartchner[17] suggests that familiar user interfaces like Internet browsers and word processors are used by CMS to interact. This can lower the learning curve and is thus capable of encouraging non-technical users. In line with this, McClusky[18] agrees that non-technical content authors are empowered to directly post content on the site and thus keep content updated.

2. Implications of Web Content Management to LIS

Primarily, libraries began using some Library Management Systems with the objective of managing the housekeeping tasks like circulation, cataloguing, stock checking, reports generation, usage statistics, and search within internal repository. Growing dependency on external information sources provided by information vendors in the form of databases, external library collections and URL links necessitated the libraries to migrate their OPAC systems onto WebOPACS. WebOPACS helped the management of structured content. Increased Web dependability and interaction has opened new sources of content collection in libraries. Users can contribute content to libraries say in the form of thesis, and also contribute content using Web-forms which include suggestions, purchase requests, renewal requests, online reference query etc. Publishers and book vendors push promotional information via e-mails. It is imperative for a library to have its Web-presence today, both in terms of providing access to users and also to market the library profile and its services. Towards this, library staff is engaged in publishing library related content like catalogues, services, and other attraction features like discussion forums or research guides etc. Links to databases and relevant URLs also form a part of the library collection. Budget crunch in libraries is pitted against the inversely growing publishing prices. Consortia are an alternative to balance between user demands and low budgets, experiments on which have already been initiated by some libraries in the country. Briefly put, a library collection is unstructured in nature. It is contributed online from multiple points. It is aggregated from and linked to various sources. So there is an online give and take. Content is also created within a library.

Traditional cataloguing, classification and indexing methods were capable of organising and retrieving printed documents with great efficiency. A survey conducted by Gartner[19], a technology analyst found that most information activities can be divided into three broad categories alongwith the percentage of time spent in it :

- Searching (27 percent): “Active” searching, in which the searcher has a clear idea what a person is looking for, and “passive” searching, in which information needs may be very vague
- Processing (52 percent): Understanding and producing information
- Organizing (21 percent): Classifying, distributing, archiving and deleting information

Heterogeneity of content in terms of formats, language, temporality, spatiality, search techniques and interfaces used by information vendors is a major hurdle in organising and retrieving content today. Web content is granular in nature. In other words it can be broken into smaller chunks and distributed. Categorising of such content is a challenge, as it is likely to fit in more than one category. While manual categorisation will have professional indexers to provide keywords relevant to the user profile to improve the likelihood of retrieval, it is a tremendous amount of manual labour and unaffordable to have a professional team to do the job. The most difficult and time-consuming aspects of taxonomy creation — labeling nodes, creating cross-references or thesauri, and post-editing document sets — remain human-centered activities. Automated tools exist but rely on extraction techniques as compared to manual categorisation. Some techniques include picking up frequently used words, extraction of subsequent matching of terms to the in-house stored terms, list of top terms appearing in a document etc. although some tools offer a combination of automated and manual indexing e.g. Semio Taxonomy [<http://www.ahip.getty.edu/aat%5browser/titles.html>].

At a time the same content can be available in different formats. Retrieving the same content residing in multiple formats requires a detailed description. Web content is prone to multiple versions. It becomes necessary to maintain old and new versions. Retrieving a document of a specific version needs tracking of versions. Unlike print documents, Web content is volatile. It may have been removed from the Web-site or moved to another location on the Web-site. Updating the URLs in a library catalogue for consistent retrieval is a persisting effort. Hence basically the elements for description of documents in print and electronic documents differ considerably. An OPAC query should bring results of e-content alongwith the print repository status. One way is to introduce the metadata elements in the existing OPACs. A metadata enriched catalogue (similar to amazon.com) allows libraries to integrate the libraries' print and e-content collections via a single search mechanism. With metadata linked to the retrieval mechanisms, users can smoothly navigate from location of information (URL), to retrieval of it without having to shift their mode of use.

Ideally a user would want to have a single point seamless access to content across locations,, across formats, and across languages with personalisation to save his time and make the search effortless. There are many approaches to improving information access e.g. manual indexing, natural language search, auto-categorisation, portals etc. Indeed, the variety of approaches can be confusing, making it difficult for libraries to settle on a “holistic” information access strategy. Every information provider has his preferred search tool incorporated. To gain familiarity with several search interfaces can be frustrating to a library user.

The above discussion shows the various emerging challenges of web content that a LIS professional is facing. These challenges touch the entire life-cycle of web content (See Figure 2) – from creation to archive. Web content has thrust upon the library professionals a new range of roles across this life-cycle. New roles of content creation (authoring) and publishing are beyond the management capabilities of any Automated Library System that is implemented in libraries. An integrated tool to encompass all these emerging roles, with a low-learning curve and less dependency on Information Technology (IT) Specialists, is the need of a library professional today. With increasing competition among several commercial Information Providers, tools like WCM only empower LIS professionals to manage content independently. One stop solution for content management in terms of access, publishing, & archiving puts LIS professionals on the forefront as Knowledge Managers.

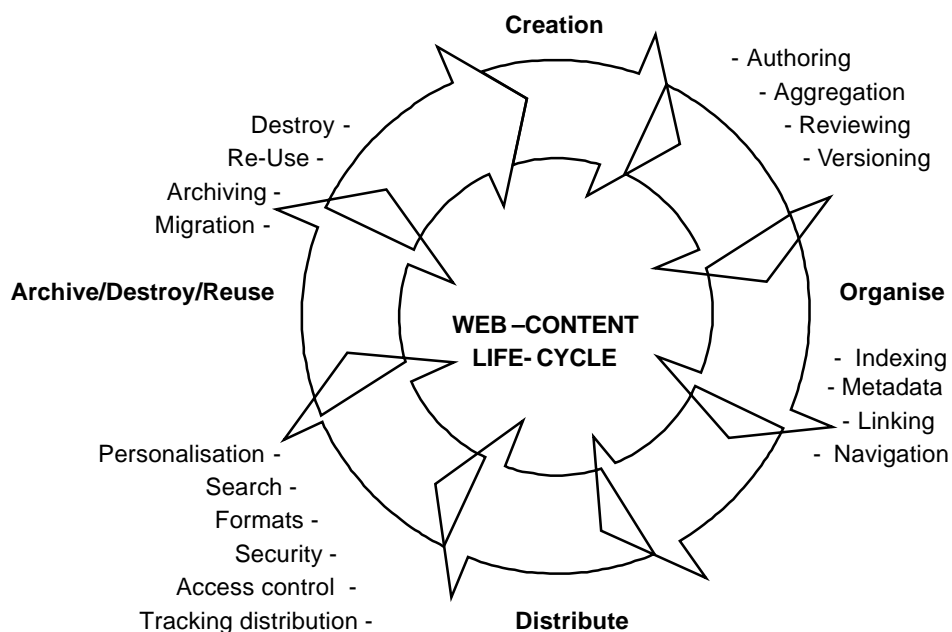


Figure 2 – Web-Content Life-Cycle

3. Implementing WCM System in LIS : a three phase plan

Libraries may contemplate on whether implementing a WCM technology would be appropriate for the type of content and activity carried out. There are a few pointers to analyse this need.

- Frequent publishing of information on the web-site (New arrivals, Databases etc.)
- Delay in publishing this information (due to lack of technical support)
- Frequent changes in the content published (Circulation status, Catalogue updations, Events, Training schedules)
- Users relying heavily on published information (databases, e-journals, reports)
- Large web-site (more than hundred pages)
- Maintenance of web-site links is difficult (due to many links)
- Content is created and contributed from multiple locations (branch libraries, multiple departments contributing content for library page)

The criteria for selecting a WCM system can be broadly divided in three areas – knowing the organisational content, the functionality (i.e. the activities) involved in managing the content, and the content management environment.

3.1 Know your content

- List the ways in which web-content supports organisational goals
- List the audience who will be served by this web-content
- Research on type of documents and content that needs to be managed
- List the degree of performance objectives e.g. creating three databases in a year, managing unstructured content for search and retrieval.

3.2 Know your activities

- What classification schemes already exist for the Web
- The extent to which a WCM will integrate with the existing schemes
- Development of key workflows
- Resources e.g. staff and other tools used to organise content

3.3 Know your environment

- Check interoperability and infrastructural issues like the hardware, software and the operating systems required by the WCM system
- Available technical skills and support
- Consider the learning curve and amount of training. Training may have to be across various sections of the organisation e.g. training on modules used to contribute content, review, edit and delete content etc.
- Study the scalability to incorporate future requirements

4. Feasibility Study of WCM Implementation to LIS

This section is an introspection into web-based activities of libraries. Every library is fairly similar in its objectives – to acquire information, organise and disseminate it. The difference is in the means and methods of achieving these objectives. Libraries are in a transition and are gearing up to manage web-content collections. A study to collect factual data on LIS web-content life-cycle within such libraries is essential to arrive at any conclusion on WCM requirements. With this objective, the authors have conducted a survey of libraries engaged in managing web-content and providing web-based services. Adhering to the phases of WCM implementation as mentioned in section 3 above, this study undertakes to explore the phases 3.1(knowing LIS content) & 3.2 (knowing LIS activities) for a group of 15 select libraries of Mumbai. The analysis of the survey is illustrated in the Table I below. Number of libraries engaged in the activity is given alongwith the appropriate WCM feature applicable(See section 1.2). The survey enabled the authors to distinguish between the core WCM features and the less important need-based WCM features for these 15 libraries studied.

Table I – LIS Activities and Associated WCM Features

Number of libraries	Activities Performed	WCM feature
Content Creation :		
10	Write content	Workflow feature streamlines the process and triggers interaction between content creators, editors and reviewers.(who does what and when).For non-technical content providers, templating editor, and authoring tools allow to easily create templates and give a uniform look.
7	Collect content contributions	Syndication helps collect and distribute content via multiple channels, online or offline. Encourages faster updates, generates accountability for authored content (logs) and cooperation between authors. (see version control).

9	Review content	Workflow tracks the document through various stages and uploads after review. Workflows help identify authentic contributors and reviewers. Decentralised maintenance allows editing anywhere, anytime. WYSIWYG editing, a Rich Text Editor (RTE) allows users to format text, insert images and create internal and external links
10	Upload content	
9	Aggregate content	Tools to move or copy data from multiple "source" data sources to a "target" aggregated-data repository; tools to access data from multiple data sources, then combine it temporarily for specific purposes such as cross-database queries; tools to query data from multiple sources, aggregate structured and unstructured data
9	Collect unstructured content	Allows indexed full text search in the WCM system's pages <i>and</i> external media files like TXT, HTML, MS Word and PDF-files. Includes advanced options for searching only parts of a website and intelligent relevance rated display of results.
5	Have static and dynamic content	Dynamic content like forums, polls, shopping applications, searching, news management are typically ready-made modules. Good CMS's also allow for truly user defined extensions. Allows to publish any mixture of static HTML (for speed), dynamic content (for database interaction) or a truly mix of dynamic and cached content for the best of both.

Content Organisation :

11	Assign keywords	Meta data such as description and keywords can be entered generally for a template and for individual pages.
6	Assign metadata	Further metadata can easily be applied through custom extensions to any object in the system.
3	Use more than one classification scheme	Supports external thesaurus and other controlled taxonomies.
6	Use more than one search tool	Compatible with all search engines (webcrawlers) - all pages will be indexed (software requirements apply).
4	Use more than one management tool	Many default plugins are available such as forums, calendars, guestbooks, sitemaps, banner-controls, email-forms, polls, ratings, faqs, glossaries, news, and online shop systems.
9	Maintain different versions maintained	All of the changes to a document are recorded in a version management system. There is an infinite undo option within a complete and legible view of the documents version history. If multiple authors are involved in developing content, the system will ensure that no two authors modify the same content at the same time.
9	Plan site-map	Navigation is automatically generated. Menus are typically generated automatically based on the database content and links will not point to non-existing pages.

Content Delivery :

10	Provide access to commercial databases	(See Aggregate content)
9	Synthesise information from various sources or provide part content from the whole document	Because content is stored separate from design, the content from all authors is presented with the same, consistent design. Content is stored in a database. Central storage means that content can be reused in many places on the website and formatted for any device (webbrowser, mobile phone/WAP, PDA, print). It increases granularity of content thus making part deliveries of chunks of content easy.
9	Multiple query points	Compatible with all search engines (webcrawlers) - all pages will be indexed (software requirements apply).
13	Design personalised service based on user profile and user requests.	Personalisation- Through PHP, user logins and the unique speed-optimized integration of dynamic content, you can personalize the web experience for the visitors to the website

Content Analysis :

14	Users ask for personalised content services	(See Personalisation)
12	Check user authentication	Access restrictions are configurable. Users are assigned roles and permissions that prevent them from touching content which they are not authorized to change. Access control of pages is available on user, owner and group scheme
10	Responsible for content updation	Updates can be scheduled. Technical assistance is not required for every little modification - you are in control of your website.
13	Libraries track usage of site links	System ensures that there are no "broken" or "dead" links within the system. Statistics are available ranging from simple internal hit-counters to advanced analysis of standard or extended logfiles written. Furthermore, page impressions made by previews from staff members can be excluded, so only true page hits from customers are written to logfiles. You get a precise picture of your success on the web.

From the above table, it can be summarised that libraries are involved in activities like authoring, editing, reviewing and publishing of content. Organising of content involves linking of databases, and integrating searches of structured and unstructured content. System administrative roles like checking updates, links and authentication have also emerged. All of these fall outside the gamut of present Library Management Systems. Activities in which nine or more than nine libraries are engaged can be categorised as the 'core' activities performed in this set of libraries. The literature of WCM vendors studied by the authors show that WCM features cover all these activities in its core functions. They also provide a range of functions like staging, roll-back versions of web-sites, internationalisation, auto-categorisation, customised personalisation, multimedia management etc. As mentioned earlier, the commercially available range of CMS meet specialised requirements and need to be chosen with the organisations objective and purpose in mind. WCM systems include low-end, middle-tier and high-end solutions depending upon basic, customised and advanced features incorporated. But LIS requirements for the libraries studied are met within the core functions of any reasonably good WCM product.

5. WCM Open Source Vendors

Content Management technologies generally prove to be economical and beneficial in the long run. Proving the return on technological investments in service sector is difficult. Libraries are seeing a decrease in their periodical collections and staff. Considered as 'support' staff, librarians in such institutions find it very difficult to convince the management for technological investments. Hartman, an independent content management consultancy agency in its report[20] provides a tabulation of commercial WCM product pricing which indicates a range from low end systems beginning at Euro dollars less than 2000, the middle tier at 14 to 15000 Euros, and the high-end solutions roughly at 75000 Euros. Libraries are under a perpetual budget crunch. In the light of this problem, consideration of Open Source Systems (OSS) is suggested by the authors. In addition to the cost factor there are other flexibilities in an OSS. According to the open source definition, an open source vendor is bound by following criteria as enforced by the Open Source Initiative [21] –

- to offer free re-distribution,
- should include the source code,
- the licence must allow modifications,
- allow distribution of modified source code
- the licence must not discriminate any person or group,
- no discretion in any specific field of endeavour e.g. business or research
- licence should provide rights to all whom it is distributed.
- no restrictions on other software being distributed with this licenced software
- licence must be technology neutral

According to Brand[22]- a special columnist to ZDNet (an Online publication by Ziff-Davis), OSS is increasingly being considered as a viable replacement for commercial systems. An approach to selection of OSS WCM should include parameters like –

- Application area (e.g. e-commerce, document management, web-content management etc.)
- Operating system (e.g. Windows, Unix, Linux)
- Database (e.g. SQL)
- Programming language (e.g. Python, Java)
- Server (Apache, IIS, Tomcat)

Some well-known OSS includes names like Typo3, Xoop, Drupal, Geeklog, Midguard, Zope and Cocoon. There are various sources like vendor web-sites, analysts reports, vendor sales visits etc. from where information of these vendors is available. However, Roberston[23] mentions a survey which showed that 'recommendations from others' was the highest preferred mean (88%) to evaluate a system. Followed by recommendations was the 'demo/sample software' (81%). Recommendations on a WCM product for libraries may not be easy to come as Indian libraries have not implemented WCM systems. Recommendations could be sought from corporate libraries like Berlex and Fischer Control or University libraries as mentioned in the Introduction of this article. Demos of WCM systems are also made available on www.opensourcecms.com. Some considerations beyond implementation are noteworthy. Once technical support is withdrawn, it is essential to observe and maintain the system for any troubleshooting. Monitoring the return-on-investment is a continuous process as technology keeps changing every few years.

6. Conclusion

A shift from print to digital collection management has imposed new challenges in libraries. Unlike in the traditional library setting, success of today's library services is increasingly becoming system dependent. Monopoly is diminishing on various fronts – it has diminished in library as an information body, library as a single collection developer, library as a single information provider. Today, a library develops and sustains on interactions between a network of systems and people. The organisation and deliveries of information are more far too complex for legacy systems to handle. Much of our energies are spent in trying to gain control of this electronic environment, as we what we have established in the print set-up. WCM has made a beginning and is here to stay and so library web-presence is bound to grow. The paper has given directions on the working of the first two phases of WCM implementation. Phase three is specific to the infrastructural set-up of every library. As technological implementations are closely tied to expenses, each library will have to know its content life-cycle and arrive at the considerations of whether a WCM is to be adopted, adapted or created.

7. References

1. "Five-Year Information Format Trends", OCLC Library & Information Center Report, Mar. 2003, pp. 8 <www.oclc.org/info/trends/> (26 April 2003)
2. Trippe, Bill."Delivering Content that Makes a Difference", The Gilbane Report Whitepaper, Cambridge : Gilbane Inc., April 2003, pp-10-12
3. "FileNET WCM Gains Wider Acceptance in Higher Education Market" , <www.econtentmag.com/Newsletters/NewsletterReader.aspx?NewsletterID=22#9> , (31 July 2003)
4. Ovum Ltd."Web Content Management-Strategies, Technologies and Markets", London : Ovum Inc., 2000, p. 6
5. Guenther, Kim."What is Web Content Management Solution?", Online, 25(4), Jul/Aug 2001, p.81.
6. <www.ukoln.ac.uk/nof/support/help/papers/cms.htm> (7 February 2003)
7. McClusky-Moore, Nancy, "Untangling Web Content Management : Intranet, Extranet and Otherwise", < http://www.intranetjournal.com/articles/200004/im_04_18_00a.html> (23 November 2002)
8. Arnold, Stephen E."Content Management's New Realities", Online, 27 (1), Jan/Feb 2003, pp.36-40
9. Lite, Thomas-"Knowledge Management : What's There In It for Me?" <www.intranetjournal.com> (23 November 2002)
10. Howard, Jim."Finding the ROI in Content Management"<www.cmswatch.com> (20 April 2002)
11. Hackos, JoAnn T. "Content Management for Dynamic Web Delivery", New York : Wiley Computer Publishing, March 2002, p.352.
12. White, Martin."Defining Your Content Management Strategies", E-Content, May 2000, <www.econtentmag.com>(12 September 2002)
13. McClusky-Moore, Nancy. Op.cit.
14. Hackos, JoAnn T. Op.cit.
15. Nakano, Russell."Approaches to Content Management", <http://www.informit.com/content/index.asp?session_id={B196131D-8A35-46CB-9F5E-38FA7C928A13}&product_id={2C4C93F5-603E-4F65-90C9-AA8B8732C708}> (30 September 2001)
16. Ericson, Jim."Enterprise Content Management for the Masses", Line56, 19 February 2003, <www.line56.com> (20 February 2003)

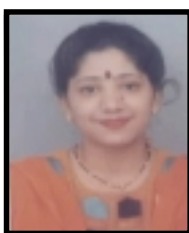
17. Arnold, Stephen E. "Right-Sizing Content Management", Whitepaper, Wokingham : Ektron Inc. 2003, p.30, <<http://data.bitpipe.com>> (22 April 2003)
18. Kartchner, Chris."Content Management Systems : Getting from Concept to Reality" The Journal of Electronic Publishing, 3(4), June 1998, <<http://www.press.umich.edu/jep/03-04/kartchner.html>> (23 October 2002)
19. McClusky-Moore, Nancy. Op.cit.
20. Linden, Alexander, Ball, Rafe, Filho Waldir and et al."Gartner's Survey on Managing Information", Note Number –COM 15-0871, 21 Jan 2002, p.4
21. Hartman Communicatie BV : Overzicht Van Content Management Systemen, <<http://www.hartman-communicatie.nl/extra/tools.htm>> (7 July 2003)
22. Open Source Initiative, 2003 in <http://www.opensource.org/docs/definition_plain.php> (26 August 2003)
23. Brand, John. "Open Source for Content Management", ZDNet Australia <www.zdnet.com.au/itmanager/trends/story/0,2000029592,20275976.00.htm> (18 July 2003)
24. Robertson, James. "A Consumer Survey of CMS Survey Websites", Cmb 2003-08 in CM Briefing, Sydney : StepTwo Designs Pvt.Ltd, 2003.

About Authors



Dr. Pratibha A. Gokhale is Reader in DLIS, University of Mumbai, Santacruz (E), Mumbai-400 098, India. Earlier she worked as a Librarian in Alchemie Research Centre and in TIFR, Mumbai. She holds a Ph.D and contributed several articles and is a resource person for several courses. She has visited many important libraries worldwide. Her specialisation includes Classification, Indexing, Information Management, Grey Literature.

E-mail : pratibha_gokhale@yahoo.com



Ms. Dhanashree A. Date is Assistant Manager-Library at Tata Infotech Ltd., Andheri(E), Mumbai-400 096, India and holds M.Lib.Sc and pursuing Ph D from University of Mumbai. She has five papers to her credit and is a visiting lecturer to M.Lib.Sc students and refresher courses.

E-mail : dhanashree.date@tatainfotech.com