

# Content, Management, System

## - The Construction of a CMS Evaluation Prototype from Communicative Perspectives

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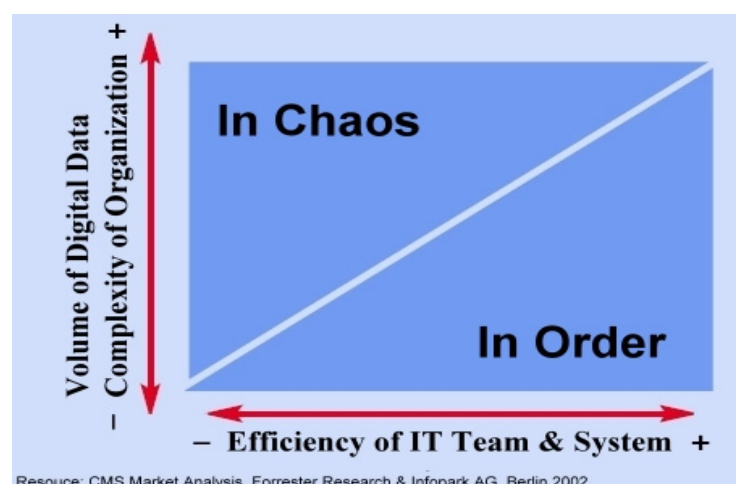
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### I. Introduction

The economy paradigm of our modern society shifts from Production to Knowledge after the Millennium. With the rapid developments and the robust growth of E-Commerce on the WWW platform, again, “Content is king!”

However, ask any group of web-site managers or IT staffs, and they will tell you – after investing in applications and services over the past few years – that they still often find themselves drowning in the mass of critical supporting content that lies beneath everything they are doing online. Just like what the chart shows below (**CHART 1.01**), as the volume of digital data/content and the complexity of organization increase, the efficiency of IT team and system declines. Though this contradict seems to be a common sense to most of us, to understand how these contradictories all came about is still a good start point for our exploration on the competitive advantages of content management systems and the concepts behind.



(Chart 1.01) “The contradict between IT efficiency and data volume & organization complexity”, CMS Market Analysis, Forrester Research and Infopark AG, Berlin, 2002. This research results are “exclusive authorized” by Infopark AG to privileged academic uses. Please see the appendix for more Information.

## 1.1 Why CMS? Is Content Management A Big Concern?

Mostly, CIOs may sense they have content management problems, but what are these problems exactly? Based on a survey on CIOs of TOP500 American Enterprises in 2002, the famous American market research Institute “Forrester Research” concludes a “content management problem ranking list” (**CHART 1.02**), with 15 detailed described annoying (web) content management problems that disturb CIOs the most, as followed:

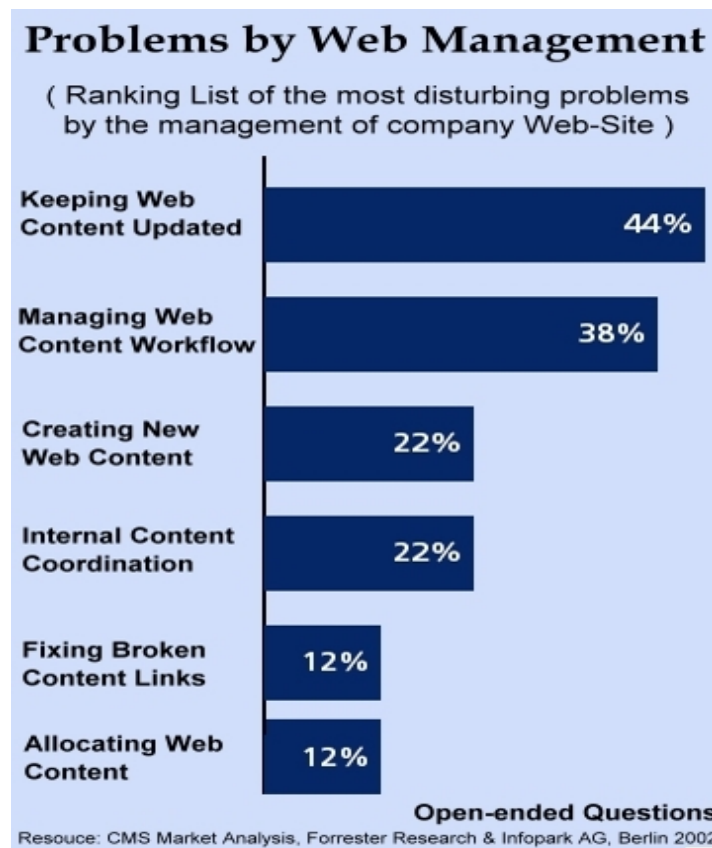
<b><i>Ranking List of Content Management Problems in TOP500 U.S. 2002</i></b>	
1.	Content bottlenecks with a webmaster, IT department, or some other related gatekeepers in company.
2.	Site visitors have difficulty finding what they need.
3.	Content contributors have difficulty finding what they need.
4.	Some content is inaccurate / outdated / redundant / unauthorized.
5.	The home page does not provide a full, up-to-date portal information into the rest of the company internal/external web site.
6.	The web-site exhibits inconsistent design and navigation schemes.
7.	Contributors occasionally overwrite content / files accidentally.
8.	Web managers need to “roll back” the site to a previous version – perhaps for legal or regulatory reasons – but cannot.
9.	Content contributors are unable to pre-publish content to appear at a specified later date or time.
10.	Web-site managers cannot associate the company’s products and services to articles or news on the site (or vice-versa).
11.	Content has feet of clay: web managers cannot easily reuse / share / distribute / import it.
12.	An inability to protect or control access to content keeps good material offline.
13.	Marketing and product managers cannot customize content for customers, partners, and other important visitors.
14.	Internal company staff is not invested in web communications.
15.	Company staff lament, “Our web-site is not as good as we are.”

**(Chart 1.02)** “Ranking List of Content Management Problems in TOP500 U.S. 2002”. CMS Market Analysis, Forrester Research and Infopark AG, Berlin, 2002. This research results are “exclusive authorized” by the Infopark AG to privileged academic uses. Please see the appendix for more Information.

Similar problems could also be observed in a continuous joint market research of the German content management vendor Infopark AG and the famous American market research institute Forrester Research<sup>1</sup>. In every December from 1999 to 2001, they sent e-questionnaires to the CIOs of 1000 German companies in order to collect their opinions on problems by Web management. The average return rate of is around 42.75%.

In an open-ended question in the questionnaire, the CIOs are asked to write their problems by Web Management in key words. As what we can see (**CHART 1.03**), clearly, most CIOs do have problems with “content”. These include “Keeping Web Content Updated (most disturbing with 44%)”, “Managing Web Content Workflow (2<sup>nd</sup> with 38%)”, “Creating New Web Content (22%)”, “Internal Content Coordination (22%)”, “Fixing Broken Content Links (12%)” and “Allocating Web Content (12%)”.

The first four problems could be regarded, without a doubt, “Content Management” problems. And the rest two, though a bit technical, still have much with “Content Management” to do. Since we realize that “Content Management” has become a big concern of most CIOs, either in the U.S. or in Europe, it is necessary to identify the problem factors and the challenges behind more clearly.



(Chart 1.03) “Ranking List of the Most Disturbing Problems by the Management of Company Web-Sites in the German companies from 1998 to 2001”, CMS Market Analysis, Forrester Research and Infopark AG, Berlin, 2002

<sup>1</sup> Infopark AG, 1998 ~ 2001 Continuous Market Research Project of Infopark AG and Forrester Research, Berlin, 2003, p.25~32. This research results are “exclusive authorized” by the Infopark AG to privileged academic uses. Please see the appendix for more Info.

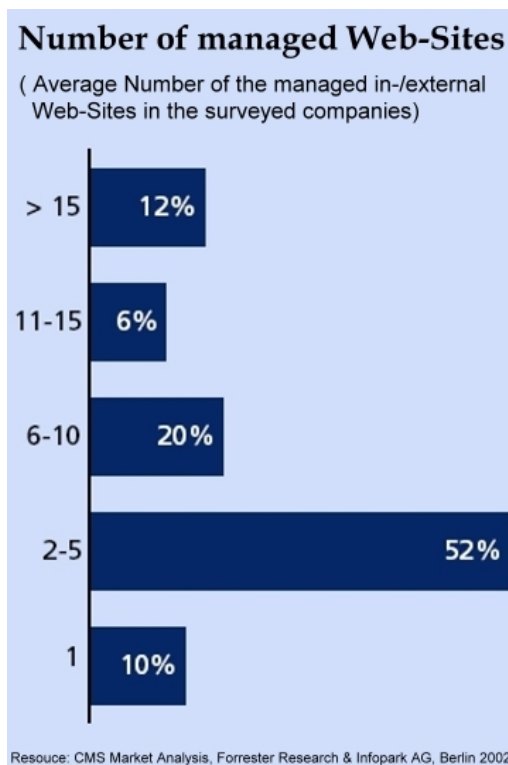
## 1.2 Problem Factors and Challenges:

### 1.2.01 Explosion of Data Volume and Web-Sites

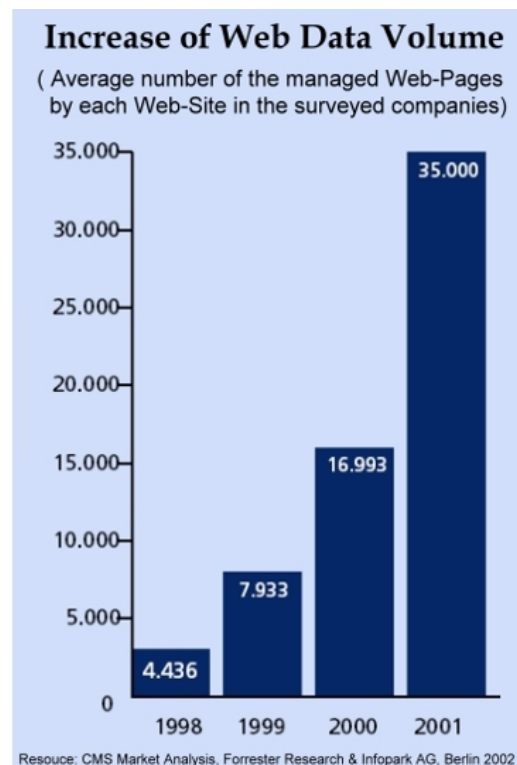
Obviously, the explosion of data volume and the continuing rapid growth of web-sites (of course, contents are required) create tremendous challenges for CIOs. If your own company web-sites are growing at nearly unmanageable proportions, you are not alone!

In 2003, various American industry analysts have calculated that content on a typical public corporate web-site grows at an 80% rate annually<sup>2</sup>. Also, in the continuous joint market research of the German content management solution provider Infopark AG and the famous American market research institute Forrester, which we've mentioned, they find out:

The average amount of enterprise external/internal web-sites in the German companies reaches to 2 to 5 in 2002. **(CHART 1.04)** And the average web-pages volume in the questioned companies' web-sites is also in a fierce growth. From 1999 to 2000, the increase is about doubled. From 2000 to 2001, it's 120%, which is more than doubled. And from 2001 to 2002, the growth/difference range is almost 145%, heading a triple jump. **(CHART 1.05)** The research results also indicate a more rapid growth after then.



**(Chart 1.04)** The average amount of managed enterprise external/ internal web-sites in the German companies in 2001, CMS Market Analysis, Forrester Research and Infopark AG, Berlin, 2002



**(Chart 1.05)** The average web data volume growth in web-sites of the German companies from 1998 to 2001, CMS Market Analysis, Forrester Research and Infopark AG, Berlin, 2002

<sup>2</sup> Meta Group Inc., 2003 Enterprise Content Management Report, New York, 2003, p.12,

Ironically, more content does not necessarily make for a better web-site, and indeed, some web-site publishers find that as more material gets pushed online, it actually diminishes the value of existing content: valuable material becomes harder to organize and be found by impatient internal / external visitors. The Chart 1.01 of this dissertation on P.001 shows exactly this contradictory dilemma to the IT department of all the organizations today.

For sure, a good search engine can surely help here, for most of the “content readers”. But ultimately, the ability to develop user-centered navigational and metadata schemes and enforce quality control mechanisms – likely with the help of a Content Management System (“CMS”) for the “content contributors” becomes even more important.

Most companies started to address problems of content expansion by placing text into online databases and using dynamic scripting languages to generate pages on demand. However, they quickly learned that a database alone is not a content management system and by itself doesn’t solve the key problems related to content production and publishing. Many companies therefore resorted to building – piece-by-piece – homegrown Content Management systems to address standard CMS issues that users predictably demand, like versioning, archiving, personalization, syndication, and so forth.

Unfortunately, as the feature set of these do-it-yourself systems expanded, the weight of the various applications typically began to fracture the foundations, leading to tremendous end-user frustration and ultimately a search for packaged CMS solutions.

## 1.2.02 Better Communication with Market

Over the past couple of years, many companies’ web efforts have transitioned from simple “web publishing” to more full-blown “e-business,” as they sought to take advantage of the universal Internet platform to conduct core commercial operations online. It is now a truism that content provides essential fuel to all e-business, and therefore this transition has served only to increase the volume of content that companies must manage.

Whereas four years ago web managers might have overseen a single (and likely static) public web-site, now they must juggle the demands of an Intranet, Extranet, possibly multiple public corporate web properties, as well as the company’s participation in any number of Net markets and partner sites. In short, corporate content now lives in a virtual ecosystem, compounding the complexity of managing it.

This is particularly the case if the enterprise is trying to introduce automation and added value to sales and marketing. The sell-side of e-business is where most of the expense and overhead of e-commerce resides, and it is inherently a content-heavy process. In the B2B realm especially, the transfer of knowledge to prospects is crucial if enterprise’s goal is to de-commoditize the product line and promote a more solutions-oriented sale. Transferring knowledge to top distributors and customers may well be essential for market survival<sup>3</sup>.

However, many companies are beginning to see the limitations of traditional electronic catalogs. Catalogs excel at storing relational data (product price, size attributes, etc.), but frequently run into difficulty managing complex documents, particularly those with granular text and image elements, such as spec sheets, brochures, case studies, and user manuals. In short, catalogs are not typically well suited to managing the very materials that help promote a

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<sup>3</sup> Zarnekow R; Brenner W: Content-management in service on demand-systems, WIRTSCHAFTSINFORMATIK 1997, Vol 39, Iss 5, pp 451-&, VIEWEG

more solutions-oriented approach. This has merchandisers looking into CMS solutions<sup>4</sup>. The buy side of e-business also carries important information needs. Tighter integration with suppliers requires a greater exchange of information about inventory, delivery, payment, and so forth. Suddenly, there is much more content flowing through e-commerce systems than their designers originally anticipated.

### 1.2.03 Content Quality and Integration

Today, more demands than ever are placed on web publishing processes. Web managers must often work with highly diverse content sources, pulling text and images from databases and file systems around the company.

In response, some organizations devolve content maintenance to content owners. A broader group within a firm taking a bigger stake in content management can be a very good thing, and in visionary companies, this happens by direction. In most firms, however, the devolution of content maintenance occurs in an ad-hoc way, and this frequently leads to quality problems if the system is not designed for distributed, collaborative content management.

Typically, quality problems first appear at the content and presentation layers. Content becomes redundant, unapproved, and/or outdated. Enterprise may have editorial controls in place for offline content that is later repurposed for web, but what about the proliferation of web-only content? Who is controlling that and how? Navigation and usability also suffer, as page archetypes begin to break down and users become presented with different layout schemes that don't seem to belong on the same web-site.

Web managers also face pressure for more dynamic content – up to the minute pricing or personalized content. Internal stakeholders and external customers alike will frequently ask, “if it's in a database here, why can't we just push it to the web?” Unfortunately, it's rarely that easy, even though techniques for extracting and presenting database content online have become ubiquitous. But dynamic, database-driven pages have a serious impact on download times, especially within busy sites. Competing demands for site speed and dynamic presentations therefore put web managers on the horns of a dilemma.

### 1.1.04 Instant and Interactive Communication with Customers

The pressure to rapidly convert corporate information into consumable online content is omnipresent. This has led to a new phrase entering the common vernacular: “webmaster bottleneck.”<sup>5</sup>

However, this label is a little unfair! If only one person or a small team can place content on a large corporate web-site, publishing schedules will surely suffer, but it is typically symptomatic of broader deficits within a company concerning inadequate tools, knowledge, and authority.

Companies also want to respond faster to market conditions and competitive pressures. This places a new, higher premium on the adaptability of web-site structures and presentations at exactly the same time that managers are struggling to tame publishing processes which threaten to expand beyond reasonable control.

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<sup>4</sup> Arnold SE: Content management's new realities, ONLINE 2003, Vol 27, Iss 1, pp 36-40, ONLINE INC

<sup>5</sup> The “webmaster bottleneck” has also been stressed in: Fowler SL; Novack AMJ; Stillings MJ: The evolution of a manufacturing Web site, COMPUTER NETWORKS-THE INTERNATIONAL JOURNAL OF COMPUTER AND TELECOMMUNICATIONS NETWORKING 2000, Vol 33, Iss 1-6, pp 365-376, ELSEVIER SCIENCE BV

And of course, end-users want information faster too. From manufacturing, the online world has borrowed the term, just-in-time (“JIT”) content. In a customer-driven environment, responsive companies must publish the content the customers specifically need, when they need it, in the format they need it. Brokerage firms have gotten very good at this. They can beam the latest stock quotes for your personal portfolio to your cell phone. Most other companies are still playing catch-up.

### 1.3 CMS Trend Forecast and Market Chances:

To face the above mentioned challenges and to struggle for a survival way in the e-Trends, companies spare no effort in the IT and Web works and the so-called “investments for future”.

Nevertheless, as their online efforts proliferate, companies begin to take harder looks at the costs of their rapidly expanding infrastructure. Naturally, one of the biggest expenses is people, especially in the technology field. Savvier firms are also tallying the amount of time that non-technical contributors need to expend updating corporate web-sites, and are looking for ways to automate the entire process. This creates the tremendous market chances for all the document and content management solutions providers.

However, in the search for software solutions, it is not unusual to experience sticker shock at the price of CMS packages, particularly those targeted at the enterprise, where multi-server, hundred contributor licenses can run into the millions of dollars. Fortunately, software licensing costs are falling, and a surfeit of vendors have emerged to address the mid-market customer. In the following chapters, we are going to have in-depth reports and further discussions.

As a footnote to the introduction, here are some digested Trend Forecasts<sup>6</sup> based on the research results of the internationally recognized enterprise content management authority, the Association of Imaging and Information Management, AIIM, in 2003:

- CM market rising at 7% CAGR to \$2 billion by 2006
- Portals and Content Management gains (index values of 75+) increased IT visibility as a key strategic technology
- 2002, though a tough year -- decline of 7% overall (yet Document Management market up 15%), Greater than 85% of G2000 will deploy portals by 2004 and most will tie to Content Management systems
- By 2005, 80% of Fortune 100 companies will use commercial CM systems to reduce web publishing costs.
- By 2004 the true value of rich media will be unlocked
- By 2008 Digital Rights Management will have evolved from a niche application securing content royalties, and emerge as the underpinning of a new trusted computing platform

Though the predictions of growth may be overly generous, clearly the CMS software market is expanding, and with good reason – companies and organizations need this technology, obviously!

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<sup>6</sup> ECM Market Forecast 2003, Association of Imaging and Information Management, U.S., <http://www.aiim.org> ; also see in article in CONTENTMANAGER.NET 05/2003, Kampffmeyer, PROJECT CONSULT GmbH, Germany, [http://www.contentmanager.de/magazin/artikel\\_321\\_aiim\\_und\\_ondemand\\_vereint.html](http://www.contentmanager.de/magazin/artikel_321_aiim_und_ondemand_vereint.html)

## II. CMS: Concepts and Technology Developments

Today, according to Web directory DMOZ ([www.dmoz.org](http://www.dmoz.org))<sup>7</sup>, more than 800 products in the software marketplace call themselves “Content Management Systems.” They all attempt to solve some or even most of the content problems which we have introduced and discuss in the previous chapter, albeit in different technical ways and on different platforms.

Similarly, there are also almost as many definitions of “Content Management System” as there are CMS vendors and analysts, whether in the U.S. or in Europe. When you review the available academic researches or materials on the “CMS” products and the related terms, you will soon find yourself get totally lost in this chaotic terminology jungle. The solution or the definition that you are looking for is likely to be as unique as your different needs.

Though this fact shows the robust developments of CMS technologies, the enormous needs from enterprises/customers and the rapid growth of the market, it also implicates that there are different management factors, technical consideration and system development perspectives which we should not neglect, either for academic research purposes or simply for making a purchasing or implementing decision for CMS products.

In order to make our observation on the CMS concepts and the technology developments to be more systematic and precise, in this chapter, we start from the industry definitions on CMS first and then try to explain the developments of the related terms and technologies.

### 2.1 Why Content Management System? And What It Is?

One of the most interesting phenomena in the CMS markets is: It seems that the industry, CMS vendors and solution providers, goes further than the academic researchers.

Maybe it's true, due to the fact that the industry sectors nowadays tend to have more R&D budgets than the universities or research institutes. However, it might also be possible that these “NEW” terms are nothing but buzz words from the businessmen who eager to get money from customer's pockets.

After reviewing more than 100 related materials<sup>8</sup>, here, we pick up the most distinguished definitions and followed with our comments:

***“Content management is the storage technology that enables reuse of information at the granular level. Content is stored at the information level, not the document level.”***<sup>9</sup>

– Business Objects Inc.

This definition helpfully distinguishes Content Management (CM) from Document Management (DM). Nevertheless, although granular element storage is central to Business Objects Inc.'s approach to WCM and can be a very good idea for many CMS Developers. However, it doesn't address the key business processes around the validation, publishing and distribution of online content. Decision makers could hardly imagine how their companies could apply the CMS technology from this definition.

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<sup>7</sup> In comparison with other commercial search engine as Yahoo, MSN or Google, DMOZ aims more at IT professional communities and have a more systematic category structure for hardware or software developers.

<sup>8</sup> See literature list and Appendix B. Categorized Online Professional Comments and Active Commentator List

<sup>9</sup> User manual of software product Crystal Report v.10, 2004, Business Objects Inc., p.46~48, see <http://www.businessobjects.com>. Business Objects Inc. is a leading developer in the field of Business Intelligence Software since 1995.



**“Content Management Systems (CMS) are software toolkits that automate the rapid deployment of content from multiple sources. CMS are collections of application programs and middleware that automatically organize the content for your web site according to rules you set up.”<sup>10</sup>**

– Bernd Völker, Infopark AG, Germany

This is an excellent description of CMS packages from a wise CEO of a CMS Total solution/product provider. In this definition, “product” and “software technology” take the priority of conceptualization. It makes the CIO feel rather curious for CMS. But, for people who don’t really understand business information systems, it still does not speak to what people actually *do* with that software.

**“A combination of clearly defined roles, formal processes, and a supporting systems architecture used by companies to produce, collaborate on, monitor, and publish Internet sites.”<sup>11</sup>**

– Forrester Research

As the most famous American market survey institute, the definition of Forrester Research emphasizes more on roles and processes, obviously from business logics and perspectives. It helps illuminate the non-technical challenges to building a good CMS. But the definition may be too restrictive in its detail, if we consider the possibilities of industrial vertical and horizontal integrations of CMS in the future.

**“Content management represents a combination of knowledge and infrastructure. Imposing order on chaos requires investment from real people who are domain experts.”<sup>12</sup>**

– Heckman JM & Glantz EJ: Web content management: A collaborative approach

Heckman and Glantz point out the difficult, but often hidden task of classifying and annotating content accurately, which is how its true value can be exploited. Whatever the tools at their disposal, only *people* can effectively organize and give meaning to content. This definition seems to be more related with the knowledge management and storage perspectives.

In the end, after summarizing the above mentioned definitions, here we try to give our own definition of a Content Management System:

**“A set of business rules and editorial processes applied to content by people and organizations to align online publishing efforts with business objectives.”**

In our definition, “CONTENT” moves to the center of the equation, where it belongs. “PEOPLE” play a decisive role in what happens to it. What they do with content can be encapsulated into “BUSINESS RULES” (organization) and “EDITORIAL PROCESSES” (workflow). The goal of these efforts is to support specific “BUSINESS OBJECTIVES” (strategy). Perhaps the most important content management problem that modern enterprises face is that their publishing processes do not advance business goals. The purpose of implementing a CMS should be to put those two back in sync.

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<sup>10</sup> Interview Bernd Völker, CEO Infopark AG, Germany. In Berlin 2003.10.15 (Vincent, Chung-Wei Lin)

<sup>11</sup> Infopark AG, 1998 ~ 2001 Continuous Market Research Project of Infopark AG and Forrester Research, Berlin, 2003, p.03. This research results are “exclusive authorized” by the Infopark AG to privileged academic uses. Pls see the appendix for more Info

<sup>12</sup> Heckman JM; Glantz EJ: Web content management: A collaborative approach, INFORMATION PROCESSING & MANAGEMENT 2003, Vol 39, Iss 4, pp 667-668, PERGAMON-ELSEVIER SCIENCE LTD

## 2.2 The Landscape of CMS Related Concepts and Technologies

Our definition to CMS provides a simple principle and a clear perspective to observe and understand the content management problems in digitalized enterprises nowadays. However, with this definition, when enterprise IT decision makers feel that they have an content management problem and turn themselves back to the ultimate products in the market, they still tend to have problems to understand all those fancy terminology, slogans and products. Why? Simply because of the fact that: There are really too many factors to consider for implementing a enterprise-wide, even a partner cooperation oriented, information system!

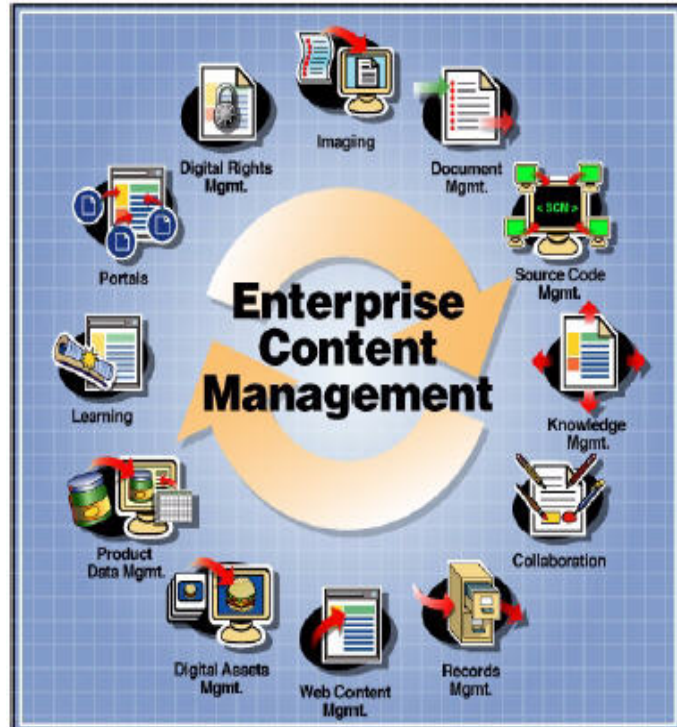
However, summarizing the interviews with different professionals and consultants in the CMS field, we could point out that: Mostly, the CIO’s dilemma could be answered by a sounds-easy yet hard to fully accomplish cliché:

***Defining the exact nature of the problem is always half the battle to finding a solution!***

In order to make us become better aware of our content related problems in the enterprise and to clearly distinguish the differences among the available technologies/products in the market, we apply an industry structures, which is proposed by AIIM in 2004, for a systematic review on the CMS related technology and market developments (**CHART 2.01**).

Let’s take a look at this chart first. In this visual mapping of technology and market developments, technology solutions to business problems that are associated with the production, storage, and distribution of information have historically gelled around different types of management software:

- Imaging
- Collaboration
- Digital Asset Management  
(abbr. **DAM**)
- Document Management  
(abbr. **DM**)
- Knowledge Management  
(abbr. **KM**)
- Source Code Management,  
or Software Configuration  
Management (abbr. **SCM**)
- Digital Rights Management  
(abbr. **DRM**)
- Web Content Management  
(abbr. **WCM / CMS**)
- Product Data Management /  
Catalog Content Management  
(abbr. **PDM / CCM**)
- Learning Management, and  
Learning Content Management  
(abbr. **LM / LCM**)
- Portals



(Chart 2.01) Mapping Enterprise Content Management Industry – The fundamental software concepts and elements, in ECM Market Forecast 2003 – Annual Industry Report, AIIM, U.S.A. <http://www.aiim.org>

This industry mapping offers us an overview on the key function-oriented elements in the CMS related technology. However, the question is: “Why AIIM calls it “Enterprise Content Management, ECM” instead of “Content Management Systems, (CMS)”?”

The reason why AIIM calls the whole industry as “ECM” could be simply summarized as followed:

Today, the lines among these product segments have become increasingly blurry, and there is consequently broad confusion around what is increasingly being called “Enterprise Content Management,” or ECM. For example, when is a document a “digital asset?” Shouldn’t my Knowledge Management portal also control versions of its associated code base? Don’t all digital files represent “content” of some kind?

Compounding this confusion is the rapid expansion of feature sets among ECM products in the rush to web-enable existing client-server products, capture larger market-shares, or simply lay claim an ECM mantle. While some companies have taken a partnership approach – particularly among the more niche-oriented SCM and DAM vendors – the marketplace as a whole has seen substantial convergence, consolidation and overlap. This, coupled with vague yet expansive marketing information, can make it difficult to discern the core capabilities of the solution a vendor may be offering.

Moreover, a vendor may only provide a single function-point solution, such as Imaging or RM or WM, but call themselves an “Enterprise” Content Management vendor because they are “TARGETING” enterprise-level customers – or simply because that term makes their software sound more sophisticated and valuable.

### **2.2.01 Enterprise Content Management and CMS**

This dissertation focuses on web-based Content Management System (also generally referred to as “CMS”) as opposed to Enterprise Content Management (ECM). According to our literature reviews and interviews with IT Professionals, ECM itself is a term still in search of a commonly-accepted definition. ECM could mean:

- **“Enterprise-level” function-point solutions**

This could be a very big DM, DAM, or WCM implementation that crosses departmental silos, and essentially promises a highly scalable approach to a common, practical need. This is a nice strategy in theory, and some large, cohesive enterprises (especially in the tech sector) have executed successfully on it.

However, we see a some backlash against this approach today, for financial reasons and because the implementation times across multiple silos can be highly impractical. At the same time, many enterprises are beginning to provide content management as a central service to different business units. In any case, this definition means that any large vendor from among the all the various categories above could call themselves an ECM player (and many of them do).

- **Combined functional solutions**

The idea here is to combine various functions under one management umbrella. This is what Gartner<sup>13</sup> promotes as “Smart Enterprise Suites.” As a strategy, it speaks to vendors like Stellent, OpenText, and Documentum that are assembling nominally integrated

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<sup>13</sup> Content Management Software Market Research 2003, Gartner, p.34–36. See <http://www3.gartner.com/news20040206.htm>

functional solutions under one brand. In reality of course, the individual products are typically marketed and sold separately, and in most cases (including Documentum), the offerings are far from integrated. Moreover, it is not at all clear that the marketplace actually will want combined suites even when the vendors finally get there.

• **Ubiquitous Content.**

This school of thought says that ECM is not an application, but a framework for making content as accessible as possible to the right people from wherever it lives, and that the prime function of disparate repositories is to feed the right information in the right format to key line-of-business applications that truly drive profitability (like Relation Management, RM). This is where content integration vendors are trying to get noticed. Many enterprises want to experiment incrementally here, but the fundamental concept of “content anywhere, any time, any format” remains highly utopian. Nevertheless, we believe that understanding ECM” as a framework for threading together content-rich applications across the enterprise is a useful way of trying to obtain more value from heretofore isolated function point solutions<sup>14</sup>.

In short, no one agrees on what ECM is, and the various definitions touted today don't really help technology buyers very much. So we will try to break down some of the basic business functions a bit more to begin to isolate the core features of Web content management versus related disciplines.

At a very basic level, all content management systems do the same thing: take in content, add value to it by applying approval and other business processes, then output it in some format. The simple input/output chart above can be applied to nearly the entire class of “ECM” solutions. Within a content management system, regardless of content type, several standard features are typically available to support these business processes. This set of core features spans the ECM functional spectrum from DM to DAM to WCM, and can be found in almost any major vendor package in those spaces. Whether the content in question is text, images, binary documents, XML nodes, multimedia files, forms, or something else, we conclude these core capabilities are essential in any content management system:

- Contributor and managerial **rights and privileges** must be managed, usually according to pre-set roles; this promotes security and insures that participating staff/people are only undertaking suitable and appropriate tasks.
- Content must be **authored or ingested** into the system, and sometimes transformed into a consumable format; this enables corporate information to be actively managed.
- **Repositories** must be managed, through versioning and version control; this insures the integrity and authority of the core content.
- Content must be **tagged with metadata**; this enables content to be subsequently retrieved more easily and reused more widely, with minimal human intervention.
- **Workflow** mechanisms must be emplaced; this helps assure consistency, quality, auditability, and reliability of content and business processes alike.
- Content must be **localized** for multiethnic or multilingual audiences as well as authors; this enables enterprises to extend their content management efforts across national boundaries.

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<sup>14</sup> Similar comments see also: Kampffmeyer: Enterprise Content Management - The new message, CONTENTMANAGER.NET 03/2004, [http://www.contentmanager.net/magazine/article\\_394\\_enterprise\\_content\\_management.htm](http://www.contentmanager.net/magazine/article_394_enterprise_content_management.htm)

However, the function-points domains of Content Management, Document and Records Management, Digital Asset Management, etc. all still represent distinct solution sets, each with their own unique business and technical drivers.

### **2.2.02 Imaging**

Sometimes also called “document capture,” this entails either using digital imaging technology to convert paper documents to electronic images, or performing a forms capture, where data is extracted from either a paper form or an electronic form. Imaging requires using character recognition technologies to accurately convert printed text to digital data. In both cases, some kind of validation is required, against a set of quality-control rules. And usually a human is needed to “index” – think classify – the documents. Upon passing a QA check, documents are then “released” into a repository, for workflow and other value-added services.

Imaging is the oldest of all the ECM technologies and therefore perhaps most deserving of that mantle. When companies started making serious investments in imaging two decades ago, though, it created a problem: how to manage all these new electronic files? And so, Document Management was born.

### **2.2.03 Document Management (DM)**

Document Management is an important precursor to Web Content Management. Indeed, many of the famous DM companies, like FileNet and Documentum, have recast themselves as Web-savvy CMS companies in the Internet era.

DM products function to help companies better manage the creation and flow of documents – in particular structured documents – through the help of databases and workflow engines that encapsulate metadata and business rules. Perhaps more importantly, they represented the first manifestation of effective library services: versioning, version-control, and cataloguing.

DM systems have grabbed a significant toehold in heavily regulated or document-centric industries such as insurance. In their more advanced versions, they initially took advantage of much of the power behind SGML, and have been relatively quick to migrate to XML. Much of what we know about automated editorial workflow comes from the DM world.

Note that there are at least two very different use-cases for Document Management: managing and assembling compound documents from discrete content chunks, and managing binary files (who’s innards have not been disassembled) in a file repository. The latter is sometimes called “fixed content management.” This is an important distinction, because many CMS vendors purport to manage documents, but sometimes they mean file management, and other times they mean compound document management<sup>15</sup>. You’ll need to decide which type you need.

In any case, DM vendors have tended to weather the recent IT recession more successfully than pure-play CMS players, due to:

- A more diverse product line and larger, less dotcom-heavy installed base;
- More experienced professional services teams;
- Successful adaptation to business processing needs, like forms processing.
- Renewed corporate focus on DM, especially for Intranets.

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<sup>15</sup> See also: Warzecha, A: Differentiating content management, document management, and portals, ELECTRONIC BUSINESS STRATEGIES Nov.2003, META GROUP Inc

In our judgment, DM packages tend to remain weaker in certain web content management functions, such as templating and content deployment. However, they usually excel in workflow and repository services.

#### **2.2.04 Software Configuration Management (SCM)**

Also known as “Software Change Management”, or more colloquially as “Source Code Management.” SCM tools help technical teams manage the development and roll-out of software engineering projects through a coordinated, documented system of platform builds and enhancements. Think Document Management for techies. These tools have broadened their footprint in the market as IT projects have become more complex and as web development operations – perhaps belatedly – have begun to turn to the kind of established, formal methodologies that have typically characterized more traditional IT activities.

Like all ECM disciplines, the SCM problem domain mirrors many challenges found in content management, including workflow, versioning, and version control. Similarly, maintaining a sophisticated online publishing system requires that systems and controls exist for the behind-the-scenes software code as well as publicly-accessible content. SCM vendors have argued that as web-sites become increasingly like applications and less like than brochures, there is a natural parallel with content management.

As a practical matter, moreover, IT departments are typically responsible for managing the health of a CMS at some level, and are usually involved in any software selection process. Thus, since they already have the ears of important back-office stakeholders, SCM vendors moved aggressively earlier this decade to find WCM tools that they could integrate and market with their legacy products.

#### **2.2.05 Knowledge Management (KM)**

The purpose of KM is to capture and distribute the knowledge held among individuals within a corporation to other co-workers and partners, according to set rules. It is not so much about the content itself, but how people interact with content<sup>16</sup>.

Not surprisingly, KM is especially well suited to the internal needs of organizations in knowledge-oriented industries, such as tech-intensive manufacturing, professional services firms in general, and consulting outfits in particular. KM has traditionally more of an academic discipline than a technology sector, and in the software realm has been represented by a plethora of different types of packages, from search engines and specialized retrieval software to Collaboration tools.

Today, the KM mantle is perhaps most strongly assumed by a class of products known as “Enterprise Information Portals (EIP),” that apply a standard web interface overlay above corporate content. From the users’ perspective, the most important feature of an EIP is its search engine, and indeed, several search-engine vendors have recently recast themselves as EIP products.

A critical distinction here is that the target content is often quite heterogeneous in nature. A company’s HR handbooks may reside in word-processing files that could easily be indexed and

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<sup>16</sup> Frommholz I; Brocks H; Thiel U; Neuhold E; Iannone L; Semeraro G; Berardi M; Ceci M: Document-centered collaboration for scholars in the humanities - The COLLATE system, RESEARCH AND ADVANCED TECHNOLOGY FOR DIGITAL LIBRARIES 2003, Vol 2769, pp 434-445, SPRINGER-VERLAG BERLIN

shared within a DM or CMS. But what about corporate pronouncements or other content residing in e-mail archives (where much knowledge lives in the contemporary corporation), or sales data buried within your ERP system? To integrate that all together – at least at the interface or presentation layer – you may need a Portal. By redefining themselves as “portals,” KM products have breathed some new life into a stalling KM market, even though EIPs have arguably not displaced groupware vendors (Lotus Notes, Microsoft Exchange) as the central corporate collaboration space.

At their best, enterprise portals serve as the end-user prism into complex corporate content. Then an intersection with CMS becomes readily apparent<sup>17</sup>. Content still remains at the heart of any portal, and therefore, the management of that content, including versioning, workflow, and presentation control – all typical CMS features – is required. Without CMS, an enterprise portal is “read-only.”

According to our market investigation, many American portal vendors have smartened up to this duet and offered prepackaged integration modules to plug into major CMS packages. For example, Plumtree offers specialized “gadgets” (its term for portlets) to plug into the Documentum and Interwoven TeamSite products, as well as its own, very simple CMS.

### **2.2.06 Collaboration**

CMS products have not traditionally been seen as collaboration utilities in the marketplace. Most buyers tend to employ them initially to automate procedures that have become too sclerotic for the volumes of content enterprises are trying to process, as well as to exploit various options for content re-use.

However, enterprises are discovering that collaboration is an important attribute in content management.

First of all, by devolving control and authority for managing content to actual business users via non-technical interfaces, the number of people collaborating on a document (or some other digital product) can expand dramatically under a DM or CMS system, often with little forethought for the consequences. At the same time, traditional workflow features have been typically somewhat immature in their support peer-based collaboration. Many packages often assume that any collaboration has already taken place – perhaps offline – in some way during the content creation phase.

Some CMS and Portal vendors have recognized the need for greater collaboration by adding richer annotation features to traditional workflows (e.g. digital “stickies.”). But others, like Documentum, Vignette, Stellent, Oracle, and OpenText, have aggressively purchased or developed fairly sophisticated collaboration tools to add onto their CMS offerings. These new capabilities include project-based categorization for workgroups, threaded discussion boards, and real-time, collaborative document editing facilities. In this connection, however, they are bumping up against traditional groupware vendors (MS Exchange, Lotus Notes), who already command dominant market shares<sup>18</sup>.

The key distinction for would-be CMS buyers is whether the enterprise needs full-blown collaboration functionality for workgroups that are collaborating on specific projects, or whether

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<sup>17</sup> Same comments could also be found in: Frommholz I; Brocks H; Thiel U; Neuhold E; Iannone L; Semeraro G; Berardi M; Ceci M: Document-centered collaboration for scholars in the humanities - The COLLATE system, RESEARCH AND ADVANCED TECHNOLOGY FOR DIGITAL LIBRARIES 2003, Vol 2769, pp 434-445, SPRINGER-VERLAG BERLIN

<sup>18</sup> Fowell S: Bridging the gap between information resource design and enterprise content management, DIGITAL LIBRARIES: PEOPLE, KNOWLEDGE, AND TECHNOLOGY, PROCEEDINGS 2002, Vol 2555, pp 507-515, SPRINGER-VERLAG BERLIN

the enterprise simply wants his content management processes to be more collaborative and for the CMS system itself to be able account for multiple actors working together and on – and communicating about – a single piece of content while it exists in any particular status (e.g. draft, edit, approved, etc.). A full-blown collaboration package may help you manage ad-hoc projects run by distributed teams of staffers, but it may not help you improve cooperation in your content-approval workflows.

### **2.2.07 Digital Asset Management (DAM)**

Also known as simply Asset Management (AM), or Brand Asset Management, or Media Asset Management (MAM), the business case for DAM traditionally argued that companies whose life blood revolves around their digital assets – such as entertainment and media companies – should actively organize and repurpose those assets to streamline costs and enhance revenues.

The DAM systems are especially suited to managing multimedia content<sup>19</sup>. Unlike other products, DAM products tend to offer “HOOKs” into specialized desktop media authoring systems and cull specialized metadata from multimedia assets. If streaming video is your company’s main web content, you may want a DAM instead of a CMS. If multimedia content serves as your company’s products itself – rather than supporting other products – then you almost surely want a DAM system.

Recently, DAM vendors have been focusing on “brand asset management,” asserting that marketing departments of major corporations require sophisticated capabilities to manage key audio and graphical assets that comprise the critical foundations of a company’s brand equity. Whereas most traditional CMS products manage these assets as generic binary files (or “BLOBs”), new-generation DAM offerings understand their native file types and can use information accordingly.

Thus, for a typical video file, a DAM product might be able to generate video logs, storyboards, text indexes, streaming snippets, and dynamically-generated thumbnails – functions unreachable through almost any WCM package.

Some companies need both types of software, which is why WCM/DAM partnerships are common. For example, Artesia, a famous American solution provider of the popular TEAMS asset management platform, has teamed with Vignette for content management. In late 2001, Documentum acquired DAM vendor Bulldog outright, and in its latest edition (Version 5) has integrated asset management features into its core product line. Then Interwoven acquired DAM vendor MediaBin in 2003.

Indeed, many analysts have touted a convergence between DAM and CMS. Much the same way that CMS grew out of publishing roots to insinuate itself among the Global2000 by empowering everyday businesspeople to manage text content, DAM is slowing expanding out of its media and entertainment roots to a broader corporate audience by enabling marketing staff to better control the creation, archiving, and custom retrieval of media assets<sup>20</sup>.

But at the same time, the market for DAM remains relatively small, and only the largest and most sophisticated marketing departments appear prepared to make a significant investment in asset management systems.

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<sup>19</sup> A relevant and valuable research on this issue, please see: Thomas P: Influence of integrated content management systems on operational sequences in the broadcasting corporation, NFD INFORMATION-WISSENSCHAFT UND PRAXIS 2001, Vol 52, Iss 5, pp 283-291, DEUTSCHEN GESELLSCHAFT DOKUMENTATION E V

<sup>20</sup> Trippe B: Content management technology - A booming market, ECONTENT 2001, Vol 24, Iss 1, pp 22-27, ONLINE INC



Our suggestion is: An important choice for you to make is whether you need to develop a management system for your media assets at large – regardless if web delivery is the principal outcome and channel. If the answer is “yes,” you may want to look into a DAM package. If the answer is “no,” or “maybe,” you could probably suffice with the asset-management features found in a Web content management product. Many WCM products are beginning to incorporate just the basic DAM features (like browser-based image cropping) required for Web publishing.

### **2.2.08 Records Management (RM)**

In theory, records management enables information to be easily accessed and reproduced on demand, regardless of location or form. Enterprises implement records management to reduce costs and risks through classification and profiling of inactive documents. In practice, few organizations manage records comprehensively or well, although this is changing. The events of 9/11 in the U.S. and securities industry investigations in North America and Europe have elevated the profile of records management in those two regions.

Moreover, the extensive costs around legal “discovery” in more litigious countries like the USA are prompting a greater awareness of records management and compliance. Like WCM and DM, records management (RM) is partly a technical challenge, and partly a reflection of enterprise practice and policies.

Records management systems do very similar things that DM systems perform, albeit with a principally archival and retrieval purpose. A core feature is to back up –or take a “snapshot” of a content repository. Like DM and WCM, records management relies heavily on metadata, especially to determine a document’s authenticity or “chain of custody.” RM systems typically have an indexing mechanism, so that backed-up information can be found and retrieved subsequently, according to particular access controls and a user’s privileges.

Finally, RM systems must deal with disposition. Many enterprises maintain records according to their intrinsic value. Not everything is kept, and not everything that is kept is maintained forever. Proper disposition eases the records management burden by reducing storage volumes and controlling potential sources of future liability and discovery expense. RM software allows enterprises to assign explicit record schedules to classes of documents, and specific disposition instructions to a record.

Records managers are quick to point out, then, that RM is really a way of life, and not easily solved by software alone (we could say as much about all ECM applications!). As a practical matter, you may need record-keeping facilities built into several or all of your ECM applications, and not just those governed by a formal RM tool.

For example, you may need to be able to point out what your web-site(s) said on a particular date in time, possibly as legal evidence or to meet a compliance mandate. Some content management systems can create this snapshot. Other systems – typically at a lower cost-point – cannot.

### **2.2.09 Learning Management (LM)**

Learning Management Systems help companies manage and administer training, especially e-learning programs. Traditional LMS software will manage student profiles and log-ins, serve course materials, administer tests as required, track student performance, and generally allow the host company to manage the delivery of entire e-learning program.

LMS packages, therefore, are essentially content delivery systems. Not surprisingly, a subset of Content Management products called “Learning Content Management Systems (LCMS)” has emerged to help organizations manage the development and approval of learning content before it goes live.

These packages work very similarly to Web and Document content management systems, but natively offer certain content types germane to online learning (like “multiple choice questions”) and connect directly to important e-learning authoring tools (like Flash or Authorware). The LCMS marketplace today is extraordinarily fractured; there are no dominant vendors, so take great care in vendor diligence here.

### **2.2.10 Product Data Management (PDM)**

Product Data Management, also known as “Product Lifecycle Management,” or more simply, “Catalog Content Management,” refers to tools and methodologies for managing information – really both data and content – related to a company’s product and service offerings. As a product family, it emerged in the 1980s as a distinct alternative to DM systems inasmuch as PDM packages had to manage more than just documents, they had to account for all product-related information, including digital files, and database records. Moreover, the digital files tended to be highly specialized – and often rapidly-changing – outputs from CAD/CAM systems.

PDM systems attempt to keep track of all the heterogeneous sources of information required to design, build, and then support and maintain products and services. It typically requires substantial integration with legacy systems (such as ERP applications), so not surprisingly, PDM has attracted major platform vendors, such as Baan, IBM, EDS, SAP, and others.

PDM today is often subsumed under the broader and more fashionable label, “Product Lifecycle Management” (or PLM). PLM has attempts to encompass more broadly the creation, management, and use of product-associated intellectual capital and information throughout its lifecycle, and includes project management, collaboration, and other such functions and methodologies.

### **2.2.11 Digital Rights Management (DRM)**

DRM tools enable content owners to regulate and control information distribution by applying granular access rights and downstream privileges to specific pieces of content. Some solutions work on the server side, others control distributed materials at the desktop level, and some employ a combination of both approaches. On the server, these technologies are sometimes labeled “privileges management.”

If CMS is enduring its adolescence, then DRM remains in its infancy. DRM is a product space awaiting true definition in terms of competitive rungs, product and service definitions, and a common problem domain. DRM may be approaching lift-off, though, because the core need for Rights Management is potentially a powerful one, and not just for content vendors. To the extent that content is a key corporate differentiator, and you need to distribute it beyond the enterprise in digital form, then clearly, some sort of control is in order.

Moreover, an important assumption of content management is that:

Information carries dynamic value in Internet space and time. As a company, you may want to set one price or privilege level to view a document, another to print it, another to save it, another

to archive it longer than 30 days, and yet another price/privilege level to re-distribute the information further. This requires DRM tools.

Nevertheless, you’ll want to find the balance point between the inevitable overhead and potential user hassle of control mechanisms and the likelihood of lost sales or uncompensated value. CMS Watch elected not to implement any formal rights management mechanisms in the report you are reading now. We protect this information via our copyright and the license agreement you “signed” via submit button.

DRM vendors presently focus intently on vendors of content, as well distributors of value-added content, but expect them to broaden their target markets over the next year. Be sure your DRM vendor can tell you where and how its products integrate with major CMS packages.

### 2.2.12 Web Content Management (WCM)

Major web content management packages typically offer the canonical ECM features listed earlier in this section, although with a particular purpose: moving content to the Web according to enterprise business rules.

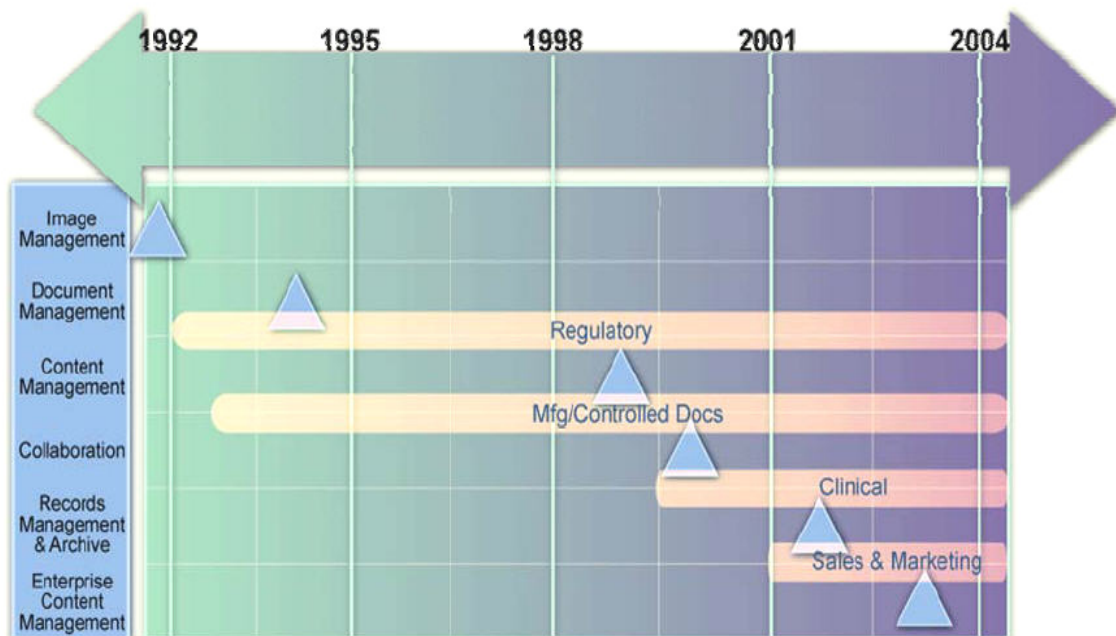
As newer, web-based products, these packages also tend to emphasize web-based interfaces over proprietary, client-based tools. More so than other ECM segments, web content management also concerns itself more closely with actual content delivery to end-users. In addition to core ECM functions, Web CMS packages bring special capabilities to the mix, including, potentially:

- **Specialized authoring and transformation tools**, to enable business users to input content into the system and have it normalized to HTML or XML.
- **Aggregation and Component Management**, to combine and publish discrete chunks of content that may originate from a variety of sources.
- **Templating**, to ensure consistent, predictable renderings for the Web environment.
- **Deployment Path**, to publish to standard Internet platforms (development, stage/testing, production)
- **Page Assembly and Delivery**, for dynamic production and submission of content to end-users (content consumers)
- **Personalization**, to deliver targeted sets of content to individual consumers.
- **Caching and Replication**, to ensure high performance in public environments characterized by spikes in demand.
- **Syndication**, to add value to content through advanced Internet-based distribution.
- **Producing Wireless and Other Formats**, to push content through multiple channels.

## 2.3 CMS Software Development Trends – A Short Summary

The above described landscape of CMS concepts and technologies provides us a clear overview on the conceptual and technological developments in the last 10 years. Besides, it also helps to

understand the historical and practical correlations among these terms, ideas, concerns and the technologies behind.



(Chart 2.02) The CMS concept and technology development, AIIM, U.S.A. <http://www.aiim.org/library/case.htm>

As a short summary of the developments of CMS software, here, we would like to take a chart by the Association for Image and Information Management (AIIM) in the U.S. to illustrate the main stream of the CMS concepts and technology developments.

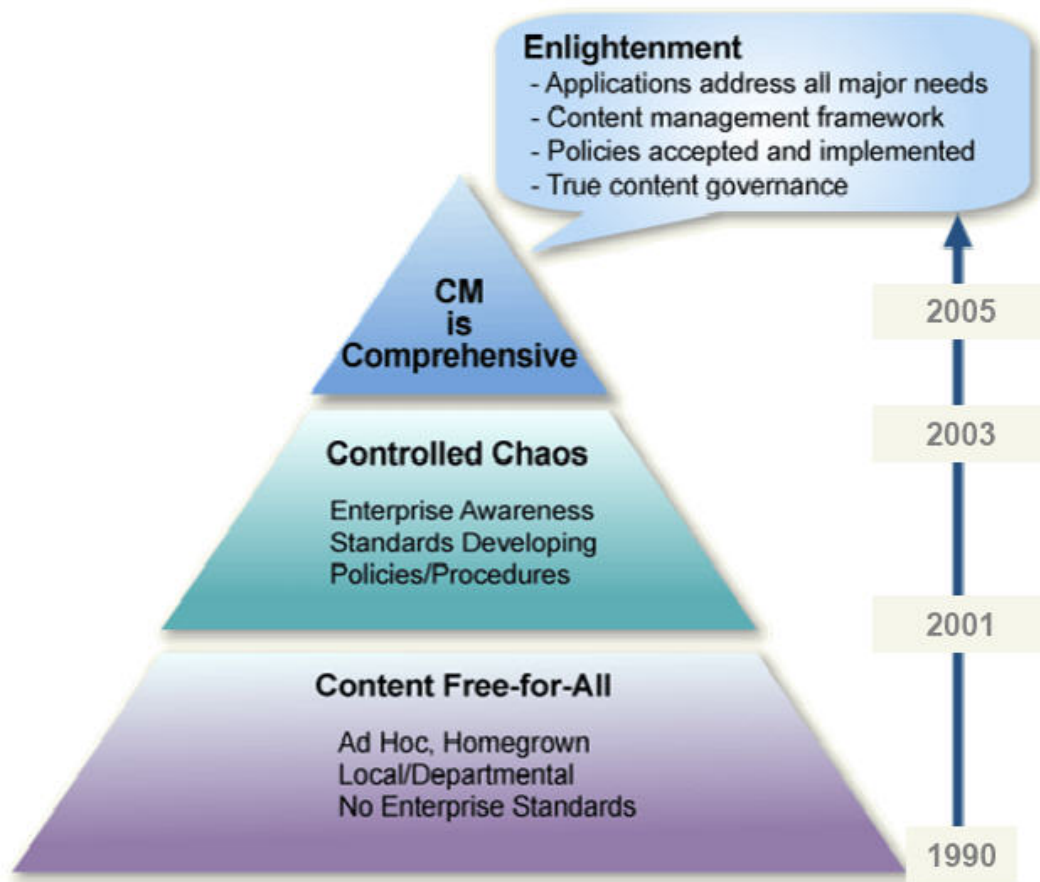
Let's take a closer look at the chart above (CHART 2.02), and don't forget, with some memory on the technical development of the IT technologies in the last decade. Then, it is clear to us that:

At the beginning of 1990s, when scanning technology and computer word processors were realized to the general uses in the business world, step by step, "Image" and "Document" Management soon became a big concern in the industry.

Then, with the spread of networking and EDI systems, the expansion of data/content forced the industry to take more care of "Content Management". Especially, since 1995, the rapid growth of Internet, especially the Word Wide Web (WWW), enabled the possibility of a more interactive way of "Collaboration". And through the developments of new Media after Millennium, ultimate "Expansion" and "Need" of Information/Content become the drives of "Records Management & Archive" and goes on its way to "Enterprise Content Management",

The developments of CMS software also follow the changes of concepts. CMS packages have been especially acquisitive in adopting key features from KM, DM, DAM, SCM, and DRM segments. For example, CMS vendors today have been increasingly aggressive about adopting DAM features as customers' graphical assets become more sophisticated.

On the other hand, the CMS packages have been slower to recognize key infrastructural considerations around code and asset promotion and thus left the door open for SCM vendors to provide a more reassuring story to internal IT managers.



(Chart 2.03) The CMS concept and technology development by Miller R in Content management - Case studies, ECONTENT 2003, Vol 26, Iss 5, pp 23-26, ONLINE INC

A famous American CMS researcher, Miller R., also illustrate the development tracks of CMS from another perspective. As what we can see in the chart above (CHART 2.03), he divides the CMS concept and technology developments since 1990 into three phases: “Content Free-for-All”, “Controlled Chaos” and “CM is Comprehensive”. In his opinion, the next generation CMS software should be heading the following four directions:

- Applications address all major needs
- Content management framework
- Policies accepted and implemented
- True content governance

Obviously, the first two targets belong to the technical dimensions, which the computer system specialists continue devote themselves to. But the last two targets: “Policies accepted and implemented” and “true content governance” seem to have less with IT system to do. A computer engineer is professional for programming jobs, but never good at administration. The last two developing targets of CMS belong far more to the “business management” and “communication” dimensions.

Why? Let’s discuss in the next chapter...

### III. CMS: The Study and the “Collaborative Function Model”

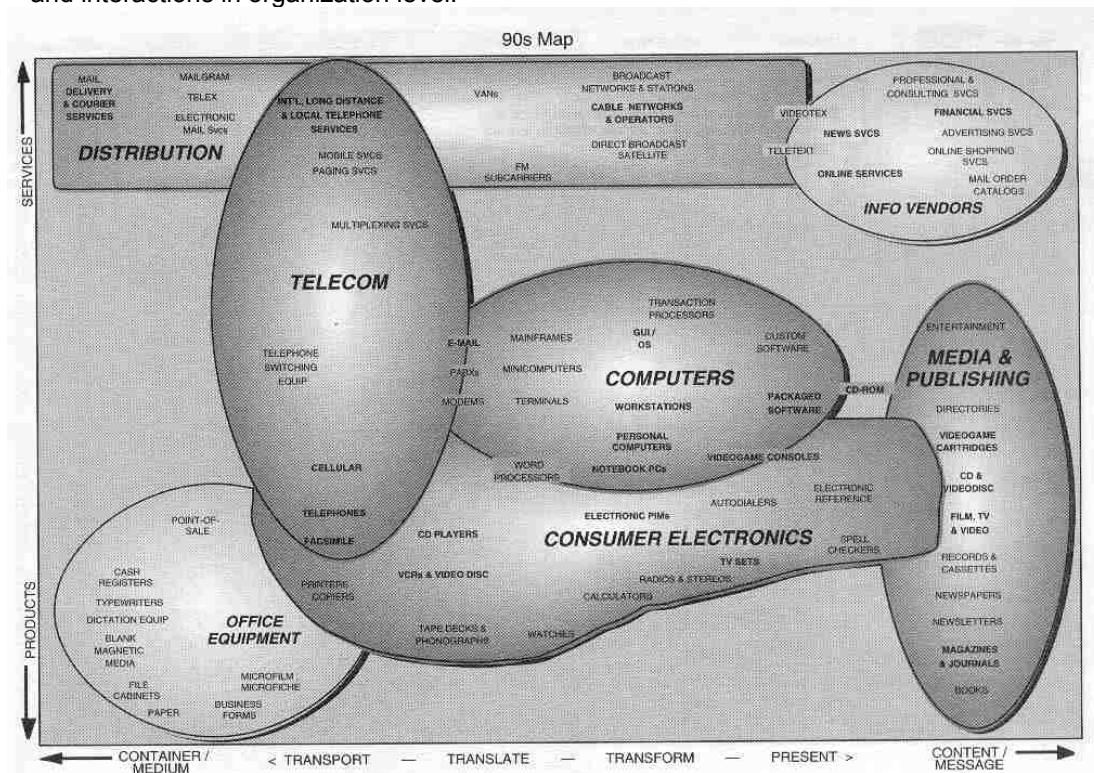
#### 3.1 Why a Study on CMS with Communicative Perspectives?

As what we've mentioned in the end of the previous chapter, the American CMS researcher Miller points out that, in the latest developing phase of CMS “CM is Comprehensive”, there are some more important factors which is far more than simply better technical solutions. They are:

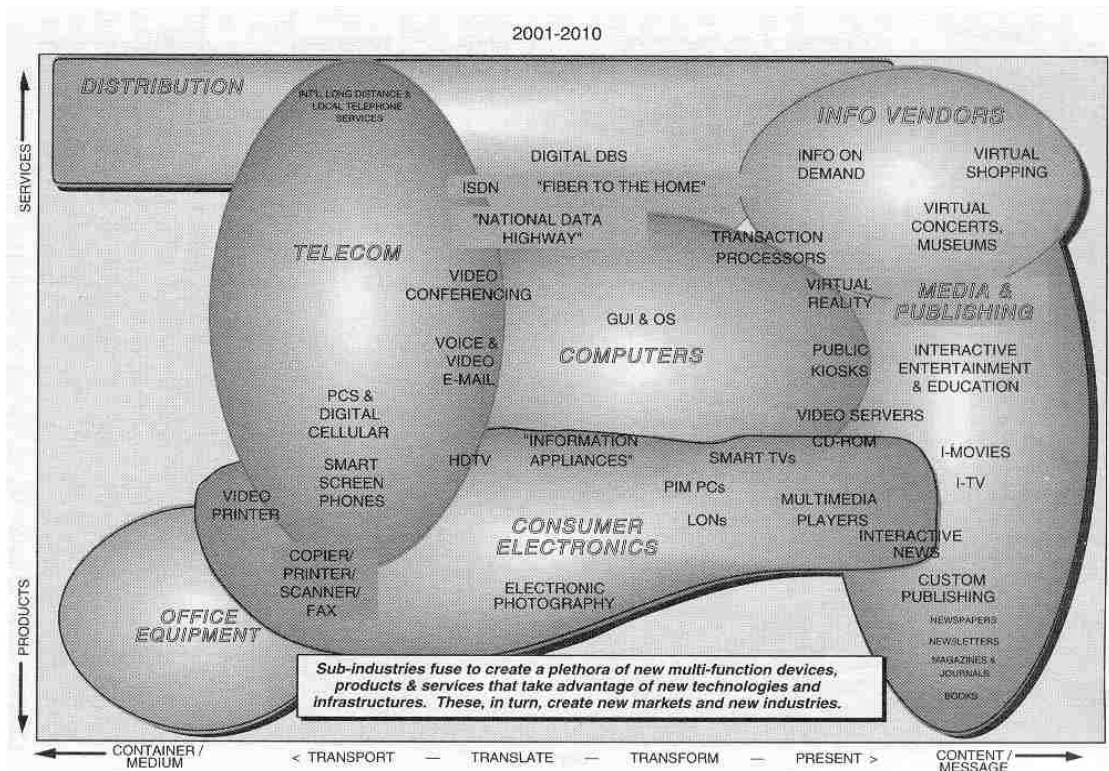
- Policies accepted and implemented
- True content governance

These two developing targets of CMS belong far more to the “business management” and “communication” dimensions. They indicate that, the design and implementation of CMS are not merely the development of a more powerful computing system or the installation of software products. In addition to system analysis and programming jobs, CMS has close relationships with the marketing goals, organizational structure and culture, most important of all, the internal and external communication behaviors of the enterprise/organization.

This is a particular interesting point for the communication/information researchers, especially when the boundaries between information and communication, or let's say, among the industries which are illustrated in the two charts below (CHART 3.01/3.02), vanish and melt gradually. Now, we could do much more than the traditional communicative studies on the distribution/adoption of New Information-Communication Technology (ICT), Human-Machine Interactions. With integrated and systematic interdisciplinary approaches, now, communication/information researchers should try to understand the changes of relationships and interactions in organization level.



(Chart 3.01) Mapping the Information/Communication Technologies and Industries in 90s, Ministry of E-Commerce, U.S.



(Chart 3.02) Mapping the Information/Communication Technologies and Industries 2000-2010, Ministry of E-Commerce, U.S.

Following the above mentioned idea, let's take a look at CMS again. CMS itself is a mix of information/computer system and communication technologies. When facing CMS (or other similar information systems/products) as a research "object", for many communication researchers, they will take it as a "device", which serves for the computer mediated communications (CMC). Then, in the traditional ways, their analysis falls on the understandings of "Effects" and "Efficiency", that is, the "Before/After" comparisons. Or, they might do it with psychological or social perspectives and make researches on the new technology "adoption" and "distribution" processes".

However, what we like to point out is that we should to think the CMS as a "Place" rather than a "device", where CMC occurs, and most important of all, continue to happen, function interactively and repeat itself, till the "Tasks of Organization" have been (temporarily) finished.

How about other information systems (software) or let's say other ways of CMC? "Email" is absolutely a one-way communication, you have no "instant" response until the person you write answers you. With "Instant Messenger (e.g. ICQ/MSN/YAHOO)", you have bidirectional ("some" also multidirectional) instant response, but seldom have common consensus with the counterpart. Similar problems could also be found in other Groupwares, such as "Forum", "News Group", "Message Boards" and so on. People are "quatsching", giving different ideas to the topics (some have even nothing to do with the topic), sometimes also quarrelling.

Only in CMS, communications between the related parties are ongoing with the same goal. According to the CMS workflows, each party knows the "rules" and has his/her own jobs. This makes the whole communication processes to be much more "meaningful", especially when the "thing" they are handling with is "Content".



Why is “Content” so special? According to Oxford Dictionary, in English, the word means:

- (usually in plural) what is contained, esp. in a vessel, book, or house.
- amount (of a constituent) contained (high fat content).
- substance (of a speech etc.) as distinct from form.
- capacity or volume.

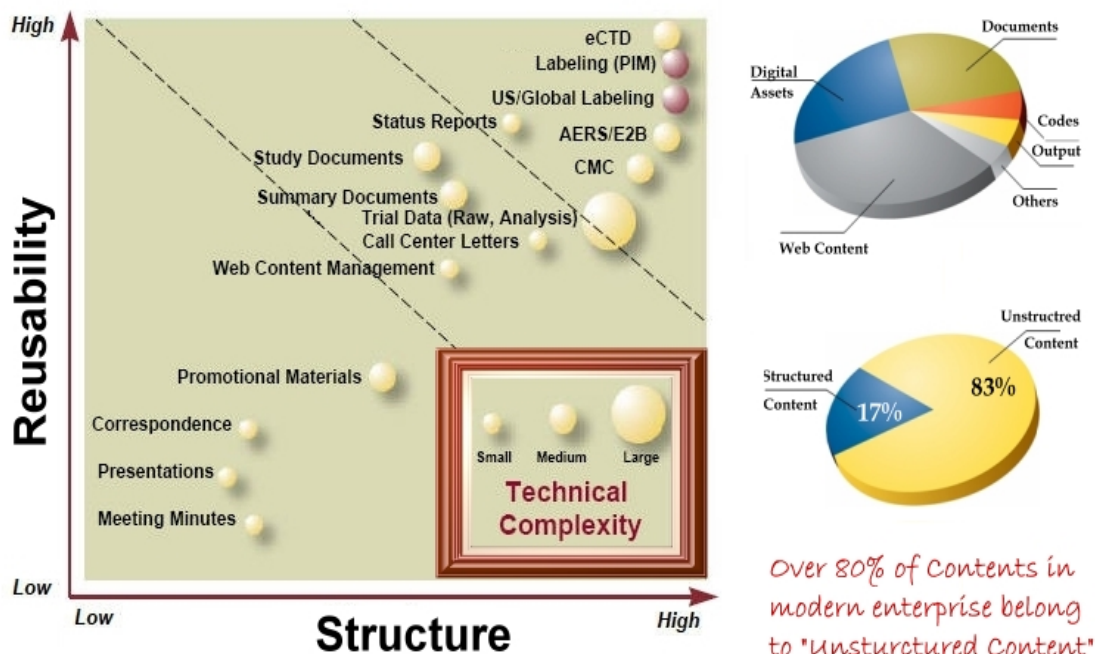
It comes from the Medieval Latin and it is close related to the verb “contain”. Following, the first definition: “what is contained”, “Content” could be defined as “all the information in the electronic information systems of modern enterprise” and could be roughly categorized in two “Types”:

“**Structured Contents**” are data in standardized layout from databank-supported systems, for example, data from ERP systems, statistic reports for managements, etc..

“**Unstructured Contents**” are data in different layouts or content-layout embedded and come mostly from non databank-supported systems, for example, pictures, Videos, management reports, faxes and etc..

Then, here comes the problem: what kind of content do we have in the enterprise practices? A study made by one of the major business player in the CMS field, the Documentum Inc. in U.S. (2004 merged by EMC and now EMC Documentum) offers us a very good reference:

## Types of Content in modern Enterprise - Examples from a company in life science industry



Source: EMC Documentum Whitepaper. <http://www.documentum.com/literature/literature.htm>

(Chart 3.03) Types of Content in Modern Enterprise – Study on a Company in Life Science Industry, EMC Documentum Online Whitepaper databank, <http://www.documentum.com/literature/literature.htm>

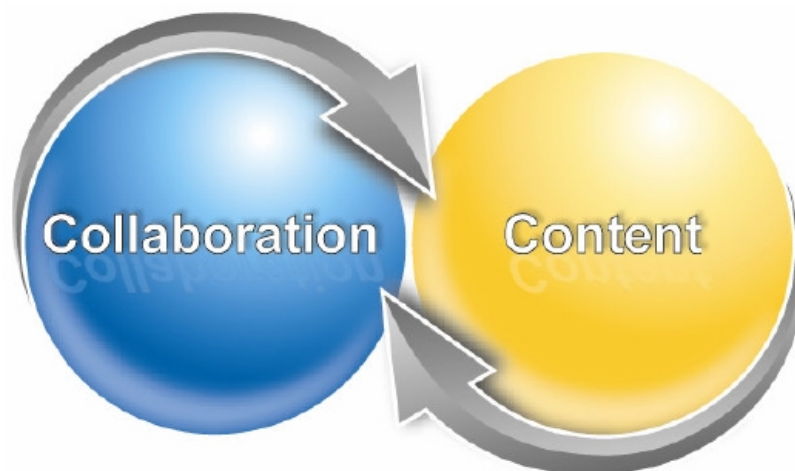


Same as what is shown in the chart above (**CHART 3.03**), the content are categorized from three different perspectives “Structure”, “Reusability” and “Technical Complexity”. We see clearly that, over 80% of contents in our daily enterprise jobs belong to “unstructured content”. They are “promotional materials”, “correspondence”, “(business) presentations”, “meeting minutes” and so on. Most of them are not technical intensive works, yet we spend most time/resources working with them. Besides, the technical complexity of the named types of content is also relatively low in comparison with the “structure content”, such as “analysis data”, “patent management data” and so on.

Think a bit further on the mentioned examples of “Unstructured Content”: “promotional materials”, “correspondence”, “(business) presentations”, “meeting minutes”, we might also find out that there is still some big differences between “structured” and “unstructured” contents. That is, by “unstructured content”, it’s more like “a temporary output of a business process”. The output is temporary, ‘because they all need to be “updated”. Without “Updating Works”, there content are less “valuable” by its business meaning. And the key point is “process”! Most of the “unstructured contents” are rundown results of the process. They are the results of a serious of interactive communication activities, in which people have to “COMMUNICATE” and “COLLABORATE” with each other to create the content, and most important of all, give meanings to the content.

So, this makes a study on CMS from communicative perspectives special and important for communication researchers, because the “object” which we handle in the CMS is the result of series of interactions/communications! And our goal is, definitely, to find out the way, how to make the communications among the related parties in the system to be more efficient (“smooth”) and effective (“productive”)!

By doing this, the CMS is exactly like what we’ve mention above: it’s a “place” (not a “device”) where series of communications and interactions take place. We try to call the ideas here “collaboration”, to indicate that the series of communications and interactions are with “goal”. The goal is “content”, because as a counterpart in the mechanism, which we illustrate below, “collaboration” and “content” are in a circulate situation, just like a loop without ending that we illustrate in the chart below (**CHART 3.04**). Completely different from the “structured” data, the most “unstructured” data must go through these processes to gain its meaning. Otherwise, it’s will be “garbage in” and “garbage out”.



(Chart 3.04) The Conceptualization of the relationship between “content” and ”collaboration”

So, it's obviously to us that it's human intelligence - "collaboration" - that plays the most important role by content management. This is also the reason why the title of this dissertation is named "Content, Management and System", because we frankly believe that these three words are not just ordered by literally orders, but also by conceptually order. Only when we understand that "Content" is in the essence of "the result of the internal/external interaction/communication processes", and only when we understand that "the meanings and roles of the Content in the related Management purposes and processes", can we talk about the designing and planning of such "System". The dissertation is therefore organized following this logic, too. But before we introduce this, let's have some small introductions on the background information of this dissertation first.

### 3.2 The Study: First CMS Knowledge Portal in the Chinese-speaking areas

The author of this dissertation is a Taiwanese Journalist and consultant in the Media and IT industries. At the same time, he is also an active Researcher at Soochow University, Taipei, Taiwan. Since 2003, sponsored by the German Academic Exchange Service (Deutscher Akademischer Austausch Dienst, DAAD<sup>21</sup>) (**APPENDIX C.**) he works in Department of Information Science, Institute for Media Studies and Communication Science, at Free University Berlin, advised by the Dean of the Institute, Univ- Prof. Dr. Gernot Wersig. (For detailed information, please see the attached CV of the author (**APPENDIX H.**))

In this dissertation, we are not trying to pretend Prophet in the CMS field. The judgment criteria and evaluations concerning CMS concepts and products are all based on the literature reviews, market surveys, interviews with IT professionals and the researching conclusions of this dissertation.

However, "Reality is in the eyes of beholders!" Only when one jumps into a real situation, then he/she will have more understandings of the problems domain and find his/her own way to overcome the difficulties!

Therefore, when trying to find out how to design a CMS for the company and, most important of all, how to make it works in the enterprise. We take a very practice oriented approach in this dissertation. That is, we create a REAL CASE to build up a CMS based web-site.

In this REAL CASE, we cooperate with two German CMS developers, INFOPARK AG (<http://www.infopark.de>) and STRUKTUR AG (<http://www.struktur.de>), and a Taiwanese business intelligence service vendor, the Creative Network Solution Co., Ltd. (<http://www.creative-lab.net>)<sup>22</sup>, to make an experiment on CMS with the following three goals:

1. Trying to build the first Knowledge Portal of CMS and the related document related technologies (to some degree, also refers to Enterprise Content Management, ECM) (<http://www.dcms.org.tw>) (<http://www.dcms.org.cn>)
2. Trying to build a CMS based cooperation platform and information exchange system for this trilateral project. And this international cooperation aims to push the CMS knowledge and technology developments in the Chinese speaking areas and, of course, to open the CMS market there.

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<sup>21</sup> The certificate of sponsorship form DAAD could be found in Appendix C of the dissertation.

<sup>22</sup> In Appendix D/E/F of the dissertation, we offer the scanned copies of the business contracts of the above mentioned international cooperation project for CMS in the Chinese speaking areas. For further details and information of the cooperation, please directly contact the author: Mr. Vincent, Chung-Wei Lin at [Vincent@creative-lab.net](mailto:Vincent@creative-lab.net)

3. Obviously, in this three parties' cooperation project, there will be surely many problems which we might be able to resolve by implementing a CMS based cooperation platform and information exchange system.

By starting the international CMS business cooperation and by building up the mentioned CMS Knowledge Portal in the Chinese speaking areas, just like all other companies, we have to consider the whole project from the business value perspectives and facing exactly same technical and organizational challenges by choosing, evaluating, designing and implementing an “appropriate” CMS system.

So, the above mentioned initial of an international cooperation for CMS makes us exactly in the similar and “quasi-enterprise” situations and conditions like all other companies. We start this project since March 2003 and spent more than 2000 man/womanpower/hours to put it into practice. Based on the lessons learned and the experiences gained, mostly from our working diary and developing notes, we try to offer a CMS Implementation Compass to the companies which are interested for such an application. And at the same time, these practices are also good materials for further communication researches in the CMS field.

### **3.3 Structure and Method: the “Collaborative Function Model”**

The title of this dissertation is “*Content, Management, System – The Construction of a CMS Evaluation Prototype from Communicative Perspectives*.” Under this title, we believe that the CMS, which is developed from more-human communication and collaboration perspectives, should be able to avert the technical problems for the users when they work with information systems. And in this way, the internal communication and collaboration mechanisms in modern enterprises will be improved and to be more effective and efficient, which is one of the most important competitive advantages nowadays.

The main title is “Content, Management, System”, we divide them into three separated elements because it's our belief that these three words are not ordered just by literally order, but also by conceptually order. Only when we understand that “Content” is in the essence of “the result of the internal/external interaction/communication processes”, and only when we understand that “the meanings and roles of the Content in the related Management purposes and processes”, can we talk about the designing and planning of such “Systems”. The whole structure of the dissertation is also organized following this logic.

In this dissertation, we try to do the following FIVE things:

- A.) Understand the content management problems and challenges in modern enterprise;**
- B.) Make an review and overview on the CMS related concepts and technologies to define our own ideas of “Content”, “Management” and “System”;**
- C.) Identify the CMS conceptualization in the communication research field and propose a systematic evaluation prototype that could combine “content”, “management” and “communication” perspectives/concerns, both conceptually and technically;**
- D.) Evaluate CMS from business management perspectives/concerns and it's solutions;**
- E.) Record our CMS experiment, both conceptually and technically, to propose a CMS project procedures and system features for future researches**

For the above mentioned targets, in **Chapter I** “Introduction”, we describe the critical challenges and trends that enterprises face today, especially focusing on the problems of Content, Management and (IT) Systems. This chapter describes the development trends and technologies and tries to define the problem factors and challenges of the current software solutions. By reading our introductions, business owners or IT staffs in the company might feel: if there’s a solution that could solve the problems which we’ve mentioned above, that should be definitely a great idea!

Ironically, in fact, there are many solutions (software packages) in the market already! But the problem is: with different start points, emphasis and software development perspectives, entrepreneurs and IT decision makers (mostly CIOs) start to get lost in this “**professional terminology jungle**”, which is created by IT freaks or Vendors who eager to get money from your pocket.

Therefore, in **Chapter II** of this dissertation, we start from a simple discussion on the definitions of Content Management System (CMS) and then, using this definition as a compass, to take an overview on **the Landscape of CMS related concepts and technologies**. These include:

- Enterprise Content Management and CMS
- Imaging
- Document Management (DM)
- Software Configuration Management (SCM)
- Knowledge Management (KM)
- Collaboration
- Digital Asset Management (DAM)
- Records Management (RM)
- Learning Management (LM)
- Product Data Management (PDM)
- Digital Rights Management (DRM)
- Web Content Management (WCMS/CMS)

The above listed terms could go without ending! But it is worth to have some ideas of them, because the concepts and definitions will help you to realize the problems in your company more, to identify your own problems more precisely and to find out the solutions in the right way. We make a short summary in 2.3, in which we organize the developments if technologies in historical order and concept divisions.

In **Chapter III**, we start our discussions from the meanings of a study on CMS from communicative perspectives. Then we define CMS as a “place” but not a “device” of series of communications and interactions. Most important of all, we also define the key word “content”, explain our thoughts to make “content” to be related with “collaboration”, which represents the process of series of communications and interactions.

By literature review, we found Nakano’s theory for designing a collaborative web site to support our ideas<sup>23</sup>. In Nakano’s prototype, he describes two concepts for applying web content management: “Collaboration operations” and “work cycle development”.

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<sup>23</sup> Nakano, R: Web content management: a collaborative approach , ADDISON WESLEY PROFESSIONAL 2002, BOSTON

According to Nakano, “Collaboration operations” include the following five operations:

- (1) **Submit** — when you move web assets from a work area to a staging area;
- (2) **Compare** — identifies whether the assets that were submitted were new, modified or deleted assets to the staging area;
- (3) **Update** — copies new, modified or deleted assets from staging area to the given work area;
- (4) **Merge** — resolves conflicts between the work area and staging area and
- (5) **Publish** — is a snapshot of the staging area.

And “Work cycle development” is important to people who are ready to start a web project. They must follow these basic rules:

- **Update** — get the most recent assets from the staging area;
- **Edit** — make changes to the assets,
- **Test** — make sure that the edits work properly;
- **OK** — if the edits work, then submit to staging area (then goes back again to the beginning of the Collaboration Operations).

Nakano’s prototype is very constructive, theoretically. It provides a fundamental, well-organized, and easy to follow observing and designing perspective for CMS. When working with many web developers, it is very important to follow these two concepts. If they are not followed, the web content can become unusable and starting over may be unavoidable.

However, Nakano’s prototype provides only a linear and process oriented perspective. He mentioned only the five important ideas (**SUBMIT, COMPARE, UPDAE, MERGE, PUBLISH**) for CMS designing and the basic work cycle procedure (**UPDATE, EDIT, TEST, OK**). It’s, in the essence, a simple CMS prototype, and there’s no further ideas and implications from other perspectives. And most important of all, in this prototype, “content” is the “result”/“product” from a linear production line! Hence, by really engaged to design, set up and launch the purposed web site, most important of all, a collaborative platform (web-site) for our international cooperation project we need a more function oriented methodology to help us.

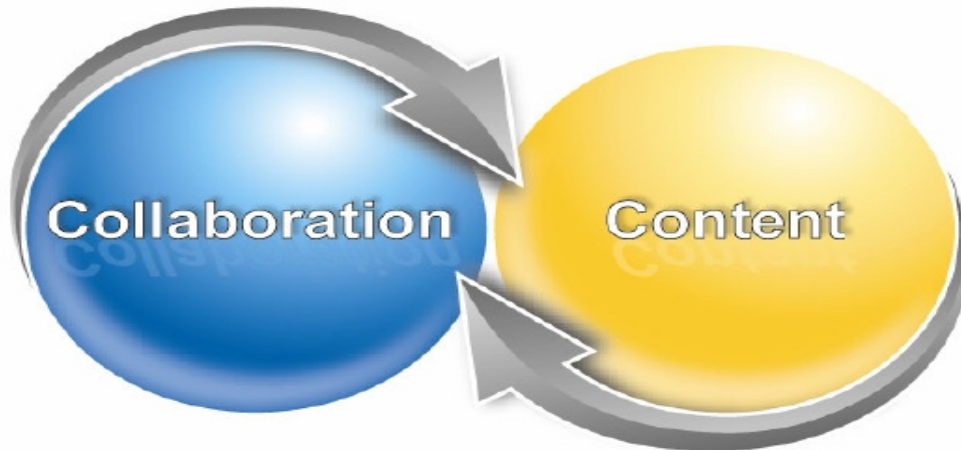
For an international cooperation project like what we are attempt to establish, the CMS, which serves as the collaboration platform, should provides more functional mechanisms to improve the interactions among workers, speaking three different languages and locating themselves in t countries and 5 cities, to be easier and straight forward to create value-full contents together. That is, from a communication perspective, we believe the relationship between “content” and “collaboration” (now, it means the mechanism which helps people to manage content) should be more dynamic and interactive, just like the chart that we illustrate on page 25 (**CHART 3.04**).

Following this concept and based a Nakano theory for designing a collaborative web site, we established a function oriented model on our won as the critical consideration and judgment criteria to design and implement a CMS based web site for our international cooperation web site. We call it “**Collaborative Function Model**” of CMS, ‘cause it stresses the importance of understanding the internal/external communication needs and processes in any CMS Designing Project.

In this model for international business collaboration/ communication, a (perfect) CMS should be firstly divided in two dimensions:

1. DIMENSION I. **Production**, where content goes “from thought to click”.
2. DIMENSION II. **Delivery**, where content actually gets “consumed by end-users”.

Nakano hasn't mentioned the dimension II “Delivery” or he did by take this part simply as “publish”. However, as the boundaries between information and communication, or let's say, among the industries which are illustrated in the two charts in 3.1 (CHART 3.01/3.02), vanish and melt gradually, it is necessary to expand discussions in this dimension. So, we conclude the “Collaborative Function Model” in the following chart below (CHART 3.05). Both “content production” and “content delivery” dimensions contain its specific attributes that must be carefully considered in any CMS projects:



Dimension	Content Production	Content Delivery
<b>ATTRIBUTES</b> The sub-attributes are the function oriented mechanisms that we think most essential for improving the interactive effectiveness and the business value achievements of a CMS platform	Role Management (5.2.01)	Page Generation (5.2.10)
	User Interfaces (5.2.02)	Searching (5.2.11)
	Author System (5.2.03)	Personalizing (5.2.12)
	Integration (5.2.04)	Privileging (5.2.13)
	Metadata (5.2.05)	Caching (5.2.14)
	Workflow (5.2.06)	Syndication (5.2.15)
	Templating (5.2.07)	Cross Media Publishing (5.2.16)
	Versioning (5.2.08)	
	Globalizing (5.2.09)	

(Chart 3.05) The Structure and Attributes of the “Collaborative Function Model”

In this “Collaborative Function Model”, the interactive and dynamic relationships between “content” and “collaboration” is on the bottom of the prototype to remind all the designers the symbiosis of these two elements. That is, CMS serves a “place” of series of communications and interactions.

The in table listed 9 attributes in the dimension of “content production” and 7 in the dimension of “content delivery” could be regarded as the expansion of Nakano’s simple CMS prototype. Based on our lessons learned and the experiences by designing and implementing the CMS

Knowledge Portal in the Chinese-speaking areas, we found the attributes, mostly the function-oriented mechanisms, essential for improving the interactive effectiveness and the business value achievements of a CMS platform. That is also the reason why we name our prototype the “Collaborative Function Model”, because the attributes are functions needed to enhance the “collaboration”, in other words, to improve the communications in CMS.

Each of the attributes mentioned will be discussed in details, both technically and practically in chapter V. These discussions will help us to get clear on the latest technological developments and the factors that we must think about if your web site has the needs in the attribute related criterion. And, therefore, the **“Collaborative Function Model”, which is both IT-and communication- oriented (“Function” and “Collaboration”), is especially useful for the CMS project managers and IT related staffs to evaluate and to design their own CMS based web site and project.**

In **Chapter IV**, we use the “functional” and “business value” perspectives to make utility analysis on CMS. The former approach **“functional perspective”** is for IT decision makers to understand the advantages by implementing CMS in their information structures. That is, ***how can CMS help you solve your current troubles or how can it release you from the annoying burdens.*** These include six main concerns:

- Enable Faster, Less Expensive Content Updates
- Increase Content Accuracy, Quality, and Value
- Decrease Information Retrieval Time
- Centrally Manage Site Usability and Branding
- Centrally Manage Site Development and Deployment
- Facilitate New Opportunities for Innovation

On the other hand, the latter approach **“business value perspective”** is for entrepreneurs or all the NON-IT guys to understand the benefits of CMS. The discussions here are further divided in two viewpoints: “Quantitative” and “Qualitative”

By **“Quantitative”**, we focus on the “short/mid- term” Cost & Revenue analysis. This is, of course, the central concerns of all the CFOs (Chief Financial Officers) and business owners. We introduce the possibilities to cut down the costs by implementing CMS and, of course, the potential increase of sale by applying CMS for marketing activities.

By **“Qualitative”**, the emphasis falls on the “mid/long- term” benefits of implementing CMS in your company. This viewpoint could help CEOs (Chief Executive Officer), CSOs (Chief Strategic Officer) or CIOs to consider CMS as a tool to enhance the competitive advantages of their companies, such as to strengthen customer relationship management, to improve internal communication mechanism and collaboration with business partner, etc..

If your company is considering or decides to deploy a CMS, then **Chapter V** will be a must-read for you. As a matter of fact, this chapter is proposed based on ***our REAL experiences by implementing a CMS based web site for international business collaboration and the design and launch of the first CMS Knowledge Portal in the Chinese speaking areas.*** The whole Chapter is designed for the purpose to discuss two BIG questions:

1. **How should I implement a CMS in my company?**
2. **How should I design a CMS in my company?**

Based on the lessons learned and the experiences that we had by realizing our business cooperation, in the second section of chapter IV (5.1), we list **13 steps that you should follow by initializing or running a CMS Business Project** in your company. They are:

- **Identify Stakeholders**
- **Build and Prioritize Your Initial Requirements**
- **Develop Use Cases or Scenarios**
- **Solidify Your Business Case**
- **Design the Outlines of the System**
- **Review Technology Alternatives**
- **Perform Due Diligence**
- **Download Trial Packages When Possible**
- **Evaluate Security Implications**
- **Consider Requiring a Proof-of-Concept**
- **Choose a Platform**
- **Prototype as Early as Possible**
- **Recognize When you Need Help and Seek Outside Assistance**

Then, for the people who already decided for a CMS deployment and are about to evaluate their requirements, to select proper (or the most suitable) CMS packages and vendors, to design the CMS in accordance to enterprise's strategic objectives, the second section of chapter V (5.3) will definitely enlighten your minds.

The business project perspectives provide useful criteria to evaluate your CMS projects and create the possibilities to the “use and gratification” linkage to your enterprises business goals and strategies. By our international cooperation project for building up the first CMS Knowledge Portal in the Chinese speaking areas, this methodology has been proved very effective and efficient in the whole project running processes.

Besides, we also make an “**Author's Checklist**” at the end of each attribute discussion. This “Author's Checklist” is both a review to the discussion and the additional remarks to the related discussion. ***It is a questionnaire that aimed to help you focus on your own analysis for planning the appropriate CMS platform for your unique needs.***

The following is the list of our discussion topics:

- **Role Management: The Groundwork of Your CMS**
- **User Interfaces: The Usability of Your CMS**
- **Author System: The Core Function of Your CMS**
- **Content Integration: The Puzzling Game of Your CMS**
- **Metadata: The Value-Adds of Your CMS**
- **Workflow: The Gate-Setting of Your CMS**
- **Templating: The Cinderella's Dresses of Your CMS**



- **Versioning: The Reliability of Your CMS**
- **Globalizing: The Multi-nationality of Your CMS**
- **Page Generation: The Dynamics of Your CMS**
- **Searching: The Readability of Your CMS**
- **Personalizing: The Uniqueness of Your CMS**
- **Privileging: The Access of Your CMS**
- **Caching: The Speed of Your CMS**
- **Syndication: The Sharing of Your CMS**
- **Cross Media Publishing: The Variety-Show of Your CMS**

This dissertation should be a very good compass for people who are interested in CMS, especially for enterprises who attempt to deploy a CMS in their own companies. However, just like the old saying goes: “There is no royal way to success!” CMS is not an all-can solution! In the last “Conclusion”, we pointed out “WHAT CMS WON’T DO?!” to eradicate the over-exaggerations of CMS vendors and the myths that enterprise tend to have for CMS.

Instead of the above mentioned parts, we have some more distinguished achievements:

#### **In Appendix A**

It is a **“HAND-MADE” Glossary for Content Management Related Terms and Definitions**, based on the researching notes and writing digests of us. The selection of the Terms and followed Definitions are from the author’s perspective and, most important of all, from the perspectives of CMS to its relevant technologies. Unlike other “COPY” glossary, it will help you the most.

#### **In Appendix B**

In this appendix B, we make a **detailed list of the more than 250 online literatures** which we’ve collected through the whole researching processes. For the convenience of people who are really interested in CMS and its related technology developments, we even categorize these online resources in four main sectors:

- a.) **CMS Market Analysis and Technology Developments**
- b.) **CMS Concept Definitions and System Analysis**
- c.) **CMS Applied Uses and Developments**
- d.) **CMS Project Planning and Case Studies**

Besides, each reference has a tag (Metadata!) at the beginning, which is arranged as the following format:

**Title of the literature**

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**Source**

**Author**

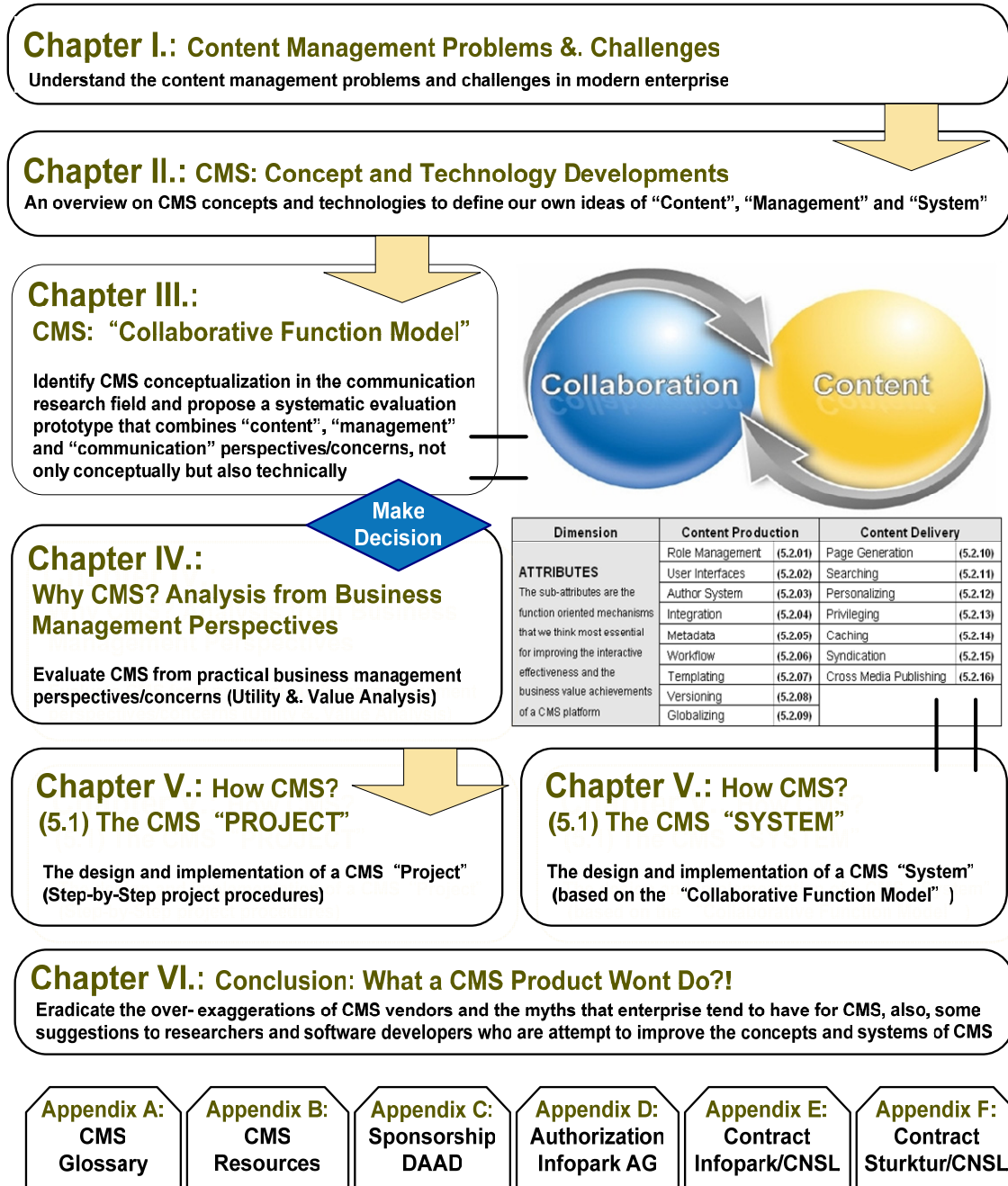
**Short Introduction to the Author’s Professional Backgrounds**

**WWW Link to the literature**

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The literature itself can help you to understand the topic that you are interested more. And the reason why we also list the author and his/her professional backgrounds information is that we think this might be good hints for further researches. Or, at least, you know who you should contact, if you have further questions on the literature or its related topics.

As summary of this chapter, here is a concept structure chart of this dissertation, which offers you an overview on our works.



(Chart 3.06) The Concept Structure of the Dissertation and the “Collaborative Function Model”

## IV. Why CMS? Utility Analysis on CMS from Functional and Business Value Perspectives

Before we continue our discussions, let's go back to the previous industry mapping chart of AIIIM on page 10 (**CHART 2.01**) to have a review on the CMS concepts and technologies. Then, let's use the ranking list of content management problems in Top500 U.S. in the survey of Forrester Research 2002 as a checklist of our won and ask ourselves: Do we have similar problems?

<b>Checklist for the Content Management Health of Your Company</b>	
✓	Content bottlenecks with a webmaster, IT department, or some other related gatekeepers in company.
✓	Site visitors have difficulty finding what they need.
✓	Content contributors have difficulty finding what they need.
✓	Some content is inaccurate / outdated / redundant / unauthorized.
✓	The home page does not provide a full, up-to-date portal information into the rest of the company internal/external web site.
✓	The web-site exhibits inconsistent design and navigation schemes.
✓	Contributors occasionally overwrite content / files accidentally.
✓	Web managers need to “roll back” the site to a previous version – perhaps for legal or regulatory reasons – but cannot.
✓	Content contributors are unable to pre-publish content to appear at a specified later date or time.
✓	Web-site managers cannot associate the company's products and services to articles or news on the site (or vice-versa).
✓	Content has feet of clay: web managers cannot easily reuse / share / distribute / import it.
✓	An inability to protect or control access to content keeps good material offline.
✓	Marketing and product managers cannot customize content for customers, partners, and other important visitors.
✓	Internal company staff is not invested in web communications.
✓	Company staff lament, “Our web-site is not as good as we are.”

**(Chart 4.01)** “Check List for the Content Management Health of Your Company” from “Ranking List of Content Management Problems in TOP500 U.S. 2002”. CMS Market Analysis, Forrester Research and Infopark AG, Berlin, 2002. This research results are “exclusive authorized” by the Infopark AG to privileged academic uses. Please see the APPENDIX C for more Information.

Clearly, the lines between the related concept and product segments have become blurry, but CMS – however and whatever you define it – can still be seen as distinct problem domains in the modern enterprises, and perhaps more importantly, most enterprises approach them rather differently. After thinking of the questions in the checklist above (**CHART 4.01**), now, you are ready for this chapter: Why is CMS a buzz word in the Information System now? And what are the business values for implementing a CMS in your enterprise.

## 4.1 Utility Analysis on CMS – Functional Perspective

Obviously, the overwhelming complexity of Web sites makes effective Web communication extremely expensive to achieve using manual processes, which you might have found through checking the above problem list. To realize the benefits of Web communication, your company needs tools that increase the manageability of and reduce the cost of publishing content. And content management systems accomplish this by providing tools that automate the publishing process and providing business users with the ability to create content when they recognize a customer need for information.

In our research processes, we found out that most business cases for a content management solution starts with the cost savings generated by improved Web development and publishing processes. Most IT decision makers told us their goals by implementing the CMS are:

- **Reduce content update costs and improve frequency of information publication.**
- **Increase Web content value with workflow and approval processes.**
- **Standardize content structures, and maintain design control and branding across an organization.**
- **Maximize effectiveness of team skills by enabling business users to publish their own content and technical staff to work on site infrastructure.**
- **Leverage existing enterprise technologies and skills to deploy Web applications.**
- **Reduce site creation, maintenance, and enterprise rollout costs by creating automated processes.**

The above target settings of enterprise CIOs reflect the fact that: Many costs are involved in building and maintaining a Web site, and these costs can increase exponentially as the size and complexity of a Web site and its audience grows. By implementing a CMS, the system automates many standard content and design management tasks, and can reduce costs. Summarizing the researching materials and the interviews with IT Managers, we conclude the following six major utility benefits to implement CMS in your enterprise:

### 4.1.01 Enable Faster, Less Expensive Content Updates

CMS enables non-technical business users to publish their own content. Traditionally, content is published by a Webmaster whose main responsibility is the technology, not the content of the site. Web content management systems remove this middle step by putting content publishing in the hands of the content experts.

Companies have discovered that by implementing a content management system, they can scale their technical team without adding new resources. This is accomplished by reallocation of publishing tasks to the content experts, which frees technical staff to build new applications. After implementing a content management system, Institutional Investor Magazine realized

immediate savings of \$60,000 per year, the amount it had previously allocated for external technical resources to complete content updates and maintenance.<sup>24</sup> Content updated can now be done by their internal writers.

Cost	Description of Cost	Benefit of Content Management System
<b>Content Contribution</b>	Cost to create original content and convert existing content for Web publication.	Eliminates conversion steps by placing the responsibility for content creation in the hands of the business user.
<b>Workflow and Approval</b>	Cost to find and review content prior to publication.	Speeds the approval process by helping business users find and track changes.
<b>Content Updates</b>	Cost to update content, metadata, and links to other content as required.	Enables business users to quickly make changes, determine the impact of changes, and ensure links are not broken.

(Chart 4.02) Utility Analysis on CMS – Functional Perspectives (1) (Our Analysis)

#### 4.1.02 Increase Content Accuracy, Quality, and Value

Content management systems that put business users in control of content creation, contribution, and updates can increase the value of the actual content on the site. Business users, who are content experts, are more likely to understand the value of accurate, relevant content than technical staff or other non-business users.

Companies without content management systems might face delays in publishing new content or in correcting errors — delays that can result in lost customers or revenue.

According to Information Week Online:

*Visitors tend to lose patience quickly with a poorly performing Web site, and especially with out-of-date content. Content-management systems offer companies an easy way to make their sites more relevant, keep content up to date and accurate, and reduce the time required to get important content published.*<sup>25</sup>

Cost	Description of Cost	Benefit of Content Management System
<b>Inaccurate Content</b>	Cost of publishing incorrect information, such as a wrong price, poor support information, or poor guidance.	Content approval process helps ensure published content is accurate and appropriate by putting content tools and control in the hands of business users who understand the needs of the business and its customers.
<b>Untimely Content</b>	Customers require timely content to make decisions. Out-of-date content hinders them from making accurate business decisions.	Placing responsibility for content in the hands of the business user and providing appropriate tools ensure content is up-to-date and responsive to current customer needs.
<b>Irrelevant Content</b>	Customers must work to filter irrelevant material. If this task is too difficult, customers will abandon the site, having found no relevant content.	Capturing metadata in the content authoring process lets the system target content to customer content needs.

(Chart 4.03) Utility Analysis on CMS – Functional Perspectives (2) (Our Analysis)

<sup>24</sup> Landers, G: A case study in content management, INSTITUTIONAL INVESTOR MAGAZINE V.365 2001, GARTNER GROUP ADVISORY SERVICES

<sup>25</sup> Trepper, C: Content currency is key to a successful web site, INFORMATION WEEK ONLINE 06.2000, INFORMATION WEEK Inc. <http://www.informationweek.com>

#### 4.1.03 Decrease Information Retrieval Time

Web sites provide faster access to information than print or other traditional communication tools, resulting in significant cost savings. CMS improves the information retrieval benefits of a Web site by providing a standard navigation structure and content templates. This consistency results in increased site usability and faster information retrieval times.

According to the Meta Group:

*Organizations that can provide infrastructure for employees, partners, and clients to find the concise relevant information they require to make decisions will have a significant competitive advantage in terms of efficiencies, service, and satisfaction.*<sup>26</sup>

Cost	Description of Cost	Benefit of Content Management System
<b>Information Retrieval</b>	Cost in time to find and retrieve information, and find relevant content in information.	Infrastructure for navigation, content presentation, and metadata simplifies and speeds information retrieval.

(Chart 4.04) Utility Analysis on CMS – Functional Perspectives (3) (Our Analysis)

#### 4.1.04 Centrally Manage Site Usability and Branding

CMS provides templates and site structure tools that help enforce centralized control over site and corporate branding. Dynamic link management reduces the costs of manual link-checking and correction while improving site usability through consistency.

The traditional Web site model requires significant costs to maintain the structure and consistency of design or branding. Organizations must impose and police strict rules to ensure the integrity of the structure, or tolerate inconsistent site navigation and broken links. The result is either higher costs for technical staff or reduced effectiveness.

Cost	Description of Cost	Benefit of Content Management System
<b>Structure and Link Management</b>	Cost to create, maintain, and enforce a standard content structure and navigation structure, and link validity.	Enables site architecture experts to create and enforce a consistent and usable site structure.
<b>Brand Reinforcement</b>	Web sites are often the only contact customers have with an organization. Weak or inconsistent site branding creates a poor impression of a company.	Centralized control of design and branding ensures the message and site design are consistent with a company's brand and values, and a professional face is displayed to the world.

(Chart 4.05) Utility Analysis on CMS – Functional Perspectives (4) (Our Analysis)

#### 4.1.05 Centrally Manage Site Development and Deployment

CMS that combines a dynamic content repository and template-based publishing enables an organization's Web developers and designers to maintain control over the Web site's look and feel, layout, and navigation logic. Developers are able to update sites rapidly by changing a

<sup>26</sup> Warzecha, A: Differentiating content management, document management, and portals, ELECTRONIC BUSINESS STRATEGIES Nov.2003, META GROUP Inc.

few templates as opposed to updating each page manually. Once approved, template and content changes can easily be distributed to other sites. An organization can centralize its IT staff and reduce Web development costs across the organization.

Alternatively, it is very costly to update the design and logic of typical, static, file-based Web sites. Each page related to that logic must be updated to reflect changes, and the Web site content cannot be updated while the logic changes are being made resulting in lost time and cumbersome revisions.

Cost	Description of Cost	Benefit of Content Management System
<b>Administration</b>	Costs to maintain the system, set up security, manage scalability, and manage user rights and roles.	A comprehensive set of administration tools reduces the cost of administering multiple separate servers and Web sites. Costs are leveraged across several Web deployments.
<b>Application Change</b>	Cost to update existing Web applications and deploy new ones either to replace or update existing applications or to deploy Web applications in new parts of the organization.	Dynamic, template-based Web applications separate the content from the application so applications can be updated and distributed to new users without affecting the underlying content.
<b>Deployment</b>	Cost to deploy content and Web applications created in one part of the organization to other internal and external parts of the organization.	Content management systems provide a simple mechanism for packaging Web sites and all interdependent templates, resources, and pages, making it easier to distribute sections of a Web site developed in one location to other sites.

(Chart 4.06) Utility Analysis on CMS – Functional Perspectives (5) (Our Analysis)

#### 4.1.06 Facilitate New Opportunities for Innovation

A dynamic CMS enables businesses to innovate on knowledge traditionally locked in static Web pages and other documents throughout the organization. By providing a standard content platform on which the organization can build automated business applications and by enabling business users to take a direct role in the Web site, a content management system opens the lines of communication between a company’s business users and customers to deliver real competitive advantage.

Organizations adopting content management systems can build Web sites throughout their enterprises using a standard content architecture and dynamic Web content infrastructure. Organizations can then create new Web applications that take advantage of the incredible richness of Web content and, by doing so, adopt innovative communication tools such as internationalization, customer relationship management, personalization, syndication, application integration, and enterprise portals.

### 4.2 Analysis on CMS – Business Value Perspective

Functional Analysis above could really answer most CIOs and IT staffs’ questions for the initial and deployment of a CMS. However, what’s more important to the enterprise IT decision makers are the business values of implementing CMS, especially if the CFOs have to write big checks to a software vendor and possibly an integrator as well. Though it might be painful to the most IT freaks, yet, it’s still one of the biggest concern of the enterprise by facing a CMS deployment decision.

In all likelihood tough decisions will have to be made, and it is best to have a business plan in place as a touchstone to keep the team focused. Like any investment, a CMS project should also been justified in terms of “QUANTITATIVE” and “QUALITATIVE” business values, that is, from the business value perspective: first, cost and revenue, then effectiveness and future. Based on the interviews with entrepreneurs, here we try to conclude the “niches” of implementing CMS in business logic.

#### 4.2.01 “Quantitative” Business Values of Implementing CMS

Let’s address the revenue side of the equation first. A CMS could enable your enterprise to:

- **Increase sales.**

Better context around products and services can provide a more differentiated, solutions-oriented proposition. By providing richer, more accurate, and higher-quality information online – both pre- and post sales – you may be able to increase revenues from new and existing clients alike. According to the Gartner Group<sup>27</sup>, 50% of web sales are lost because customers can’t find the right content fast enough – and go elsewhere, or use a different channel. Of course, as with all e-commerce, the marginal added sales might partly cannibalize other channels. You’ll need to decide if this is truly a bad thing. But at the end of the day, if better content management can elevate your overall gross intake, then without it, aren’t you leaving money on the table?

Some people may need to take a more liberal definition of “sales” here. For a university, it may entail fostering a greater propensity towards spontaneous transactions, such as downloading an admissions application or making a donation to an alumni fund. For a local government agency, better, more contextual content may lead to greater online transactions, saving on expensive labor and printing costs.

- **Expand the deployment of products or services, and variations of them.**

The ability to mix and match digital assets enables you to present yourself and your content in new and innovative ways at potentially very low marginal cost. This is particularly the case in content-heavy sectors such as professional services or publishing. But consider the manufacturing company that provides aftermarket product support via the Internet; if it can segment its documentation repository in new ways, it can develop novel service offerings at different price-points.

- **Obtain a greater return from your other corporate IT investments.**

Your firm may have content locked in knowledge management (KM), document management (DM), or enterprise resource planning (ERP) systems and other corporate repositories. By providing an access and management layer on top of that information, you can liberate the value of the underlying content. With a system in place allowing you to confidently manage and publish it over the Internet, you can make greater use of your content on behalf of your staff and customers. Note, however, that many other information systems – notably Portals and Search Engines – make this same case.

- **Accelerate your time to market.**

Printing and distributing marketing collateral, sales catalogs, and customer support

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<sup>27</sup> Landers, G: A case study in content management, INSTITUTIONAL INVESTOR MAGAZINE V.365 2001, GARTNER



documentation takes time. Effective content management coupled with Internet delivery should enable you to reduce dramatically the time it takes for these materials to travel from your content owners to the content consumers among your prospects and customers. This speeds the return on your development investment and improves cash flow – music to any CFO’s ears!

Also, a CMS could also reduce enterprise’s costs. Since these benefits tend to be more immediate and quantifiable, they are particularly attractive in tight economic times. A CMS could enable you to:

- **Achieve process efficiencies.**

According to the Working Council for CIOs<sup>28</sup>, knowledge workers spend 50% of their time looking for information and the other 50% actually working on that content. Good content management can substantially reduce the time spent finding and verifying information. If your own staff cannot efficiently retrieve web content, they will be more likely to try to recreate it, which is wasteful – and potentially damaging if it spawns non-authoritative versions of the same content. Now think about the same problem from your customers’ viewpoint: what if you could reduce the time *they* spend finding the right content on your web-site?

- **Reduce time.**

An effective content management system should enable you to spend less time on web production and updates. You will spend less effort propagating changes throughout multiple versions of the same content, and for that matter, run fewer cycles editing different iterations of the same content. CMS vendor Documentum argues that a single manager in a typical corporation typically manages less than 1,000 webpages in a manual system, but that this number can be expanded 10-fold with a good content management system<sup>29</sup>.

- **Reduce paper.**

The “paperless office” may still lie far off in the future, but a good CMS can reduce the internal flow of paper. It will also lower the costs of generating print materials for external audiences, including production, inventory, and shipping.

- **Reduce human errors.**

Inaccurate web content can almost always be traced back to haphazard publishing processes. A CMS that enables site owners to “roll back” content to a particular date and time also reduces potential costs and risks associated with recreating an older version of the site for regulatory or legal reasons.

- **Improve record-keeping.**

In an era of heightened awareness and new regulations concerning the maintenance of good electronic records, a content management system can provide an essential audit trail of what was published when, where, by whom, and on what authority. Of course, this means you need to make sure your CMS is actually auditing all this activity and that you are saving the logs for a suitable period of time.

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<sup>28</sup> Hudak-David G: Content management for dynamic Web delivery, TECHNICAL COMMUNICATION 2003, Vol 50, Iss 1, pp 96-97, SOC TECHNICAL COMMUNICATION

<sup>29</sup> Roth MA; Wolfson DC; Kleewein JC; Nelin CJ: Information integration: A new generation of information technology, IBM SYSTEMS JOURNAL 2002, Vol 41, Iss 4, pp 563-577, IBM CORP

“QUANTITATIVE” business value figures on costs savings are difficult to come by, and your results will vary. Some recent analysis suggested that typical web-site maintenance costs could be reduced by one-third, labor costs for content authoring and design by one-half, and Web publishing-based IT operations costs by one-third<sup>30</sup>.

Also, these figures will mesh with the specific enterprise’s own experiences on successful implementations, but they must be tempered by the potential for cost overruns in mismatched CMS systems and the need to expend resources on maintaining and improving the CMS itself.

#### 4.2.02 “Qualitative” Business Values of Implementing CMS

Some of the intangible benefits to implementing a new CMS also count among the more powerful rationales for making the investment. A CMS could enable you to:

- **Put business people in control of your online communications.**

Web publishing efforts are too often marginalized to distinct IT, Marketing, or New Media cubbyholes within companies. Greater automation and non-technical interfaces put line businesspeople in control of what gets published, when, and how. This invests them more in your company’s online success, and helps guarantee that your site “is as good as you are.”<sup>31</sup>

- **Maintain brand consistency.**

Experienced marketers know that it takes real work to maintain the clarity and consistency of a company’s identity, messaging, and ultimately, its brand itself. By separating content from presentation, an automated CMS can enforce that consistency. It will also increase the return on your investments in design, usability, and user-experience enhancements, by propagating your web-site’s user interfaces via a series of controlled templates.

- **Enhance customer satisfaction and loyalty.**

Perhaps the most important goal of content management is to provide more value to your customers, by offering them a faster, more relevant and timely, and deeper online experience. Sometimes this can be quantified through higher retention rates. You may well see greater page-views and longer user sessions, which gives you more time to put promotions in front of your customers<sup>32</sup>. And finally, a better managed web-site also fosters a stronger image among prospects.

- **Improve your agility.**

Time-to-Market metrics and First-Mover advantages may still be important, but even more critical in today’s economy is having systems that can evolve quickly over the next year. As markets change and customer bases shift, your web-site efforts need to respond in kind. In short, consider Time-to-Adapt metrics and Fast-Mover advantages. If your CMS places structured content in an XML repository or database, for example, you will better position your company to participate in various marketplaces, future syndication projects, and other collaborative ventures.

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<sup>30</sup> Pack T: Know your customer - InStranet offers innovations in enterprise-wide content management, ECONTENT 2001, Vol 24, Iss 9, pp 56-57, ONLINE INC

<sup>31</sup> Stear EB: The content management strategy: Don't go to work without it, ONLINE 1998, Vol 22, Iss 3, pp 87, ONLINE INC

<sup>32</sup> Stein T: Intranet organization - how to get benefits from connected enterprise networks by content management (vol 42, pg 310, 2000), WIRTSCHAFTSINFORMATIK 2000, Vol 42, Iss 5, pp 476-476, VIEWEG

- **Improve security.**

Implemented properly, tighter control of your web publishing efforts can improve the security of both your systems and your content. Consider content management in part an insurance expense.

- **Maximize skills and talents through specialization.**

A good CMS enables specialization: the concept wherein designers concentrate on creativity and user experience, engineers zero in on the inner-workings of your business logic and publishing system, and content owners focus on the quality and relevance of the information they develop and edit. Specialists are able to concentrate solely on their areas of expertise. Along the way, the company obtains improved accountability – which can lead to hard savings, depending on what you do about it.

Clearly, what we’ve pointed above, whether “quantitative” or “qualitative” business values are all positive gains by implementing a CMS in your enterprise! However, there is also a negative flipside to each of these if you don’t move forward.

By adopting bad-designed content management system or designing and then implementing your CMS project in a wrong way, you risk reduced security, an unfocused staff, frustrated customers, and the potential for public embarrassment.

Therefore, it is worth discussing, how to make the CMS specifically fit the unique needs of your company? Converting these pros and cons into a winning business case is just the subject of our next chapter.

## V. How CMS? Design Your Content Management System

The author of this dissertation is a Taiwanese Journalist and consultant in the Media and IT industries. At the same time, he is also an active Researcher at Soochow University, Taipei, Taiwan. Since 2003, sponsored by the German Academic Exchange Service (Deutscher Akademischer Austausch Dienst, DAAD<sup>33</sup>) (**APPENDIX C.**) he works in Department of Information Science, Institute for Media Studies and Communication Science, at Free University Berlin, advised by the Dean of the Institute, Univ- Prof. Dr. Gernot Wersig. (For detailed information, please see the attached CV of the author (**APPENDIX H.**))

In this dissertation, we are not trying to pretend Prophet in the CMS field. The judgment criteria and evaluations concerning CMS concepts and products are all based on the literature reviews, market surveys, interviews with IT professionals and the researching conclusions of this dissertation.

However, “Reality is in the eyes of beholders!” Only when one jumps into a real situation, then he/she will have more understandings of the problems domain and find his/her own way to overcome the difficulties!

Therefore, when trying to find out how to design a CMS for the company and, most important of all, how to make it works in the enterprise. We take a very practice oriented approach in this dissertation. That is, we create a REAL CASE to build up a CMS based web-site.

In this REAL CASE, we cooperate with two German CMS developers, INFOPARK AG (<http://www.infopark.de>) and STRUKTUR AG (<http://www.struktur.de>), and a Taiwanese business intelligence service vendor, the Creative Network Solution Co., Ltd. (<http://www.creative-lab.net>)<sup>34</sup> (for details of the trilateral cooperation, please see the attached photocopies of the contracts in **APPENDIX D/E/F.**), to make an experiment on CMS with the following three goals:

1. Trying to build the first Knowledge Portal of CMS and the related document related technologies (to some degree, also refers to Enterprise Content Management, ECM) (<http://www.dcms.org.tw>) (<http://www.dcms.org.cn>)
2. Trying to build a CMS based cooperation platform and information exchange system for this trilateral project. And this international cooperation aims to push the CMS knowledge and technology developments in the Chinese speaking areas and, of course, to open the CMS market there.
3. Obviously, in this three parties' cooperation project, there will be surely many problems which we might be able to resolve by implementing a CMS based cooperation platform and information exchange system.

By starting the international CMS business cooperation and by building up the mentioned CMS Knowledge Portal in the Chinese speaking areas, just like all other companies, we have to consider the whole project from the business value perspectives and facing exactly same technical and organizational challenges by choosing, evaluating, designing and implementing an “appropriate” CMS system.

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<sup>33</sup>The certificate of sponsorship form DAAD could be found in Appendix C of the dissertation.

<sup>34</sup> In Appendix D/E/F of the dissertation, we offer the scanned copies of the business contracts of the above mentioned international cooperation project for CMS in the Chinese speaking areas. For further details and information of the cooperation, please directly contact the author: Mr. Vincent, Chung-Wei Lin at [Vincent@creative-lab.net](mailto:Vincent@creative-lab.net)

So, the above mentioned initial of an international cooperation for CMS makes us exactly in the similar and “quasi-enterprise” situations and conditions like all other companies. We start this project since March 2003 and spent more than 2000 man/womanpower/hours to put it into practice. Based on the lessons learned and the experiences gained, mostly from our working diary and developing notes, we try to offer a CMS Implementation Compass to the companies which are interested for such an application. And at the same time, these practices are also good materials for further communication researches in the CMS field.

## **5.1 Design and Implementing CMS – Business Project perspectives**

There is no “King’s Way” to select the right CMS package or to organize the whole project well! You should take the same approach as you would in selecting any major server software. One difference, though, may be the breadth of internal users and external visitors who will interact with your CMS. The more you can efficiently involve those disparate players, the greater your chances of success.

In fact, the steps below essentially outline how to implement your entire CMS project. New and packages CMS tools, products and solutions can play an important role in your efforts, but in order to succeed, technology must serve the business master.

### **5.1.01 Identify Stakeholders**

Inventory the range of stakeholders for your CMS project. Then identify “internal champions”, people with line responsibilities who can advocate for building your CMS. Internal champions should not necessarily be the most technical representatives, just the most in pain under the present system or the most to gain from the new one. Typically, those users with the most at stake are editors, authors, product/service managers, and other communicators.

But don’t forget about your IT group. In our CMS experiment, we found out that the selection teams trying to work around their internal systems resources because they don’t like the direction the latter is heading. Hence, circumventing your IT group is a grave mistake. They are going to have to support and enhance whichever package you chose, and none of these products are completely “out-of-the box”.

In any enterprise software selection process, if your Marketing, IT, and other teams have strong disagreements, it’s always best to surface and address the conflicts as early as possible.

Note also that you may need to involve different IT groups, if you company splits responsibility for application development, network and server administration, and security. They are all important to a content management project.

Likewise, CMS technology choices and system design should never be left solely to technical stakeholders.

One of the other key players is your Chief Financial Officer (CFO) – or at least their stand-in. You must try to involve him or her early and often, and make sure someone from your Finance group remains on the team for the duration. Among other benefits, they can help you build a business case and advocate for a reasonable budget.

### 5.1.02 Build and Prioritize your Initial Requirements

First of all, use the check list for the content management problem health in your enterprise in Chapter IV (4.1). Take a thorough inventory of content areas and owners (you’ll need to do this sooner or later), and base-level corporate infrastructure (human, knowledge, physical) for the project. A complete enterprise content audit may be overkill – focus instead on the major content components going to your key web properties. But look deeply at those components, because what you find may surprise you.

The natural inclination is to develop expansive requirements. This is OK as a starting point. But at each step in the process, you’ll want to ask your team, “How important is it really that this aspect be automated?” Remember you are not building the perfect system, just a great one. No single platform presently on the market can solve the entire web content management problems seamlessly. Remember that complete requirements are nice, but prioritized requirements are gold. Knowing which features or attributes are more important than others will make it easier to contrast the vendors, and will also help you keep costs in budgets.

At this point, you may wish sound out either your favored integrator or a handful of vendors who would appear to be a suitable match, especially on broad-brush cost estimates, to help inform the next step. This can be done by issuing a “Request for Information” (RFI). Nonetheless, avoid a vendor dog-and-pony show at this point. It is premature and can waste your time (and theirs).

### 5.1.03 Develop User Cases or Scenarios

Sometimes called “scenarios,” use cases can provide a much richer way of describing your needs and connecting them to business benefits. Use cases can also vastly simplify and speed up the vendor selection process, by giving everyone a target to shoot for. Finally, selection team members can understand vendor offerings much better if they discussed and demonstrated using scenarios that team members face every day.

We suggest you to develop use cases that start with an “as-is” and then describe an ideal “to be.” That gives vendors. The more detailed your use cases are, the more you will be able to differentiate solutions. But if time is short, even simple use cases may suffice. Consider this:

#### **AS-IS**

Jenkel Marketing e-mails some important text changes for a webpage to the IT department, who, for security reasons, control all access to the web servers. The request goes into a helpdesk queue. Two days later, Müller-prothman Engineer makes the requested changes in a text editor, and e-mails the HTML file for Jenkel to review. Jenkel e-mails back that everything is fine. The next day, Müller-prothmann FTPs the modified HTML file to a Unix staging web server.

That night, a sync process synchronizes the staging and production web servers. Jenkel checks each day to see when the new material is in production; when the modified page shows up as live on the Germany site, Jenkel e-mails Lin, Manager in Taiwan. Lin manages the company’s Chinese web presence in Taiwan. Jenkel includes a copy of her original message to Müller-prothmann, to indicate what has been changed. Lin, who runs Windows XP plus Office 2003, checks among the 130 Chinese sites to see which ones contain this content (only 42 of them do) and therefore need to be updated. He looks up the relevant translators from her Outlook contacts directory and forwards Jenkel’s e-mail (which is now several levels deep) to them.

Upon receiving that message, Schuck-Wesig, the translator for the English site, saves the relevant HTML page to her local hard drive, opens it up in Dreamweaver, and then checks against the e-mail she received from LIN, and makes the relevant modifications to the English version of the page. She then e-mails the HTML file back to Lin, who forwards it to Müller-prothmann Engineer. One day later, Müller-prothmann FTPs the HTML file to the staging docroot of the English site. That night, a sync process pushes the new content into production. Schuck-Wesig checks the live site daily and informs Lin when new changes have gone live.

## **TO-BE**

Jenkel Marketing logs into the CMS from using her Mac and changes text on an existing static HTML page, modifying some text and adding several new paragraphs. She has sufficient rights to push the change into production and does so. The page goes live on the USA site. Since this page is localized on other sites, this triggers a translation workflow.

Lin Manager receives notification via e-mail that this particular page has been revised on the English page. The CMS tells him that this text has been localized on several sites within his Chinese region.

Within the CMS, Lin directs the update task to several different translators, representing those sites. Schuck-Wesig, the translator for the English site, receives an email notification and logs into the CMS, where she is only allowed to read and modify pages in tasks assigned to her. She is given a visual cue as to what has changed in the latest German and Chinese version of the page and modifies the relevant English page.

Upon submit, the task returns to Lin, who must approve all final translated pages. He can preview all modified pages first. When Lin approves a page, it goes into a queue for an automated nightly promotion to the live server. On a daily basis within the CMS, Lin checks the completion status of the various tasks he has doled out to translators<sup>35</sup>.

What you have done here is signaled to the designing team of your CMS that:

- Your IT team cares very much about security, but has become a bottleneck; significant time savings could be achieved.
- There is a dearth of communication in your system; there are significant risks for the wrong material to be published.
- Pages have relationships across sites; work could run more smoothly if those relationships were systematically maintained.
- Your staff uses Macs and Windows machines, albeit in different places.
- You have a spectrum of very specific rights you wish to assign, and different content deployment routines based on those rights and/or content types.

You could have skipped the “as-is” piece, though bidders will find it very useful. More importantly, you’ve given the designing team of your CMS something very concrete to propose against and demonstrate when they meet you.

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<sup>35</sup> Similar situation-simulating approaches and techniques are deeply discussed in Creech ML: Author-oriented link management, COMPUTER NETWORKS AND ISDN SYSTEMS 1996, Vol 28, Iss 7-11, pp 1015-1025, ELSEVIER SCIENCE BV

#### **5.1.04 Solidify your Business Case**

Before you move on, make sure you can still connect a CMS to your broader corporate objectives. Having even a simple case statement that does this will facilitate all the choices you make going forward.

Is this a good time to set a project budget? Two schools of thought predominate here<sup>36</sup>. One school recommends waiting to see what potential opportunities lay ahead and setting a budget later.

However, it may be more practical to set a budget now to discipline the rest of the requirements gathering and vendor-winnowing, while remaining flexible depending on what arises down the road. In either event, don't forget about customization and integration resources. Account for all of the services you may need, and only set aside 25-35% of your budget for software.

#### **5.1.05 Design the Outlines of the System**

There are several tasks you can accomplish here to scope out the likely size of the project.

Hopefully, the use-case building exercise has compelled you to model your existing workflows and review what aspects can be better automated. Now take a stab at building taxonomies and vocabularies. Diagram how you anticipate different systems will work together. Create the information architecture for your new site, along with wire framed page component diagrams.

Develop a creative brief as necessary, and perhaps user-interface prototypes.

Many well-intentioned project teams skip or downplay this step. You should not. A deep understanding of your own content is an essential precondition to managing it more effectively.

You may need some outside help here. The key in selecting external consultants is their solution neutrality.

An integrator may well define the solution in a way that makes it most susceptible to resolution through their favored technology, and may receive a bounty from the CMS software vendor for recommending their product.

#### **5.1.06 Review Technology Alternatives**

Use your requirements and the outlines of a new system to develop a work plan, which will simplify matters for you and vendor alike. The work plan, together with your use-cases and the deliverables described above, can serve as the basis for a perfect ending decision making.

Surely, from the mid-market and up most (but not all) CMS vendors will come in to present their products firsthand, which may serve as a learning experience and could help sharpen your requirements and shorten your list. But chances are that if you have designed your system carefully and digested this report, you might not need to conduct a wide cattle call. Have them demo your use cases rather than their canned routines. A browser with a good Internet connection is much more useful here than PowerPoint slides.

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<sup>36</sup> Miller R: Content management - Case studies, ECONTENT 2003, Vol 26, Iss 5, pp 23-26, ONLINE INC



Be sure to ask what optional modules the CMS vendor would not include in your solution and is not including in its price. Unfortunately, “sandbagging” remains rampant: to fully realize a solution after you are underway, the CMS vendor informs you that you must purchase optional modules. This potential for extra cost is especially important to consider for “deployment” modules and application server or portal connectors.

### **5.1.07 Perform Due Diligence**

You probably already know the importance of performing due diligence on server software, but in any case, here’s a brief primer. For starters, you’ll want to talk to companies like yours who have implemented the package.

CMS Vendors will total the number of licenses they have issued in the past year, but try to find out how many actually implemented and then kept the product. If you are suspect about a particular feature or module, ask to see it in production on a live server from among the vendor’s clients. This is especially critical when your implementation depends on integrating two or more products – the fact that the vendors are “partners” means little. How many sites currently use those two products in tandem now? Fair or not, it’s the early adopters who provide integration lessons for everyone else.

If you are going to procure professional services from the CMS vendor or an integrator (and you probably will), be sure to meet the team who would work with you. Every company has experienced CMS hands. Many of them are extraordinarily knowledgeable, but unless you are the SUPERBUYER (or even if you are), they are likely to be preoccupied with the next sales call as soon as your contract is signed.

So, meet the actual project managers, architects, and developers who will be implementing your system or training you how to run it. If you can’t work successfully with them, what makes you think you can work with their product? Note that this is especially important with CMS vendors who are enjoying substantial success and momentum in the marketplace, and are therefore growing (and hiring) a lot. That’s right: financial health and the quality of human resources at hand can be competing dimensions.

Review any vendor’s financial performance, but with grain of salt. By our product selection processes for the CMS Knowledge Portal in the Chinese speaking areas, we have seen big, successful companies jettison CMS offerings, and niche vendors survive and thrive. Note that: most of the major CMS software players have just gone through the stress of flat sales and are only now beginning to climb out of the tech recession. Nevertheless, there remain key metrics to evaluate, like available cash (and burn-rates for cash-flow negative companies) and revenue momentum. Of the two, cash on hand is the best predictor of whether a company will survive. Use your experience – and instincts – here. For better or worse, positive “buzz” around a particular vendor may be a better predictor of long term viability than the quality of the technology.

### **5.1.08 Download Trial Packages When Possible**

You can sometimes download trial versions of CMS packages from vendor web-sites. Do this for your shortlist (but skip the CD-delivered demos). Note that this trend is new, and many of the trial versions are “light” implementations that can be buggy and not always well-supported. But they will give you a sense for the product. Of course, with an open-source package, you can always download, install, and play with the complete production version. Use trial versions as a basis for asking questions, rather than as your final decision point.

Remember you may need more than one package as part of a complete solution. Your requirements may push you to consider XML-handling tools, Search engines, a separate delivery platform, automated classifications products, and perhaps other software, in conjunction with a CMS package.

### **5.1.09 Evaluate Security Implications**

By now, your security staff should have a good understanding of how the different products will fit into your network environment and overall protection schemes.

However, the CMS package itself should be scrutinized. Be sure your vendor can answer these six key security questions<sup>1</sup>:

- Who runs security tests on the CMS? “No one” is a bad answer.
- Are there regular security notifications? When breaches are found, you’ll want to be the first to know.
- Which third party products are included within the CMS? Search engines and other applications have their own security considerations.
- Are there security specific guidelines for the CMS? If not, they probably haven’t look deeply enough.
- Can the supplier provide staff with recognized security qualifications?
- Have you established adequate internal controls? Remember that most security breaches are internal.

### **5.1.10 Consider Requiring a Proof-of-Concept**

If you are about to drop huge investment on CMS licenses alone (with integration on top), it’s reasonable to ask your final list of CMS vendor finalists to come in to your company, install their packages on your hardware, and develop some sample templates and workflows that make sense to your team.

You should define this exercise in advance, using your content, rather than using canned vendor demo sites. Note that: depending on whether the proofs can be done concurrently, a proof-of-concept step could add a month or more to your selection cycle. Nevertheless, this kind of “show-me” evidence can be a powerful predictor of which offering will work best for you.

Be aware, however, that you risk ruling out a vendor who elects not to compete in this way. For an enterprise installation, this is an unreasonable position for a vendor to take, but in the mid-market, the cost of participating in a proof-of-concept could far outweigh any margin the vendor would like to achieve.

One way to avoid this is to offer to compensate the vendor an agreed-upon sum for their time (but not their software) if they invest in a proof-of-concept and not emerge the winner.

### **5.1.11 Choose a Platform**

With solid requirements and a firm budget the choice should be fairly clear by now. Negotiate

your best terms. If you go the proof-of-concept route, you probably want to negotiate those terms before the final tests, when you will still have maximum leverage, but hold off on completing the contract, as issues may arrive during that phase that you might wish to address in the final agreement.

No software is perfect. Conduct a group de-brief after the competition phase and make a list what don't like about the package you are going to select. This helps you set internal expectations and account for necessary work-around as you finalize the implementation plan. It can also give you more to go back to request of the vendor. Contributing resources towards resolving some of shortcomings your team finds could be part of the final deal.

### **5.1.12 Prototype as Early as Possible**

If you are purchasing a large system, consider confirming that you made the right choice before getting the full spate of licenses you will ultimately require. This means quickly implementing even a partial solution for part of your online platform – perhaps a single section of your site, or within a single department. That way, you – and your vendor(s) – can learn critical lessons while the stakes remain reasonably low. It also allows you to show project momentum. And if it all blows up, hopefully you have hedged some of your investment.

That sounds awful, but what is worse than admitting a mistake and switching to a different package? Not admitting your mistake and being stuck justifying a system that doesn't you're your basic business needs. On several occasions by interviewing CIO of big companies in Taiwan, we have heard: “Yes, this software stinks, but we paid \$X hundred thousand for it, so we have to use it...”

### **5.1.13 Recognize When You Need Help and Seek Outside Assistance**

Through the whole process above, you may wish you had gotten help. Perhaps the project has stalled or you have not been able to reconcile differences among the team. The right consultant can add value from the earliest stages of the project.

A knowledgeable and experienced outsider can help by:

- identifying key internal stakeholders,
- facilitating among disparate factions,
- applying proven requirements templates,
- helping to clarify the confusing array of technical and design choices,
- assisting in developing the RFP and evaluating vendors and
- generally pushing the process along (this doesn't have to be a long process).

The right company can also serve as a resource (or outsource) for implementation by a team invested in the overall plan. It is also the trends of IT services industry. As always, picking the right consultant will present a key challenge. You'll be able to choose from among independent contractors to the Big 5, and everything in-between, including public web agencies, regional integrators, and niche design and information architecture firms.

However, Note that most professional services firms have pre-existing relationships with specific CMS vendors. This is not necessarily a bad thing – for example, you want an

integrator to have pre-existing experience with any particular package they implement for you – but be sure to surface and understand potential conflicts before getting started.

In any case, be sure the specialists working on your system have worked with the relevant CMS software package(s) at least 3 times before, and the current version at least once. Deep knowledge of complex software is an acquired talent. The difference between an experienced and novice developer can make or break your project schedule and budget.

## 5.2 Design and Implementing CMS – The “Collaborative Function Model”

As what have been mentioned in Chapter III, by literature review, we found Nakano’s theory (Nakano 2002) for designing a collaborative web site to support our ideas<sup>37</sup>. In Nakano’s prototype, he describes two concepts for applying web content management: “Collaboration operations” and “work cycle development”.

According to Nakano, “**Collaboration operations**” include the following five operations:

- (1) **Submit** — when you move web assets from a work area to a staging area;
- (2) **Compare** — identifies whether the assets that were submitted were new, modified or deleted assets to the staging area;
- (3) **Update** — copies new, modified or deleted assets from staging area to the given work area;
- (4) **Merge** — resolves conflicts between the work area and staging area and
- (5) **Publish** — is a snapshot of the staging area.

And “**Work cycle development**” is important to people who are ready to start a web project. They must follow these basic rules:

- **Update** — get the most recent assets from the staging area;
- **Edit** — make changes to the assets,
- **Test** — make sure that the edits work properly;
- **OK** — if the edits work, then submit to staging area (then goes back again to the beginning of the Collaboration Operations).

Nakano’s prototype is very constructive, theoretically. It provides a fundamental, well-organized, and easy to follow observing and designing perspective for CMS. When working with many web developers, it is very important to follow these two concepts. If they are not followed, the web content can become unusable and starting over may be unavoidable.

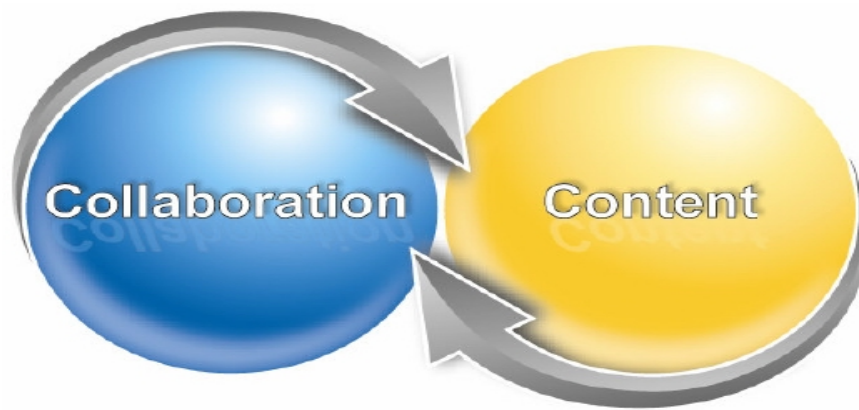
However, Nakano’s prototype provides only a linear and process oriented perspective. He mentioned only the five important ideas (**SUBMIT, COMPARE, UPDAE, MERGE, PUBLISH**) for CMS designing and the basic work cycle procedure (**UPDATE, EDIT, TEST, OK**). It’s, in the essence, a simple CMS prototype, and there’s no further ideas and implications from other

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<sup>37</sup> Nakano, R: Web content management: a collaborative approach , ADDISON WESLEY PROFESSIONAL 2002, BOSTON

perspectives. And most important of all, in this prototype, “content” is the “result”/“product” from a linear production line! Hence, by really engaged to design, set up and launch the purposed web site, most important of all, a collaborative platform (web-site) for our international cooperation project we need a more function oriented methodology to help us.

For an international cooperation project like what we are attempt to establish, the CMS, which serves as the collaboration platform, should provides more functional mechanisms to improve the interactions among workers, speaking three different languages and locating themselves in t countries and 5 cities, to be easier and straight forward to create value-full contents together. That is, from a communication perspective, we believe the relationship between “content” and “collaboration” (now, it means the mechanism which helps people to manage content) should be more dynamic and interactive, just like the chart that we illustrate below (same as CHART 3.04).



Dimension	Content Production	Content Delivery
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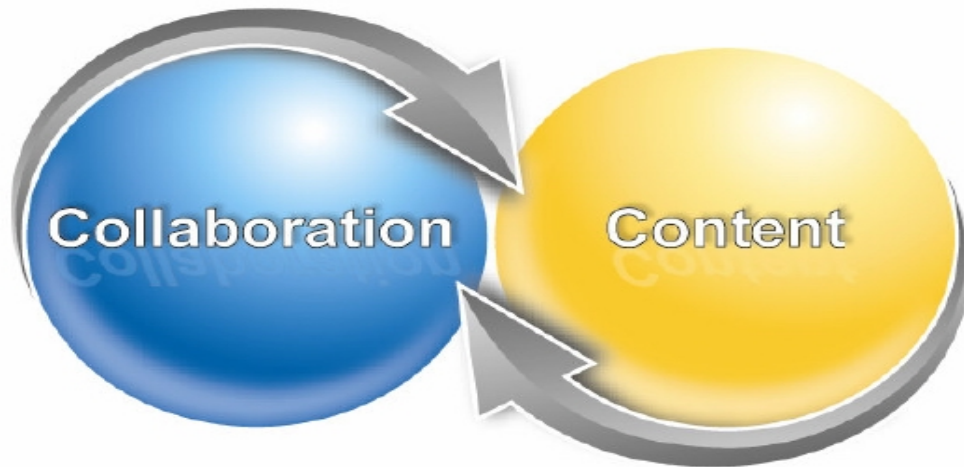
(Chart 5.01) The Conceptualization of the relationship between “content” and”collaboration” with dimension division “content production” and “content delivery”

Following this concept and based a Nakano theory for designing a collaborative web site, we established a function oriented model on our won as the critical consideration and judgment criteria to design and implement a CMS based web site for our international cooperation web site. We call it “**Collaborative Function Model**” of CMS, ‘cause it stresses the importance of understanding the internal/external communication needs and processes in any CMS Designing Project.

In this model, for international business collaboration/ communication, a (perfect) CMS should be firstly divided in two dimensions:

1. DIMENSION I. **Production, where content goes “from thought to click”.**
2. DIMENSION II. **Delivery, where content actually gets “consumed by end-users”.**

Nakano hasn’t mentioned the dimension II “Delivery” or he did by take this part simply as “publish”. However, as the boundaries between information and communication, or let’s say, among the industries which are illustrated in the two charts in 3.1 (CHART 3.01/3.02), vanish and melt gradually, it is necessary to expand discussions in this dimension. So, we conclude the “Collaborative Function Model” in the following chart below (CHART 5.02). Both “content production” and “content delivery” dimensions contain its specific attributes that must be carefully considered in any CMS project:



Dimension	Content Production	Content Delivery
<b>ATTRIBUTES</b> The sub-attributes are the function oriented mechanisms that we think most essential for improving the interactive effectiveness and the business value achievements of a CMS platform	Role Management (5.2.01)	Page Generation (5.2.10)
	User Interfaces (5.2.02)	Searching (5.2.11)
	Author System (5.2.03)	Personalizing (5.2.12)
	Integration (5.2.04)	Privileging (5.2.13)
	Metadata (5.2.05)	Caching (5.2.14)
	Workflow (5.2.06)	Syndication (5.2.15)
	Templating (5.2.07)	Cross Media Publishing (5.2.16)
	Versioning (5.2.08)	
	Globalizing (5.2.09)	

(Chart 5.02) The Structure and Attributes of the “Collaborative Function Model”

In this “Collaborative Function Model”, the interactive and dynamic relationships between “content” and “collaboration” is on the bottom of the prototype to remind all the designers the symbiosis of these two elements. That is, CMS serves a “place” of series of communications and interactions.

The in table listed 9 attributes in the dimension of “content production” and 7 in the dimension of “content delivery” could be regarded as the expansion of Nakano’s simple CMS prototype. Based on our lessons learned and the experiences by designing and implementing the CMS Knowledge Portal in the Chinese-speaking areas, we found the attributes, mostly the function-oriented mechanisms, essential for improving the interactive effectiveness and the business value achievements of a CMS platform. That is also the reason why we name our prototype the “Collaborative Function Model”, because the attributes are functions needed to enhance the “collaboration”, in other words, to improve the communications in CMS.

In the following sections of chapter V, we will have further discussion on “**Collaborative Function Model**”. Based on our lessons learned and the experiences by designing and implementing the CMS Knowledge Portal in the Chinese-speaking areas, each attribute in the table above will be discussed in details, both technically and practically. These discussions will help you to get clear on the latest technological developments and the factors that you must think about if your web site has the needs in the attribute related criterion.

Besides, we also make an “**Author’s Checklist**” at the end of each discussion. This “Author’s Checklist” is both a review to the discussion and additional remarks to the related discussion. It is a questionnaire aimed to help you focus on your own analysis for planning the appropriate CMS platform for your unique needs.

In short, “**Collaborative Function Model**” concludes the central concerns, considerations and the decision making processes, when we attempt to select our foreign CMS solution partners, to evaluate the CMS packages, products and solutions (seem to be anonym?) in the market, to propose our business strategies, and finally to design and to implement the unique and the first CMS Knowledge Portal in the Chinese speaking areas.

Surely, “**Collaborative Function Model**” is also very useful and helpful for you to design and implement your own CMS project or to select the proper CMS package or solutions from the vendors in the booming CMS market.

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## **The Dimension of Content Production**

In the “Collaborative Function Model”, we define “Content Production” as everything that happens to content before the end-user sees it. Although first in chronology, this dimension is typically last in line to be automated by web teams. Indeed, by selecting a CMS package or by designing a CMS project, most companies tend to focus first on delivery systems – be it through portals, application servers, or other forms of dynamic publishing.

However, from our experience in implementing the CMS based web site, we find out that: the Production dimension is actually where many substantial cost, control, and efficiency gains can be realized. It is, from both functional and organizational, the core elements of CMS. And according to the results of a research with similar approach<sup>38</sup>, if the CMS designer could put more attention on the production dimension, it is estimated that the efficiency of the whole software system may have a 35% increase. And, we would also like to point out that, only when the project leader of the CMS has carefully consider this dimension, can the effectiveness and efficiency of the CMS which will be implemented and launched in your own company reach your expectation.

Let’s start our discussion from the groundwork for all CMSs today: the Role Management:

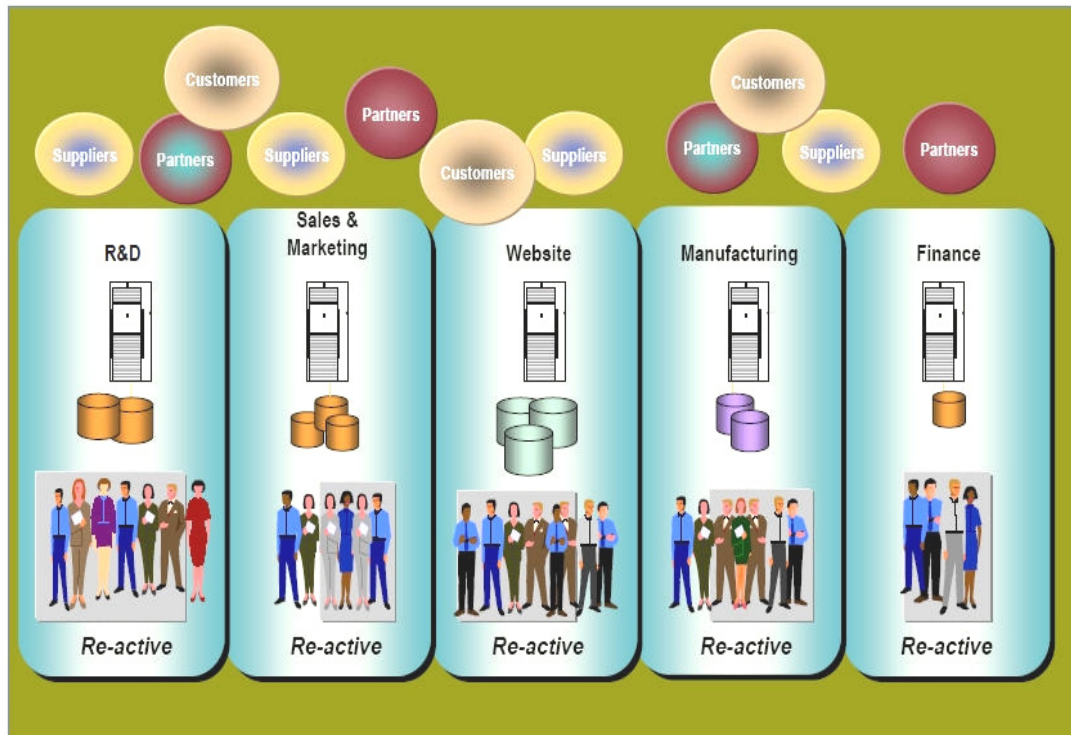
### **5.2.01 Role Management: The Groundwork of Your CMS**

With the continuous developments of information and communication technologies, modern enterprises start, more or less, sooner or later, their processes of informationalization and digitalization. However, the adoption of new technologies in the early stage doesn’t really guarantee the competitive advantages. As you can see in the following chart (**CHART 5.03**), for many companies, which have implemented many different internal/external IT projects, they are now suffering greatly from the problems of too many Information systems get involved and, most important of all, the chaos caused by too many related users get involved<sup>39</sup>. Trying to find out a way to integrate these systems for the synergy is then the biggest concern of all the IT managers in the world.

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<sup>38</sup> Goodwin S; Vidgen R: Content, content, everywhere... .. time to stop and think? The process of web content management, COMPUTING & CONTROL ENGINEERING JOURNAL 2002, Vol 13, Iss 2, pp 66-70, IEE-INST ELEC ENG

<sup>39</sup> Kerer C; Kirda E; Kurmanowytsh R: A generic content-management tool for Web databases, IEEE INTERNET COMPUTING 2002, Vol 6, Iss 4, pp 38-42, IEEE COMPUTER SOC



**Higher Infrastructure Cost ♦ Longer Development Cycles ♦ Low Collaboration**

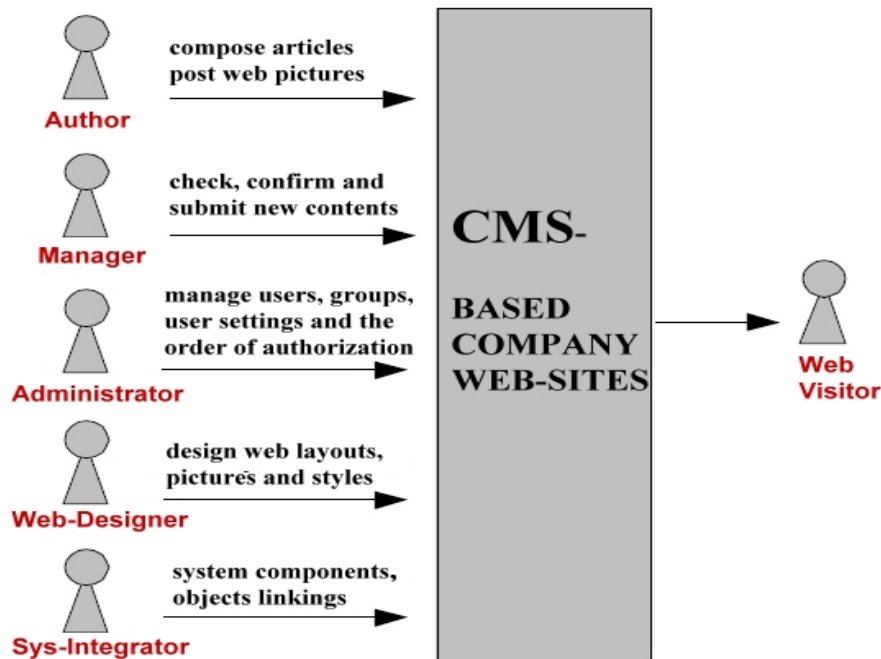
(Chart 5.03) The isolated and chaotic information system deployment in modern enterprise, BP of CMS vendor “Stellent Inc.” The chart could be found in <http://www.stellent.com> under Online Library

The above mentioned situations and similar problems could also be found by the web content management today. Many people can be involved in the production of even a departmental web-site. And since one of the key advantages of CMS is to distribute content maintenance capabilities directly to content owners, implementing a CMS leads to even more people becoming involved in this process.

In that case, if the CMS is the technology to rescue, that is, it must be a system that can enable you to manage internal access and permissions (access and privileges for users outside the corporation are addressed later) that is much more robust than that required to support only one or two webmasters updating an entire site. Users can be assigned privileges based on the role they play (the types of things they can do), or group to which they belong, which circumscribes their authority – and typically the scope of the content areas they can edit. It is possible (and indeed quite common) for a user to make up a group of one.

How will CMS make it? Mostly, CMS uses the author system concept (we’ll have further discussion on this in 5.2.03 of this dissertation ) as its kernel and takes the role management as its running principals and schema. Just like the chart below (CHART 5.04)., it is clear that the users are categorized into different groups and then differently authorized for their tasks and privileges. By doing so, CMS solves the chaotic information collaboration problems in modern enterprises, a least, to some degrees.





(Chart 5.04) The Role Management Structure in CMS ICOYA. This chart are “exclusive authorized” by the Struktur AG to privileged academic uses. Pleas see the appendix for more Info.

Today, almost all CMS packages come out of the box with generic roles already configured for your use. Except on the very low end, these products then enable you to modify those roles as necessary. However, not all CMS packages allow you to create completely new roles, and among those that do offer this capability, they may not be able to circumscribe functions in exactly the way you would like.

For example, you may want your Interns to add and modify metadata, but have no other privileges, or for Managers to initiate workflow tasks, but not be able to author content. Hence, it is important to ask CMS vendors to show you just how o make the roles and groups you think you need. Most CMS packages will tie into existing corporate directory systems (such as LDAP servers), but note that the way they do so will vary markedly among competing products. For example, some products will access an LDAP repository in real-time, whereas others require that the LDAP server sync up with the product’s own access control lists on some sort of regular schedule. In the former case, you need to make sure that the network between your CMS and your directory server is completely reliable. In the latter case, there can be periods where a user whose rights have been expunged in the corporate repository may still have access to CMS privileges, or conversely, has been added to the corporate directory but is not yet visible to the CMS until the next synchronization.

### ***Author’s Checklist for Role Management***

#### **1. What level of granularity do you need now, and anticipate needing in the future?**

Some CMS packages proscribe certain roles or limit the number of groups you can define. You can theoretically extend these to create new roles, but the level of effort and potential for problems at upgrade time might make it more worthwhile to simply select a package that could support the umber of different roles you need from the outset.

**2. Does your enterprise use a particular authentication mechanism?**

Internal users can be authenticated by the operating system, the web server software, through internal application logic, or even by a content database. Each has its advantages and disadvantages, but nearly universal experience reveals that you will trade off potency of security with ease of use and maintenance. Don't underestimate maintenance overhead here.

**3. Do you require or prefer a certain operating system?**

Obviously, this is a global consideration, so let's address it right up front. If the CMS uses Microsoft Active Directory permissions to manage roles and authentication, then you are going to have to invest in some potentially tricky integration to be able to run it on the new Sun Solaris server you just bought. Operating system choices present the first of many chicken-or-egg predicaments in selecting a CMS package. In an ideal world, you would be free to select the most suitable product regardless of any platform limitations; in the real world however, the IT team that will have to support the application going forward may be much better versed in one operating system over another.

**4. Do you need to integrate with other identity management systems?**

If your users can access the CMS through an existing corporate log-on they will be more inclined to participate actively. If you use LDAP or Microsoft's Active Directory for corporate directory services, look for a CMS package that supports those protocols. Then ask the vendor how they support the protocol. Or perhaps you are using your corporate Portal to support single sign-on across the enterprise; clearly you'd want your CMS package to tap into those permissions.

(Chart 5.05) Author's Checklist for “Collaborative Function Model's” System Attribute: “Role Management”

## 5.2.02 User Interfaces: The Usability of Your CMS

Debates about the usability of content management systems have gone on for as long as there have been CMS packages. Many early CMS products – some of which represented quick migrations from client-server systems – were notable in their difficulty to use. Over time, some common norms have emerged and are beginning to propagate throughout the industry, and we'll highlight some of them below. However, the most important thing to take away from this section is that the most usable interface is that which your content managers find most useful. What is logical and simple to one person or company can be non-intuitive for another.

Some UI trends are emerging and have spread rapidly across the CMS vendor landscape. Nearly all vendors now provide multiple ways of entering content into the system (e.g. Word, Dreamweaver, browser forms of various types, etc.). After popping new windows became fashionable in the late 1990s, most vendors now keep users to one, perhaps 2 screens to complete a simple task, using sophisticated DHTML controls and or frames.

Many usability issues – such as authoring and workflow interfaces are addressed separately in those sections below. Some other, more global interface topics are addressed here, including:

- a.) **User Interface Customization**
- b.) **Work Queues**
- c.) **Help Subsystem**
- d.) **Management Reporting**

And finally, to be clear, in this section we are talking about user interfaces for content contributors, editors, and managers, not content consumers. For your site visitors, you control the usability through your templates and navigational structures; although some CMS vendors will circumscribe your flexibility here more than others.

#### **a.) User Interface Customization**

If the intuitiveness of a user interface remains at least somewhat in the eye of the beholder, then vendors would need to be extraordinarily prescient (or lucky) to know what would work well for your team. Clearly, the UI assessments that your content managers make of competing CMS vendors is an important consideration. But in the long run, perhaps equally important is your ability to modify the user interfaces to your particular needs.

CMS Vendors vary substantially here in whether and how they expose user-screens to your developers. In some cases, user screens are constructed from XML config files or templates, which are useful for large sites where you may need variants of the same interface but want to maintain some hierarchical integrity among them, but could be limiting due to a lack of a scripting interface.

In other cases, CMS vendors allow you to create and modify system screens using the same templating approach and methods that you use to create output templates for content – often some sort of scripting language. In general, we tend to prefer this approach because it makes maximum use of the system’s existing capabilities (e.g. versioning) and leverages developer skills (i.e. learning one templating paradigm, not two).

And still in some other cases, vendors allow you to modify input screens via a forms interface; this is the easiest to use for businesspeople to make simple changes, but likely to be inflexible in the long run and doesn’t always allow for simple UI enhancements, like form field validation. Finally, some vendors – especially at the lower end of the marketplace – do not allow you to modify user interfaces at all.

Note that the return of thick clients (e.g. Morello from Mediasurface, or various custom interfaces for Mac OS X from other vendors<sup>40</sup>) presents a new dimension to this problem. Many of these interfaces are far richer than their browser-based predecessors, but nearly all of them are modifiable only through a very basic configuration interface, if that.

Before you set off to modify any interfaces, however, get in writing from the CMS vendor some sort of certification about what changes you can make (and where) that won’t expose you to having your work overwritten in any new version of the product. Vendors are increasingly sensitive to this problem and will often put templates in a separate, untouchable directory for just this reason. But not all of them work that way.

#### **b.) Work Queues**

Work Queues is also called a “task list” or “user in-box”. In the work queue process, some works are pending some action from that user. Busy users who interact with the system frequently will appreciate many of the following capabilities:

- view and sort tasks according to priority and other variables;
- view ad-hoc tasks as well as content-approval workflows;

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<sup>40</sup> Bartenstein O: Software components for Internet based self-service consulting systems, WEB KNOWLEDGE MANAGEMENT AND DECISION SUPPORTS 2003, Vol 2543, pp 23-35, SPRINGER-VERLAG BERLIN

- see a generous description of the task, including a meaningful title and where that task stands in its overall workflow;
- who originated and/or submitted the task
- the ability to take some action on the task without opening up the content item and/or task detail description.

With the above described features of work queues, a content manager can filter on “overdue tasks” and still could have also looked at “future,” “past” and other combinations of tasks due.

Separately, a good CMS should also show which content objects have been “checked-out” by that user, so that they have a quick idea about their own work in progress, as well as know what content items they may be keeping “off-limits” to other users.

### **c.) Help Subsystem**

Help screens are not useful for everyone. Ideally, your content managers would be so well versed in the interfaces they employ – carefully customized just for their needs – that they would never have to seek any help.

Yet, in practice, users ask for a lot of help, especially in super-distributed management models characterized by an abundance of casual contributors who may use the CMS infrequently. In those cases, “help” often ends up becoming an IT function, in the form of a person on the end of a phone line – even though part of the purpose of implementing a CMS in the first place was to disintermediate IT staff in the publishing process.

A good help subsystem can provide support on a self-service basis. Ideally your CMS would have instructions next to each field in a form, or contextual help on each screen in the system. In practice, most CMS packages that offer help content do not offer context-specific help, reducing its usefulness.

So, who’s job should it be to customize help screens? According to our experiences, we would suggest: it is the job of those who provide end-user training to supplement that work with contextual help materials. Keep that information relevant and updated is everybody’s job. In more forward-looking CMS packages, help blurbs for form fields can be edited on the fly by authorized users.

### **d.) Management Reporting**

It is a measure of the maturity of the CMS marketplace that buyers are starting to look at the software not just for editorial automation, but for real *management* as well. Management begs metrics, and metrics require reports. Ironically, many content management systems don’t provide such reports, and some of those don’t even create logs upon which such reports can be built.

Look back over your business objectives and figure out how your CMS could help you measure how you’re doing. You should decide which ones are most important for your business, but a small sampling of reports that could help your managers manage better might include:

- speed of workflow clearance;
- typical bottleneck points;

- duration of content within particular stages;
- who is logging into the system, how often, and who does not use it at all;
- what volumes and types of content have been classified according to specific nodes in your taxonomy;
- do you have any orphaned content;
- do you have live content of a particular lifespan that has gone unreviewed for accuracy and freshness;
- and so on.

Many CMS vendors will tell you that since they provide all the audit data, all you have to do is turn a report-writer (like Chrystal Reports) against it. That’s a cop-out. You’ll want reports right within the system itself, so that you can click on content items and tasks to act upon the data you find. You might also want to be able to generate ad-hoc reports within the system. Note that many of these reports can be created by canned search-engine queries in the system.

### ***Author’s Checklist for User Interface***

#### **1. What does “easy-to-use” and “intuitive” mean to your content contributors?**

If you can’t answer that, don’t request it in your RFP or tender. Be prepared for blank stares from users when you ask, however; most people aren’t used to being queried for details here and are likely to respond, “I’ll know it when I see it.” That’s normal. But it then behooves you to organize hands-on tests of the different systems you consider.

#### **2. How many users will there be in the system, and how diverse are the roles?**

The sheer number of users – along with the diversity of roles – is going to place greater emphasis on your ability to customize the user interfaces, including any help subsystem. If you have more than 100 users, make sure there is context-specific help and some sort of robust scripting interface into all the system UI screens. If you have more than 1000 users, make sure that the help subsystem is editable, and that any internal templates can undergo the same careful “build” and deployment process that new web-site content areas undergo – since with that many users, you will do well to roll out “editions” of the CMS. The more roles you have in the system, like the greater demand you’ll see for custom interfaces; some of these can be addressed in the rights-management subsystem, which will circumscribe what different roles can see and do, but that is not the same thing as building a usable interface for, say, your corporate librarian.

#### **3. How much workflow do you anticipate?**

If you anticipate only a simple author-approve process for most of your contents, and you expect the overall throughput to remain light, then very simple work queues will suffice. But if you have multi-step workflows, with many actors, and/or high-volumes and potentially narrow choke-points, then you will rue the day that you foisted a plain-vanilla task in-box on your users, as they will likely respond by processing tasks offline, likely using some of the rich cueing and messaging in Outlook and Exchange. Power editors in particular want highly customized and customizable task lists.

#### **4. What reports will your managers (technical, business, and editorial) require on a regular basis?**

List the reports you will want in any RFP and ask the vendors to show you them in their system. Again, start with your business objectives and go from there. If the goal was to reduce your content time-to-market, then figure out what metrics you'll need to show that. In addition to business managers, be sure to consult with editorial and technical managers – they have reports they'll want to run as well.

(Chart 5.06) Author's Checklist for “Collaborative Function Model's” System Attribute: “User Interface”

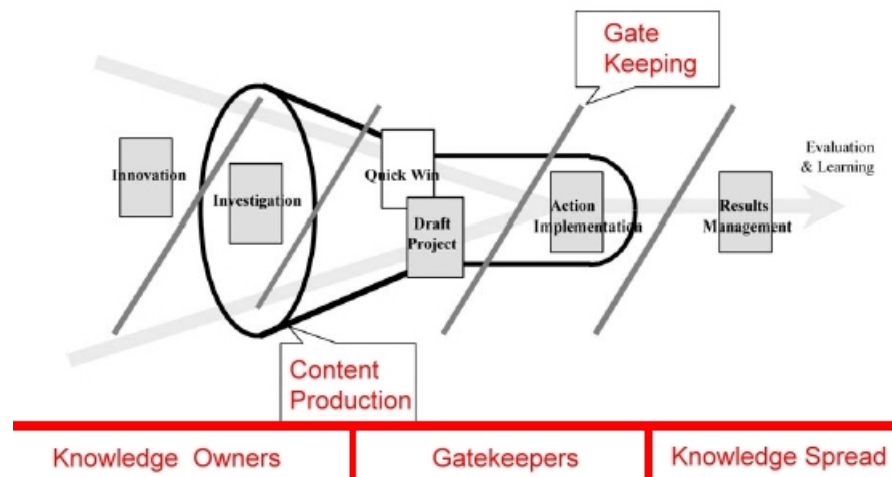
### 5.2.03 Author System: The Core Function of Your CMS

By interviews with IT managers, we find out that: most internal CMS users will spend most of their time here, so it's important to get this right.

Simply creating an inventory of your existing different digital content assets can be eye-opening, and is a good place to start your efforts. We can almost guarantee that there are more web pages on your present site than you think right now, although much of it may be duplicative (A beneficial side-effect of such an inventory is that you will find all sorts of content that you will want to delete, easing your migration effort later). Tracking down these assets will likely lead you to *people*, since putting thought to keyboard to create and update content is a labor-intensive effort. Your first task when building requirements is to identify these people – the content owners<sup>41</sup>.

Note that domain experts often reside outside of Marketing and IT departments, the two traditional institutional homes for corporate web-sites. Content owners can be found in Sales, HR, Customer Service, Logistics, and any other important area of your firm.

Content owners can be split into two general categories: knowledge-owners and gatekeepers. And the relationship of the content production, authoring and transformation could be illustrated in the following chart (somehow from a communication perspective) (CHART 5.07):



(Chart 5.07) The Roles and Processes in CMS (Our analysis)

<sup>41</sup> See also: Goodwin S; Vidgen R: Content, content, everywhere... time to stop and think? The process of web content management, COMPUTING & CONTROL ENGINEERING JOURNAL 2002, Vol 13, Iss 2, pp 66-70, IEE-INST ELEC ENG

Knowledge-owners typically create content; gatekeepers validate and approve it. Systems designers sometimes focus inordinately on one group or the other, but a successful workflow should take into account the needs of both user groups. Otherwise, the gate keeping process will easily cause the bottle-neck problems and the effectiveness of the whole content production/communication. In correlation with the design of CMS mechanisms, there are principally the following seven factors that you have take into consideration:

- a.) **Content Retrieval**
- b.) **WYSIWYG Authoring and Editing**
- c.) **Transforming Desktop Content**
- d.) **Content Elements and Reuse (and the case for XML)**
- e.) **Re-use versus Re-Purposing**
- f.) **In-Context Authoring and Editing**
- g.) **WebDAV**

Let's take a closer look at each of these factors of consideration:

#### **a.) Content Retrieval**

Within a CMS, content contributors need to be able to navigate quickly to the area where they want to add or modify content. Another term for this is “content retrieval,” and it can become an easily overlooked source of frustration.

If contributors can't easily find content on their own site that they wish to modify or update, you risk obliging them to recreate it<sup>42</sup>. Systems that offer “in-context” editing – where contributors browse to an area of the site, log in to the CMS and start editing – sometimes substitute this approach in lieu of a more robust retrieval mechanism. Browsing through rendered content is convenient, but may not show you all the content you need to see. In general, your users will likely want to be able to list content by owner, type, and workflow status. On large sites they may need some form of internal fielded search mechanism that may not be well suited for a simple search engine, for example, to find all the pages modified by a particular author and/or within a particular date range. Understand how this works in any product you consider purchasing.

In some cases, the CMS vendor will rely on their own – typically SQL-based – query tools, while in other cases, they will employ a lightweight version of a 3rd-party search engine (such as Verity or Autonomy) that they bundle with their product.

If it is the latter case, make sure to find out if there is a limit on the number of content items that can be indexed, and whether the search interfaces and scripting have been pre-packaged (sometimes, sadly, that is left to you to code, and it may not be trivial). In both cases, you'll want to know how you can make searchable any custom fields that you will be adding to your repository.

#### **b.) WYSIWYG Authoring and Editing**

Gatekeepers require an online queue (ideally with email notification) telling them what tasks

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<sup>42</sup> Gordon DH; Whitehead EJ: Containment modeling of content management systems, METAINFORMATICS 2002, Vol 2641, pp 76-89, SPRINGER-VERLAG BERLIN

await them, but otherwise should expect to edit content in an identical or very similar interface to that used by original contributors.

For web-based entry screens, users generally feel more comfortable in a familiar environment that provides both formatting tools, spell-check, and other editorial functions, such as preview. Naked forms-based entry can be easy or hard. In the example below, the author can take advantage of a WYSIWYG editor attached to the text area box<sup>43</sup>.

Don't underestimate the amount of training that will be needed, though, for users who don't know HTML. Even such tasks as adding an inline link requires more than basic word-processing skills and you will probably need to set some corporate policies here, e.g. can authors even add in-line links at all, or should they simply enter “related links” into a separate field.

There are three technical approaches to applying WYSIWYG tools to browser-based text area boxes. Most vendors that enable forms-based entry will use one or two types concurrently:

- **ActiveX controls.** These tend to be the most feature-rich widgets (and are frequently programmable). Since they work in the client, they can include spell-checkers with custom dictionaries as well. Their chief drawback is that they can only work in a Windows desktop environment, and frequently require additional DHTML for advanced functionality. Also, you'll need to ensure that your enterprise security policy allows ActiveX controls to be installed and run (they are usually a one-time download).
- **Java Applets.** Like ActiveX controls, these run in the client, and can offer spell-checkers and multi-lingual features. They will run in any Java-capable browser, but tend to be less feature-rich than the ActiveX variety, and because of the plethora of platforms and browsers they must support, can sometimes be a bit buggy.
- **DHTML code.** This is the most light-weight approach, and if your needs are simple, it will suffice. Beware of under tested code, though (it can crash your browser). Also, complex DHTML (usually combined with JavaScript) can increase load times – not always a lot, but often enough to be perceptible to users. The key here is that typically the interface doesn't work until all the code has loaded, and in fact can throw an error if a user tries to access a function whose accompanying behaviors have not yet loaded. Test before you buy.

Note that with all three approaches, you are auto-generating HTML tags, although a savvy user can always view the source. Experienced interface developers know that this brings advantages and drawbacks.

The principal advantages are ease-of-use for non-technical contributors, as well as kind of enforced coding standard. The main drawbacks revolve around the quality of the code, and the sometime need to make adjustments at the code level. All of these widgets have accessibility problems and likewise the codes they generate often fail the more strict accessibility screens. Like all WYSIWYG systems, if you make changes to the same text both through the editor and at the code level – and switch back and forth – unexpected results can appear.

Finally, it is always a good idea – and essential when using an XML-based CMS – to make sure that the system enforces XHTML compliance on any formatted content that gets written to

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<sup>43</sup> Miller R: Content management - Case studies, ECONTENT 2003, Vol 26, Iss 5, pp 23-26, ONLINE INC



the repository. There are various ways of doing this, usually entailing the use of HTML Tidy (an open source tool) or some other filter on the server.

### c.) Transforming Desktop Content

If contributors use a desktop package – like MS Word or Quark – to develop and edit authoritative versions of source content, the CMS needs to be able to convert those documents quickly, ideally without manual copy and pasting. As a practical matter, though, many CMS users do end up copy pasting, because the content in the Word file doesn't match the structure that's expected, or because they can control the formatting better than any automated tool does, or both.

Converting documents demands some sort of automated file transformation (to HTML, XML, or plain text) and import into a content repository. CMS vendors typically deal with this in one of two ways:

- **Via plug-in to the specific desktop application.** These plug-ins are more mature in HTML/XML editors right now, but are expanding into word processing and desktop publishing (DTP) programs.
- **Via file explorer.** Users drag and drop files into the CMS from their computer's desktop, as in the screen, below, from Zope.

To convert users to templates or style sheets within Word or any other desktop application presents significant training challenges, at best, and severe change-management problems, at worst. (Vendors usually don't tell you that in their demos, but experience suggests it is quite true.) This is because most content owners are not used to thinking about their content as structured, typically because they were never required to before. But structured content is where much of the value of a CMS comes from, so let's look at it in more detail.

### d.) Content Elements and Reuse (and the case for XML)

Most authors will format the appearance documents for their own needs, and desktop programs give them easy means to do so. Also, companies outside of the publishing industry typically do not enforce strict style sheet conventions. This problem merits a minor digression. Many documents are intrinsically quite structured – yet content owners have not usually had to think of them that way (except perhaps for presentation consistency).

But exposing a document's structure extends the value of its content and saves users time – and that is where the real benefit lies. Consider the typical press release drafted in a word processor. It contains:

- A logo
- Headline
- Subhead
- Date
- Contact Information
- First Paragraph
- Rest of the Body

Press releases are fairly uniform and familiar documents, and this example is no exception.

Note that its structure is fundamentally hierarchical, rather than relational; that is, content pieces flow from a central “element” and have parent-child relationships. For example, the Subhead is a child of the Headline element.

In this instance, “Press Release” is a content “type.” Other content types on your site could be Case Studies, Staff Lists, or simply, Articles. It really doesn’t matter which terms your organization uses, so long as you come up with a common vernacular to communicate document components and structure.

Breaking apart and applying rules against a document’s intrinsic structure enables context-specific display and just-in-time content strategies based on personalization. Imagine that the content types which we’ve mentioned has been transformed to XML and imported into your CMS along with other company press releases. Your publishing system can now automatically display the press release headlines on your home page in bold type.

On your media index page, the server displays head (hyperlinked to the actual release) and subhead in plain text. On the HTML release page itself, the subhead is italicized and of course the whole body appears. Wireless visitors see only the date, headline, and first paragraph. Syndication partners see only the Headline and First Paragraph. And what if the contact person changes? No problem. Change it once in the system and the new information cascades to all releases (assuming you are reassembling dynamic pages – this is a caching issue addressed below).

Of course, this underscores the value of XML and helps explain why XML has become tied closely to web content management. XML provides a way of describing the structure of content, or more accurately, a way for the structure to describe itself. It is particularly well-suited to hierarchical documents. And because the model is inherently extensible, XML documents can typically handle additions and changes to documents much more easily than database structures (where a new subsection in a document might require an additional field to be added to a database table). The example above, however, could also be accomplished in a database-driven CM without XML<sup>44</sup>.

#### **e.) Re-use versus Re-Purposing**

Thus far we have been talking about re-use in a very general way, but actually we should be more precise. Strictly speaking, re-use means taking authoritative information fragments that live outside of any specific visual context and publishing them out in different combinations to different locales. This might include, for example, product content that might be published in one form on the Web, but then married up with specific case studies for a print brochure.

Another, far more simpler, way to obtain more value from content is by repurposing it. Here you convert a single document to multiple formats, possibly stripping and/or converting some elements for certain media types. At the most simplest level, most content management packages can repurpose Word content to HTML. At a more complex level, you may have XML-based documents that you wish to transform via XSL into more than one output: e.g. one rendition for your web-site, another for wireless devices, and another for an syndication feed. In this case, the transformation is happening on the entire document, and there is no notion of assembly of atomic units. All renditions off the source are visual renditions, as opposed to structural renditions.

The distinction is important, because nearly all content management vendors suggest that they support re-use, but many of them, including many if not most of the XML-based web content management players actually just support re-purposing. And indeed, for most of

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<sup>44</sup> Detailed discussions could also be found: Rothfuß Gunther, Ried Christian: Content Management mit XML – Grundlagen und Anwendungen. SRINGER 2001, p.18~36

their clients, repurposing is the goal, and can bring value to an enterprise with multiple delivery challenges. But another reason why you see more content repurposing in the Web arena than content re-use is because the latter is actually quite hard. A solid re-use strategy requires substantial up-front analysis, a more complex content management system, but perhaps most importantly, it requires a major cultural change among content authors and managers to work on content snippets, rather than entire pages and documents<sup>45</sup>.

Some functions, such as technical documentation, and some industries, such as pharmaceuticals, can boast of a long history of re-use going back to SGML. The cost-savings were well worth all the effort and organizational change required. For other sectors, the case for re-use is typically justified on a more ad-hoc basis.

#### **f.) In-Context Authoring and Editing**

Most CMS vendors now offer “in-context” editing, where, after logging in, you browse through a version of your site in the system until you get the page you wish to edit. Click on the “edit” button, and either a forms-based editing window pops up or some cases you can edit the material right there in the same window. This kind of approach is useful for casual contributors who just need to make quick changes – e.g. the archetypal administrative assistant who has to keep the Intranet phone list up-to-date – but who doesn’t need and doesn’t want to do more complex tasks in a CMS.

In-context editing is very useful. In more powerful CM systems, you can even rearrange elements on the page or add new elements – if your content model allows. But for content that is being repurposed, you might want to insist on some sort of preview in all the different renditions scheduled for that document. For content being re-used, in-context editing presents an even greater challenge, because the editor is working on text in a specific presentation environment when in fact that content is supposed to be presentation-neutral. This doesn’t have to be a major problem, so long as your CMS package can report on dependencies in the system in a useful way (many can’t), and content updaters have been trained properly to recognize the downstream implications of their changes.

#### **g.) WebDAV**

WebDAV stands for “Web-based Distributed Authoring and Versioning.” It is a set of extensions to the HTTP protocols that allow users to collaboratively edit and manage files on remote web servers without overwriting each others’ work.

WebDAV-compliant CMS products can enable contributors using similarly-compliant desktop tools to check files and in and out of server repositories directly from the desktop, avoiding proprietary plug-ins and messy (and likely insecure and unsynchronized) file transfers. Most HTML editors, for example, are WebDAV-compliant. Or you can use Windows Explorer to simply drag files into a repository. Also, WebDAV enables an associated XML-based metadata payload that can ensure that key attributes (like author, expiration, etc.) will be maintained and updated along the way.

WebDAV compliance can vary from implementation to implementation, so test before you plunge, but the protocol can be extremely helpful, especially for image management (where the atomic unit for web publishing purposes tends to be a discrete file).

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<sup>45</sup> Also see Zarnekow R; Brenner W: Content-management in service on demand-systems, WIRTSCHAFTSINFORMATIK 1997, Vol 39, Iss 5, pp 451-&, VIEWEG. The authors have a CMS project implemented. And some time later, they found themselves tricked by the CMS vendors because they found out that the data volume exploded in their systems.

### **Author’s Checklist for Author System**

#### **1. Will you require purely browser-based administration and editing?**

Most CMSs enable internal users to manage content via a web browser. Administration of the publishing system as a whole (as opposed to just editorial access) may require a thin Windows client or Java applet. For spell-check or WYSIWYG HTML editor, several CMS packages embed a Java applet or ActiveX control in the browser interface. Will your corporate network and firewall allow this?

#### **2. Do your contributors all know HTML (or XML)?**

Typically, the answer to this is “no,” so most CMS packages include WYSIWYG content formatting tools that support forms-based entry and editing. A question here, though is whether you actually want your contributors formatting their text. Check to see if the interface supports style sheets. This way you can control the look and feel of your presentation globally and override the marketing intern who likes to add in-line emphasis through red, 16-point Times New Roman Narrow type.

#### **3. Will you need to convert documents? Including batch import?**

If you are regularly converting large documents, you will want to look into batch import functionality. This is less important if you principally need to perform a one-time load of legacy documents.

#### **4. Are you making an investment in XML?**

Some enterprises are aggressively adopting XML; others are taking a wait-and-see approach. The latter strategy is not unreasonable: XML should not be adopted for its own sake and is not the right language for every project. However, if your company falls closer to the former, you will want to carefully examine how your WCM package will leverage your XML investment. Many packages can store content as XML, but much of the power of the language resides in its content transformation capabilities. You may want (or even need) to use XML to simplify getting content into and out of your CMS repository. If your content does not yet reside in a normalized database, then the extra effort of converting legacy content to XML may well be worth it.

#### **5. How much content validation will you need?**

Validation is an oft-overlooked requirement when companies transition to a more structured content entry environment. Certain fields required, others need specific types of content. JavaScript can trap for some of this in form fields, but more robust options return to XML and formal validation against DTD or a schema.

#### **6. How much link validation will you need?**

Validating that your internal links all still work is a tricky undertaking. Some systems address it at production time, others through periodic sweeps, others at runtime, and still others not at all.

#### **7. Do you require a particular database package?**

This is another global consideration, but it crops up early in the requirements process. Your favorite CMS package stores metadata only in Oracle? If you weren’t one already, you just became an Oracle shop.

(Chart 5.08) Author’s Checklist for “Collaborative Function Model’s” System Attribute: “Author System”

#### 5.2.04 Content Integration: The Puzzling Game of Your CMS

First- and second-generation web-sites were primarily collections of static, freeform HTML pages. The HTML mark-up provided presentation logic to the text, but did not define any underlying structure.

Today, companies push much more diverse content to the web, including data based information, binary files of all types, structured documents, and freeform text content. This information frequently comes from multiple databases and varied content repositories. At the same time, web publishers are making more sophisticated use of images and multimedia. The job of a CMS is to make it all come together. At the moment, there are two main issues in this field:

- a.) **Content Integration**
- b.) **Managing Images**

##### a.) **Content Integration**

There are typically 4 broad types of content that go into a CMS:

- **Databased information.** For most companies, this means relational data from an relational database management system (RDBMS), which is highly structured, but in a particular way that features rows and columns of data.
- **Structured documents** (such as press releases). These are typically hierarchical in nature and can be split into constituent elements. Today, they may be sitting as unstructured binary word-processing files on your organization’s servers or desktops, but the information is quite structured.
- **Unstructured documents.** These include things like e-mail messages, or freeform documents like a one-off case study or your copyright statement.
- **Media Assets.** These may be structured or unstructured. Lower-end CMS packages tend to see them as unstructured, although DAM (Digital Asset Management) vendors helpfully point out that media files can be highly structured indeed. In any case the associated metadata is critical to extending the value of this type of content in your system, and media files typically have unique formats and management needs that need to be addressed in any overall CMS strategy. Some CMS vendors offer browser-based image editing, usually via an ActiveX control or Java applet.

Before you decide for a CMS package, complete an inventory of your own source content types and make sure the system you envisage adequately accounts for them.

If you already have content residing in other active Web-based subsystems (CRM, ERP, enterprise planning and knowledge management) that you want to publish on a web-site or sites, then you will have some critical integration decisions to make.

Each subsystem typically incorporates functionality for updating its own internal content, but it is unlikely to be as robust as you will find within your CMS. If your CMS is your primary e-business platform, then you probably want to run all your content through it. Different CMS packages will force an architectural choice here. Some will want to aggregate that content in the CMS repository where it can be properly versioned, re-chunked, and so forth. Other packages will offer “virtual access” to the content, but leave it resident in a remote repository.

In our experiences by surveying and selecting the most CMS packages on the market, we find that: third party application servers and portals – with their “portlet” interfaces – typically make this type of integration cleaner, and you may wish to aggregate content at the delivery tier rather than within your CMS package. Consider this approach if you do not need to massage the content (e.g. version it, put it through a workflow, re-edit it) coming from another system, but only need to display it on a web page in tandem with the information coming from your CMS. Our fair warning is: this looks nice in diagrams but it is never easy in practice, and relies on careful attention to metadata, which will serve as the glue putting different content items together at the delivery tier.

The rise of Web Services might simplify the process of adding proper content management facilities to other e-business efforts, and vice-versa, but broad adoption of Web Services remains some years off. Most slogans from web solution providers are still in the experiment phase.

### **b.) Managing Images**

In our experiences by surveying and selecting the most CMS packages on the market, we also find that: image management has been long the Achilles heel of all the available CMS packages nowadays. Many web content management systems treat images (and other media) as generic binary files, such as PDFs, when in fact images and other media represents an increasingly important part of web content – and therefore need to be managed as such. Aggregating image and text content is therefore a key challenge facing any CMS project.

To manage images on web pages, editors usually need (at a bare minimum) access granular image libraries, with images sorted by type or other attributed, all according to appropriate access rights.

Most CMS packages today will let contributors peruse thumbnails and manually add images to pages. A CMS would ideally store key metadata about each image (such as alt tags, height and width, perhaps even origins and rights), but as a practical matter few do. Some CMS vendors will point you to the new DAM product they acquired, but be careful here; you may risk paying US \$100-200,000 more in licensing fees for the privilege of managing your media content in a browser.

Many CMS vendors now provide capabilities for editing images on the fly in the browser. New widgets are popping up, including a slick ActiveX control, and a variety of Java applets that some CMS vendors are incorporating.

However, this capability is a double-edged sword. You may want to allow a marketing person to crop an image or modify its size, and perhaps even overlay some caption text. There are other capabilities – such as blurring/sharpening images or changing color depth – that might be best left to a designer. But the good news about these widgets is that they offer the ability to annotate images and put them through a meaningful workflow, thereby automating a process that previously only happened offline.

Finally, these rich media editor widgets are new, and may prove to be a bit buggier than the rich text editors they are

### ***Author's Checklist for Content Integration***

**1. Do you anticipate tapping multiple content repositories?**

Authoritative versions of digital content may reside in different places. These locations could include different countries within a multinational enterprise, different places vertically within the company (e.g. back-office ERP databases and front-office file systems), or different places functionally within the company (e.g. HR and Marketing). A single system that can put them all together for web presentation is difficult, but may be necessary.

**2. Do you need to aggregate content at the CMS tier of the Delivery tier?**

If you have a requirement to publish content from remote repositories into your web-site(s), you'll need to decide whether to put that content under management or publish it directly to a web server, portal, or application server. If you need to add value to that content in some way before it hits the web – put it through a workflow, add metadata, strip away in-line content elements, build an audit trail, etc. – then you'll want to aggregate that content via your CMS, and will need to select a tool capable of tapping those repositories. If, on the other hand, content from your other repositories can be published out to your web-sites as is, there may be no reason to complicate things by running it through your CMS first.

**3. Will you need to relate database information to documents and vice-versa?**

Do your present databases hold isolated content, or will you need to make associations between database content (such as customer records) and other structured and unstructured text content?

Customers don't care about internal walls between your data.

**4. Do you anticipate incorporating e-mail into your site content?**

Only a handful of WCM products actively integrate e-mail messages into workflows and content repositories. It can be deceptively difficult, so consider it carefully before proceeding. If the target site is an Intranet, ask yourself whether you aren't really creating an enterprise portal, and therefore might be better off with a Knowledge Management product. KM offerings typically encompass e-mail repositories, but usually lack workflow and other content management functions out of the box.

**5. Will your site be delivering substantial numbers of formatted files, such as spreadsheet files and media assets?**

If the answer is yes, you need to make sure that your CMS understands and can treat these files as the digital assets that they are, as opposed to text chunks that can be easily data based and recalled with simple SQL queries. Systems with a background in document or asset management are likely to have more robust support.

**6. Will you be importing syndicated content?**

If so, then you will almost surely require a WCM package that can read in and parse XML, the de facto standard for syndication repositories. Meta group estimates that by 2002, 85% of corporate web-sites will make use of syndicated content (although only an estimated 20% will offer syndicated content externally, a number that could rise as B2B content requirements expand).

**7. Will you allow non-designers to edit images?**

If so, then seek out CMS packages that offer browser-based image-editing utilities. But remember you will want to carefully control here who is allowed to edit what. Look for widgets that allow you to configure (i.e. turn off and on) specific features against particular roles.

(Chart 5.09) Author's Checklist for “Collaborative Function Model's” System Attribute: “Content Integration”

### 5.2.05 Metadata: The Value-Adds of Your CMS

Sometimes lumped under the general category of “tagging,” this technically concerns building, managing, and applying content classification systems. When users – or systems – apply metadata, they are classifying content. Classifying content is another key factor in liberating the underlying value of your information.

The first major benefit to tagging content is that it helps people find things. Metadata enables your search facilities to become more targeted and efficient. How so? Imagine your library with no catalog system, no labels on the shelves, and books without title and author info on their spines.

Finding the specific information you seek would be extraordinarily difficult. Today’s full-text search engines are only slightly better than going into the library above. Metadata enables you to provide greater meaning and cues, without which content is just text. Tagged data enables dynamic generation of tables of contents, and vastly improves search engine results relevancy.

A second major benefit to tagging is establishing relationships. Content element or documents can relate to each other in time (“sort by date”), subject (“show me both the 3-D image and detailed specs on the product line I’m viewing right now”), and other attributes. Tagging enables this. Tagging is especially important for establishing ad-hoc relationships among hierarchical data; relational databases were specifically designed to accomplish this using “key” fields that relate data in different tables to each other.

As noted previously, metadata is almost always the key to automated site navigation. That is, content doesn’t appear somewhere because an author put it in a particular place – it’s there because the document put itself there.

The automation here can be quite powerful and has obvious benefits for site owners and site visitors alike. Recognize however, that like all automation, you are giving up some level of granular control over layout and navigational patterns. Much the same way you standardized around a core set of templates and document archetypes, so are you standardizing around a set of categories and relationships. A good system, however, will allow you to make exceptions.

In any case, if making your content more intelligent and mobile is an important part of your CMS strategy, then pay close attention to how your vendor deals with metadata and classification. In particular, take careful note of how metadata values map you’re your content management system to your content delivery system. If your portal software can’t make use of subject metadata to build dynamic navigation structures, then your author’s work to complete “subject” fields in content entry forms went largely for naught.

Assigning metadata is often seen as the job of content contributors and editors – who else can better apply meaning to their content? Of course, some metadata can be applied implicitly, or transferred from a source document. This includes such attributes as date, file type (where relevant) and size, author, approver, and so forth. The availability of this new implicit metadata is a powerful reason to implement a CMS in the first place.

However, because entering explicit metadata requires extra manual effort, people generally don’t like to do it. If tagging requirements are particularly onerous, contributors will rebel and either put in bad data or find work-arounds to avoid this work altogether. Most CMS packages will enable you to apply rigid technical controls to prevent this, but a better strategy revolves around getting buy-in from contributors for the extra work.



When we tried to persuade our Taiwanese employees to do this extra job, we did had great internal pressures. However, the heart winning secret is: You must point out to your contributors that good tagging likely means that more site visitors will see their content, and that since the contributor herself will find the text more readily in the future, updates will come easier. Explain that metadata is critical to whatever business objectives you are pursuing by linking content to core products and services that pay the rent. Then in the contributors' tagging interface, be sure to employ intuitive, easy pull-down menus with pre-set options. The industry phrase for this is “controlled vocabularies.”

Besides, a very important lesson which we have learned by implementations of the METADATA schema in our research project is: to avoid making contributors do too much tagging at the start, and keep your classifications schemes simple.

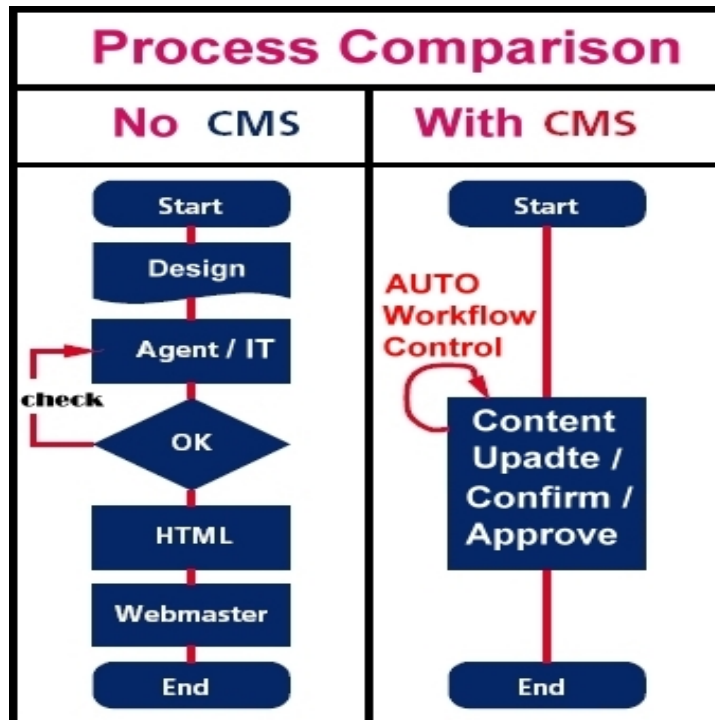
Yes, metadata provides an important value-add within the system, but like workflow, it can be overdone. Keep in mind that you will need to update your vocabularies persistently as content changes, and good contributor feedback mechanisms will be essential to keeping taxonomies relevant. The important thing, though, is to just do it in the first place, especially if your web-site exceeds, or is going to exceed 1000 pages. Without metadata, you won't be able to keep track of all that content.

<b>Author's Checklist for METADATA</b>
<p><b>1. Can you live with limited metadata sets?</b></p> <p>Some basic CMS packages limit metadata fields to keywords and description fields. This won't work for you if you need to implement a custom scheme with your own vocabulary.</p>
<p><b>2. Who and what can have access to metadata and vocabularies?</b></p> <p>Your search engine should certainly be tuned to leverage any metadata. Will you need your internal reporting systems to tap into it too? For example, do you need to know how many times a given tag has been applied? How easy is it to update vocabularies in the package you are considering? With iteration and learning comes revision, so changing the overall taxonomy and individual vocabularies should be simple as possible – ideally using the CMS itself to manage versions and approvals.</p>
<p><b>3. At what level do you want to tag content?</b></p> <p>It is theoretically possible to apply metadata to content at any level, including folders, documents, content elements, even individual words. As with everything else, the more granular your system, the more complexity you introduce. Multiple levels of metadata can also have performance implications for the system at large. Your business objectives and workflow should guide where you fall on the spectrum here.</p>

(Chart 5.10) Author's Checklist for “Collaborative Function Model's” System Attribute: “METADATA”

### 5.2.06 Workflow: The Gate-Setting of Your CMS

Workflow is how content gets “from thought to end-user” through a set of interdependent tasks that occur in a specific sequence. A workflow process can enhance systemic stability and reliability by allowing managers to align content paths with core business and editorial rules.



(Chart 5.11) CMS: The process comparison. This chart is “exclusive authorized” by the Infopark AG to privileged academic uses. Please see the appendix for more Info.

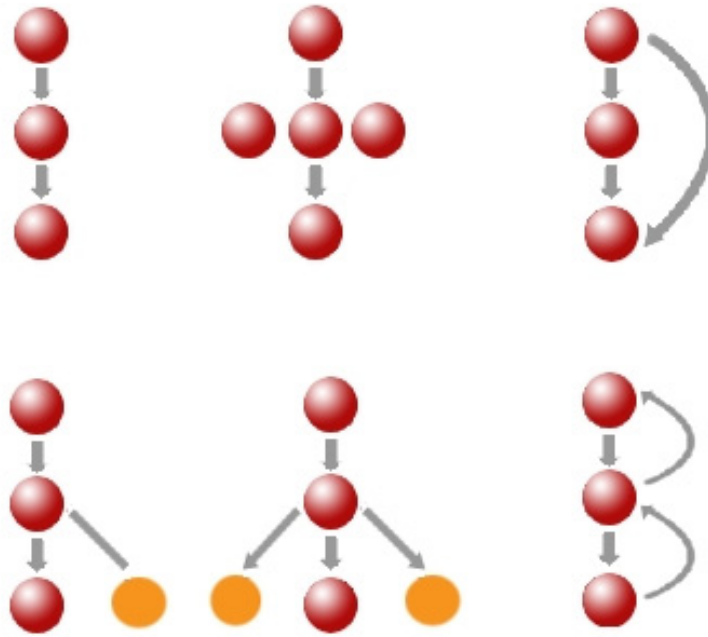
Done right, workflow systems can improve time-to-adapt within companies of all sizes. Executed poorly, a workflow system can gum up an otherwise perfectly good publishing system. If you haven’t already done so, take the time to model your existing web-site workflow process – what you find may surprise you. It’s exactly just like the work flow which is shown the left column of the chart above (CHART 5.11)..

In reviewing CMS packages, look for rules flexibility, including support for ad-hoc workflow and rerouting mechanisms. A package may contain 12 preset status identifiers, but what if one you need isn’t on the list? You may well need this flexibility, because web content workflows tend to become more collaborative than other business processes that you might be automating. There are several different ways to model content. We always recommend, however, starting out with different content types as the base element. Some of the best models simply use tabular charts, with each row representing a different content object, each column a particular state that the content resides in, with each relevant cell describing what is supposed to happen to that content in that state.

Most advanced CMS products contain visual workflow modelers built in. Others will import specially-filtered Visio flow diagrams. The keys are abstraction and flexibility<sup>46</sup>. Note, for example, that in many CMS packages, content flows through different, highly-generic states, in which developers and managers can apply certain specific rules. Others follow a process-flow approach where activity and particular steps are centered on particular tasks, rather than the content itself. In the chart below, we have some demos of the possible situations that you might encounter (CHART 5.12).

<sup>46</sup> Stein T: Intranet-organization - how to get benefits from connected enterprise networks by content management, WIRTSCHAFTSINFORMATIK 2000, Vol 42, Iss 4, pp 310, VIEWEG

In either case, you'll want to model your workflow using abstract roles, rather than saying “releases go from Bob to Lisa to Bill.” The model is actually that releases are edited and then deployed. Today, Lisa may serve as the reviewer and Bill the deployer, but the people may change (or one of them may be out sick), while the workflow may not. This is absolutely the wrong way to create a workflow that fit your needs.



(Chart 5.12) Some Simple but Practical Workflow Chart Portfolios. (Our Analysis)

Instead, thinking in terms of abstract titles, taking the chart in the left side for some illustrations, as well as content states and transitions helps you better understand the different situations your team is likely to encounter. In general, however, you want to avoid the creeping process-flow diagram. The simple process of modeling your workflow and introducing automation can tempt participants to insert new and potentially unnecessary steps into the flow. Yes, business rules need to be applied and enforced – if the CEO must sign off on all press releases, you'll want to prevent ad-hoc rerouting at an earlier point.

But if you overcomplicate a process or represent a workflow in way that doesn't actually work in the real world, users will rebel, often by circumventing the system. Stories of this are legion. We know of one public portal where content owners figured out how to FTP files directly to the staging server to avoid an onerous and buggy workflow process.

Moreover, one of the opportunities you have in implementing a new CMS is to streamline your processes – that's where time and cost savings lie.

One final caution on workflow modeling: make sure that your vendor can demonstrate using the same visual modeler in any CMS to make significant *changes* to an existing workflow process as well as create new ones. If you need to use underlying scripting to make changes to a particular workflow process, then you can be sure that the GUI editor is out the window going forward.

### **Author’s Checklist for Workflow**

#### **1. Will your workflow include branching and looping (as opposed to simple linear tasking)?**

When tasks and content begin to peel off in different directions, basic workflow systems come under stress. If your workflow requires branching and reconciliation, or complex looping chains, make sure your CMS package can support it.

#### **2. Will you require monitoring and notification?**

If contributors and editors sit more than 30 meters apart (the interpersonal universe of the typical cube dweller), chances are you will need automated mechanisms to inform actors in the system of the status of various tasks and/or content elements. Look for systems that generate alerts once certain deadlines pass. If an editor should suddenly take ill, how would others know to fill in or reroute?

#### **3. Auditing and Reporting: what do you need to know?**

And when do you need to know it? Identifying bottlenecks is a real benefit. You might also want to audit individual performance and other metrics.

#### **4. Which is more important, speed or accuracy?**

Like it or not, speed and accuracy often present a direct tradeoff. The fewer eyes that need to review a content element, the faster it gets to staging and production servers. This doesn't mean that companies with complex workflows are destined to be slow, nor that firms with simple approval mechanisms will inherently publish faster. Consider the time-to-market value on each of your documents as you examine a digital workflow.

#### **5. The CEO wants an item published in five minutes; can you do it?**

Your CEO needs to respond to an event in the stock markets and wants her piece online right away. It's times like these that a sclerotic workflow system can really get in the way. Make you're your system can handle unusual contingencies.

#### **6. Are you considering Inter-enterprise contribution and workflow?**

If you are, prepare yourself for substantial customization effort. There is a dearth of commercial tools and approaches to handle the complexity of inter-company workflows, and worse, no clear standards in the event two companies are using different WCM platforms. Look for rapid improvement here in the next year or so. Collaborative commerce – and the attendant complex content requirements – is forcing companies to manage content publishing jointly, and software vendors are sure to follow, most likely with approaches leveraging new Web Services standards.

#### **7. Do you already employ a particular workflow modeling mechanism?**

Some WCM packages will use Visio diagrams. For example, Stellent, Tridion, and Vignette offer realtime integration with Visio, allowing you to edit the properties of each step. Other products provide built-in WYSIWYG modeling tools of their own. In still other packages, workflow can only be modified through a forms interface or technical API.

(Chart 5.13) Author’s Checklist for “Collaborative Function Model’s” System Attribute: “Work Flow”

### 5.2.07 Templating: The Cinderella’s Dresses of Your CMS

At their core, all CMS packages are templating engines. That is, they enable you to publish content out through preset visual and organizational models, or “templates.” Note that when CMS vendors refer to templates, they sometimes conflate content input templates and content output templates.

We will concern ourselves more with the latter. Input templates are important, but are typically tied directly to the specific content type, or some intersection of the content type and contributor role.

In our experiences by selecting the most suitable CMS package and partner for our international cooperation project, we find that: CMS packages vary substantially in how they enable you to create templates. Some CMS packages provide their own WYSIWYG tools for template creation, but you will usually profit from using a real HTML editor to build these. Most CMS vendors have gotten wise to this and integrate closely with at least one standard editor like Dreamweaver, while allowing you to copy-paste from others.

Some CMS packages employ their own set of proprietary tags – like “<publish>”, “<include>”, or “<hide>”, and such – to extend HTML and give page designers direct access to some of the dynamic features within the system<sup>47</sup>. This is a blessing but also a curse: a blessing because non-technical designers can very quickly build more robust templates on their own; a curse because proprietary tags lock you in to a particular solution and increase any migration expense later, and may not be sophisticated enough for the sorts of template logic you want to express.

Therefore, template flexibility and component granularity are key considerations here. Some lower-end CMS packages simply dump the entire “content well” of a page into a single text area-editable element.

This may be too simple for sites that need a broader range of page display archetypes. Other midrange packages employ concepts of “inner” and “outer” (or “wrapper”) templates, each made up of standard elements. Higher-end, more flexible packages will typically allow for very granular control of templates, with a hierarchical model for template development where you can create and manage multiple variants of single template models.

Nevertheless, resist the temptation to develop an unnecessary plethora of templates. The more templates you have, the more you have to maintain. Your contributors – if they have a choice – will vote with their keyboards and probably select a subset of the most useful templates anyway.

There is also the related question of where and how templates are stored. In systems where templating becomes primarily a technical task, packages tend to assume that you will store templates offline (as with Microsoft Content Management server – see screen below from VisualStudio.NET), perhaps in some sort of code repository like CVS. This has its benefits for developers, but is one more asset to sync up in your build processes. Other packages allow you to build and modify templates within the system as actual CMS assets, perhaps with an assist from Dreamweaver.

Also, keep an eye out for design and layout limitations. Does the template system presuppose a certain presentation model? In particular, look for problems with DHTML and Javascript, since some page generation engines aren’t expecting to see formal objects outside what they

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<sup>47</sup> Rothfuß Gunther, Ried Christian: Content Management mit XML – Grundlagen und Anwendungen. SRINGER 2001

would parse on the server. If you expect to use a complex, DHTML-driven design, ask your CMS vendor to show you other comparable sites using their technology.

<b>Author's Checklist for Templating</b>
<p><b>1. Do you already use Dreamweaver Templates?</b></p> <p>Many organizations successfully control standard layouts using Macromedia Dreamweaver templates (.dwt files). This is a nice interim approach before investing in a CMS, but doesn't always scale well and locks you into a file-based system. Nevertheless, some CMS packages can import and re-use DWT files, and even allow you to manage your templates on an ongoing basis using Dreamweaver utilities</p>
<p><b>2. How many templates do you really need?</b></p> <p>To paraphrase Albert Einstein, you should build as many templates as you absolutely need – and not one more. More templates means more objects to manage, and more to modify when your design changes. If you publish a large site with many divergent templates, be sure to investigate how the CMS allows you manage those templates (and associated elements). Conversely, if your site layout consists of many variants of just one or two templates, you'll want to put careful consideration into the hierarchy of elements such that you understand the cascading layout effects of modifications to elements higher up in the tree.</p>
<p><b>3. Will your page bodies consist of multiple, reusable objects?</b></p> <p>Some organizations want to deal with the page body, or “content well,” as a single chunk, contained within an outer “wrapper template.” Among other reasons, this gives authors great flexibility in applying unstructured content and, to some extent, the ability to define the layout of the well space. Nearly any CMS can accommodate this easily. If, on the other hand, you need to standardize elements in the page body, and/or your layout makes a less absolute distinction between “wrapper” and “content,” then you will require a mid-range or higher CMS that can take a more granular approach to laying out content elements.</p>

(Chart 5.14) Author's Checklist for “Collaborative Function Model's” System Attribute: “Templating”

### 5.2.08 Versioning: The Reliability of Your CMS

“Versioning” is shorthand for a system that keeps people from stomping on each other's work in collaborative environments.

This is typically enforced through document or element check-in / check-out facilities that prevent two or more people from working simultaneously and unknowingly on the same content. MS users in distributed publishing systems often find version control tremendously helpful, but it sometimes can come at the expense of collaboration. The idea that only one person can have a content item checked out at any one time can lead to very linear processes and sometimes added stress on workflow outlines (such as excessive looping). Some CMS vendors have responded with specialized capabilities for multiple editors or work on a content item simultaneously – typically by “saving” it but rather than submitting” – before promoting it to the next step in a workflow.

Versioning enables you to track changes, so you can audit and monitor what changes have been made to any element or asset. Some CMS packages have done this in a sophisticated way relative to desktop tools, while other packages perform change tracking in a simpler, side-by-side way that can also be useful.

“Versioning” has also become a major liability-related feature, and CMS vendors have horned in on this as a critical selling point. As a company you are responsible for what you put online, but whereas print content may be frozen in time, web content is dynamic, so how can you track what your site actually said at a particular date and time in the past?

For legal reasons, even companies in largely unregulated industries have to be able to recall exactly what their web-site was publishing at any given instant. The ability to “roll-back” a web-site to that time is therefore essential, and this is why a sexy new rationale for making a CMS investment has emerged: it’s a necessary insurance policy.

A somewhat loftier benefit is the ability to perform date- and time-aware publishing. Digital publishing enables you to pre-schedule for content release *and* expiration, as well as any number of interim steps in-between (perhaps syndication or archiving). Expiration in particular represents an oft-overlooked benefit. You dilute the value of your current content by keeping outdated material in your repository, where, among other things, it can show up in search results.

<b>Author’s Checklist for Versioning</b>
<p><b>1. Do you require version branching and reconciliation?</b></p> <p>If you do, it will immediately push you to a mid-market package or better. Reconciliation can be tricky; if you anticipate doing a lot of it, take a look at the management interface of any WCM vendor that says they can handle it.</p>
<p><b>2. What is your content lifecycle?</b></p> <p>Is there an automated archiving or syndication date? And do you need to pre-produce content for publishing on a certain date or at a certain time? Are there interim steps where pieces of content have to be moved or revised while still “live” in production, but short of being archived?</p>
<p><b>3. Do you anticipate needing to be able to roll-back the site? How far? What elements?</b></p> <p>You don’t require a complicated system if your principal concern is being able to return to a previous version of something after making a mistake. If you need to recreate your entire site at a given date and time, you will need a more powerful CMS package. Find out what is versioned: code fragments, content elements, documents, images?</p>

(Chart 5.15) Author’s Checklist for “Collaborative Function Model’s” System Attribute: “Versioning”

### 5.2.09 Globalizing: The Multi-nationality of Your CMS

In a global publishing environment where less than half of Internet users understand English, globalization/localization is critical to the multinational enterprise. There are at least two major implications for your CMS effort:

- Your software may need to support multiple regions and countries, as well as multiple languages and dialects
- You’ll require a process for converting or adding content to create region- and language specific pages, both with respect to the text, but also the graphics and all the other elements.

Most global companies have figured out that they do need to localize. They may centralize certain messages and materials, but they leave key decisions about the way that information is communicated – and in what language – to their local offices<sup>48</sup>. Indeed, localization represents far more than just text translation. It is about doing business in a way that makes sense for any particular country. Doing e-business is no exception.

However, these same companies generally have not automated the mechanics of globalization localization. According to a research in Germany, 84% of international companies with more than 20 web-sites still localize site components manually<sup>49</sup>.

Localization may be the weakest area of CMS packages, though many are partnering with other specialized vendors and quickly trying to make up for lost time. What is worth to mention is that, in the process that we search for CMS package and business partners, we found out that European CMS vendors tend to provide better facilities for localizing interfaces as well as more sophisticated systems to manage multiple language versions of the same content. They have configured their version-compare systems to show the differences between a source text and the revised version, so that a translator can quickly make the same revisions in any local version.

In the meantime, a slew of professional services firms and companies with software add-ons have sprung up to help companies localize their CMS infrastructures. If globalization is important to your firm, you'll want to carefully review the partnerships your CMS vendor has in this space.

For a multinational site working off one platform, you'll want to look at the technical, organizational, and interface aspects of localization at every layer of your CMS, including:

- Database repositories, specifically how they handle character sets. Look especially for UNICODE 2.0 support. UNICODE is a standard that encompasses nearly fifty-thousand characters from all the world's major written languages.
- Administrative and content-contribution screens – especially the default ones that ship with a CMS package – as well any help screens.
- The public interfaces, including any search engine.

There are also critical procedural issues to consider. Some CMS packages, for example, will employ time zone synchronization to make sure that content is published at exactly the same local time on your different web-sites around the world.

### ***Author's Checklist for Globalizing***

#### **1. Will you need to support non-English languages or non-Latin character sets?**

If so, your CMS package, and any databases it uses, will need to support this. The most common international character set standard is UNICODE. Pay particular attention, though to languages that read right-to-left (such as Arabic), and test how your CMS will handle these.

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<sup>48</sup> \*Stein T: Intranet organization - how to get benefits from connected enterprise networks by content management (vol 42, pg 310, 2000), WIRTSCHAFTSINFORMATIK 2000, Vol 42, Iss 5, pp 476-476, VIEWEG

<sup>49</sup> Gersdorf R: Possibilities of content management, WIRTSCHAFTSINFORMATIK 2002, Vol 44, Iss 1, pp 75-78, VIEWEG



**2. Is your workflow international?**

Sending same piece of content to be localized on multiple sites requires branching. And if the source content changes, you will want to trigger a revision in its localized replicas as well. This raises a very practical issue for translators: how will they know what has changed.

**3. What languages will you require in the editorial and administrative interfaces of the CMS?**

Some CMS vendors have translated their default administrative, editorial and even help screens to non-English languages. Others have not. In most packages, these interfaces are primarily templates that are accessible through an API, so you could translate them yourself. But would you really want to? What happens when it comes time to upgrade to a new version?

**4. Do your Images frequently contain text?**

If so, then you will need to localize those as well, and build image changes into text-localization workflows. Some CMS vendors, such as Day, allow you to store a root image in a high-resolution format, then publish out different renditions (presumably with text in different languages) for distribution to local web-sites.

**5. Will you and your users need to search in other languages?**

Don't assume that the same search engine can function effectively in different languages. You'll want to test out any bundled search engine against a repository in languages you intend to employ.

(Chart 5.16) Author's Checklist for "Collaborative Function Model's" System Attribute: "Globalizing"



## The Dimension of Content Delivery

In the "Collaborative Function Model", we define "Content Delivery", similar as the most popular term "Publishing" It encompasses what happens when a user visits your site and starts clicking. You can also think of it as the "consumption" analog to earlier production phase.

While you could consider the attributes that we are going to discuss below as "run-time" features, in fact, they all have critical design-time considerations. For example, how your users search your site has very much to do with how you indexed your content.

However, for most content managers, Delivery also includes what happens to content beyond the confines of your production web server, almost something like cross media publishing. You may not be thinking about this broader content distribution now, but you may be soon.

### 5.2.10 Page Generation: The Dynamics of Your CMS

Content has value only in the eye of the beholder, so this is where the investments you made in better content management need to pay off: when a user actually visits your site. Web-sites that serve static pages from file systems need only a web server.

Indeed, web server software is optimized to do just that: read a file off the disk and serve it up. If you are incorporating other dynamic logic, engaging in any customization, or checking for

highly-changing content, pages must be assembled at the time a user calls up the page – that is, at “run-time.” A common expression for generating pages dynamically at run-time is “frying” them.

The notion of dynamic assembly is not new; it dates to the earliest days of web with “server-side includes,” where snippets of text from separate files would be inserted into master HTML pages.

The technology for frying pages is much more sophisticated now, enabling site owners to pull from different repositories, use conditional logic, and implement dynamic navigation and presentations. For this, you typically require an application server of some kind.

That application server does not need to be an expensive, Java-based product. At a basic level, Microsoft’s Active Server Pages and Apache PHP (both scripting engines built into the web server itself) as well as Cold Fusion are sufficient lightweight application servers.

For things like transaction controls, persistent session management, database connection pooling, or more sophisticated forms of personalization, you probably want a heavier-duty application server, like BEA WebLogic, SunONE, or IBM WebSphere<sup>50</sup>. Note that some CMS products still have their own built-in application server, either homegrown or OEMed from another vendors, although the industry trend is certainly to use standard 3rd-party application servers.

Since frying can prohibitively slow down a web server, some CMSs are set up to “bake” dynamic pages to static files that then reside on the web server’s hard disk. From then on, the web server spools them off on request, achieving very high performance. It also reduces risk of downtime, since static pages do not need to concern themselves with connectivity to a live database.

Typically, such page generation routines can be scheduled to run in batches, or individually as separate documents are updated. Obviously, batch-based updates mean that content on the file system may differ from that in the database until the next “baking” session synchronizes the two again.

If you take this approach, make sure that pages that are dependent at all on an asset that is baked are reassembled and re-baked as well. For example, if you change an image name or the location of page, other pages referencing those assets need to be updated and regenerated as well. “Baking” sounds simple, but in reality can be quite complex, especially with respect to deployment rules and integrity.

Some CMS packages support hybrid publishing systems that enable you to bake infrequently changing elements (such as navigation bars), while keeping other page elements (e.g. those used for personalization) dynamic. For example, the system may pre-assemble all the data based elements of a page – except the header – into a JSP file. The header contains some personalization logic that needs to be evaluated at run-time, via a snippet of JSP code. We call this approach “parbaking.” These issues are addressed in more detail below under “Caching.”

<b><i>Author’s Checklist for Role Management</i></b>

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<sup>50</sup> Cody WF; Kreulen JT; Krishna V; Spangler WS: The integration of business intelligence and knowledge management, IBM SYSTEMS JOURNAL 2002, Vol 41, Iss 4, pp 697-713, IBM CORP

**1. Do you already use an application server?**

If your enterprise has already invested in a particular flavor of application server – has grown deeply knowledgeable about its particular quirks and features and built various applications within its framework – then you may want to know which CMS packages can work with it.

**2. What programming languages are you comfortable with? APIs?**

This is another global consideration but let’s address it here. You (or your consultants or integrators) may be more or less comfortable in certain programming environments. This is a critical consideration, since CMS packages are complex and almost always require writing custom code to achieve sufficient integration.

**3. Will you need to incorporate logic from other subsystems? How so?**

At a more complex level, this refers to what other major systems you may need to integrate, such as ERP, CRM, etc. At a more simplistic level, it could refer to particular business logic around the way certain pages are displayed. On weekends, for example you might generate lower bandwidth presentations for home users. Typically, this is done through application-server interfaces.

**4. What are your performance (speed) requirements?**

This is an easy one: everyone requires fast pages. But there is fast and faster. How screens get generated is a prime determinant for how fast your site will perform. Keep an eye out for known performance hogs, like server-side “includes.” This issue is discussed in more detail below under “Caching.”

(Chart 5.17) Author’s Checklist for “Collaborative Function Model’s” System Attribute: “Role Management”

### 5.2.11 Searching: The Readability of Your CMS

If your site’s content is complex enough for you to consider a CMS, imagine how it appears to your users. On content-heavy sites, most visitors will turn immediately to a site search engine if what they can’t find what they seek after one or two clicks. Indeed, a search engine often best meets the primary need of site visitors: rapid access to just the information they want.

However, a lot of hidden complexity can lie behind search engine implementations. Don’t make promises to users about relevancy rankings or the breadth of your indexes if you can’t keep them. If your search implementation cannot simultaneously query your catalog data and your unstructured documents, then you should provide users a choice of repositories via a pulldown menu to set their expectations.

#### ***A Good CMS Can Improve Your Search Engine***

As a matter of fact, search engine results will quickly expose the quality of some of your metadata, including page titles and descriptions tags<sup>51</sup>. Great content with bad or missing titles is unlikely to be found by end users.

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<sup>51</sup> Hall WP: Maintenance procedures for a class of warships: Structured authoring and content management, TECHNICAL COMMUNICATION 2001, Vol 48, Iss 2, pp 235-248, SOC TECHNICAL COMMUNICATION

The good news here is that your CMS should provide a way for you to easily apply the all important title tag, description, keyword, and other custom metadata that will improve the quality of your users’ searches as well as the presentation of the results. The CMS will also capture other implicit metadata, such as how old a document is, that can be very helpful for search results.

A good CMS can help your search engine in other ways. Ideally, the CMS package can be used to store and manage your taxonomy, helping you keep it fresh and accurate. Your CMS can create more sophisticated rules for content elements (such as navigation or session elements) that you don’t want indexed, including the ad-hoc assignment of “don’t index” tags by authorized editors.

Besides, a good CMS can print a special, hidden sitemap of links just for your search-engine crawler. At the same time, the imposition of a CMS may make your search effort more complicated, and you will certainly want to re-tune any search engine after launching a CMS. It may also you’re your search efforts more costly, particularly is CMS user requirements – which can be fairly demanding – are taken into account. Indeed, some features within your CMS, such as reporting and task analysis may be taking advantage of a search engine in the background, and you may have some integration effort to expend to get it all to work, especially if you want to employ your existing search software, and not the package bundled with your CMS vendor.

### ***A Good Search Engine Can Improve Your CMS***

Vice versa, a good search engine that indexes your CMS content will also lead to happier authors: they can find that article they wanted to edit, more easily. Managers can become more powerful, because they can find the data they need to manage (e.g. how fast are workflows being cleared?).

However, effective search integration with your content management system often requires additional, specialized resources and expertise, and you may have neither close at hand. For example, you’ll need to figure out whether you want to index across versions of content, and across separate physical repositories (e.g. work-in-progress versus staged content). There is a case to be made for both (an author might want to search for all instances of a single content item, regardless of status).

In some cases, CMS vendors have built-in SQL or X-Path queries for this; in other cases they assume that you will have integrated a search engine to do the job. Many advanced CMS packages do come with a bundled, “light” version of a 3rd-party commercial search engine for the purposes of content retrieval for content managers working within the system. These will still require some tweaking against your retrieval needs. These packages generally cannot be used in a delivery environment, and usually come with a mixture of other limitations as well, including the:

- ◆ size of repository, and/or
- ◆ coverage (e.g. index PDFs?), and/or
- ◆ concurrent users or allowed environment.

In fact, although these search packages presumably hold the benefit that they are pre-integrated, they are supplied in the hopes that the customer will become incensed to purchase the fully functional version of the product from the search vendor. You **MUST** check your contracts carefully.

In addition, the newly-empowered content managers working in a CMS will start modifying content structures in way they couldn't before. That's generally a good thing and in fact represents an important reason to implement a CMS. However content managers may consistently put stress on your search engine configurations by:

- Modifying content types (e.g. adding new elements, changing element names that your search engine was looking for);
- Adding and removing directories;
- Creating new workflow states (that might go un-indexed);
- Creating a nearly infinite number of concurrent (e.g. sibling) versions of the same content item; and
- Opting out of irrelevant metadata vocabularies (by figuring out how to skip them or putting in bad data).

The good news is that you should be able to use that same search engine to find all these particularities, but you'll want to check often.

<b><i>Author's Checklist for Searching</i></b>
<p><b>1. Have you already selected a search engine separate from your WCM package?</b></p> <p>As what we've noted, while some CMS packages bundle their own Search Engine or OEM a separate product, increasingly, CMS vendors have begun to leave the choice up to their customers to select a "best-of breed" search product. If you are already set on a particular search engine, make sure that it can be integrated successfully with your favored CMS packages.</p>
<p><b>2. Will you require fielded as well as full-text searching?</b></p> <p>There is a classic performance trade-off between fielded and full-text searching. Some search engines are optimized for fielded search, others for full-text, and other (more expensive) ones for both.</p>
<p><b>3. How often will you need to update your indexes?</b></p> <p>When content is entered? Can it wait until an off-peak time? Indexing can be server intensive, although most search-engines have mechanisms for fairly lightweight updating of incremental additions. Perhaps more importantly, you'll want to configure your deployment mechanism to trigger this incremental update whenever you promote fresh content to your site(s).</p>

(Chart 5.18) Author's Checklist for "Collaborative Function Model's" System Attribute: "Searching"

## 5.2.12 Personalizing: The Uniqueness of Your CMS

In the "Collaborative Function Model", we define "Personalizing" as generating custom content or presentation for web users. Since it fundamentally concerns itself with mixing and matching content elements – and seems on the surface to be a self-evidently very good idea – many CMS packages have wandered into the personalization space.

But many major CMS packages are now returning the personalization function to a separate application server or 3rd party personalization engine. Why? Because personalization has proven to be a highly specialized and quite complex domain.

Personalization can also be very resource-intensive from a design and publishing perspective. It takes a lot of effort to define and implement business rules against various use cases, then test carefully across various permutations. Then, serving up custom pages can add dramatically more server cycles to what may already be a very dynamic publishing process. Beware slower page loads. In short, the hidden costs of personalization can easily equal or exceed the initial licensing and development costs.

Note that there are several approaches to web personalization:

- **Pre-Defined Affinity Groups**

Also called “roles-based” personalization. In this model, site owners and editors pre-determine groups of users and create custom pages or content sets for those users. This approach may well be the easiest to automate and might not require software solutions.

- **Rules-based**

In rules-based personalization, some level of artificial intelligence is employed. Site owners and editors establish business rules and conditions that, if met, affect the display of content on pages within a site. Example: an online gourmet store is overstocked in French Roast coffee; the site software recognizes this in the inventory database and automatically places promotions to users who have bought coffee before.

- **Preferences-based**

In this model, users indicate their preferences, usually during an initial session, so that dynamic pages can be delivered on subsequent visits to the site that better match their interests. Users are typically assigned a username and password for authentication; cookies are often also enabled so users aren't required to login each time they revisit the site.

- **Collaborative filtering/community based**

In this approach, site software uses complex statistical techniques and automated analysis to determine elements of a personalized page.

An example of “Personalizing” is Amazon’s “people who bought this book also bought” service. This approach can also incorporate inference technology: learning user’s behavior by monitoring where they go on the site and/or what they search for. An advantage of this approach is that users don’t have to do any work to see a personalized view of the site.

On e-commerce sites, where a wide product offering is present, personalization can yield quite immediate returns by guiding shoppers toward that next purchase. You can present unique value propositions based on what you know about the customer and suitable incentives for him or her to provide still more profiling data to you.

The idea of personalization for pure information delivery is less appealing – although a case can be made if there is a tremendous amount of data on a site where the typical visitor is only interested in a limited subset. One example is the IBM tech support site, where users can identify the IBM equipment they own; upon subsequent visits, only material related to that equipment is shown, even in search results.

The development of a personalization system goes beyond designing the database and code to feed dynamic, personalized content to users. In addition, in many cases you will need to have a system for entering custom user information in the system or to override automatic processes. You will probably want user- and group-based reporting that typical web log analysis tools will not be able to provide. The effort to integrate and customize these administrative and reporting tools should not be underestimated.

A simpler – and generally less resource-intensive – approach is “customization,” identifying distinct market segments and creating customized versions of your site for them. You may even want to consider “baking” those versions to yield the double-benefit of customization and performance. It’s not 1-to-1 communication, but 1-to-many, which is still better than 1-to-all.

Above all, based on our experience by putting the CMS Knowledge Portal into practice, you must be sure to get input from all responsible parties, including editorial and technical staff before scoping out a personalization system.

<b>Author’s Checklist for Personalizing</b>
<p><b>1. Is there a pressing user-focused need that personalization could solve?</b></p> <p>You should sense a palpable market need before proceeding with a complex personalization effort— you shouldn’t just do it because you can or because your application server or CMS software supports it. If your answers are all focused on internal needs, then your investment may not provide a good return.</p>
<p><b>2. Do you require customization or true personalization?</b></p> <p>Customization focuses on affinity groups, while personalization works at the individual user level. In many instances, limited customization can save time and money in developing a targeted information system. It is also a good way-station on the path to more advanced personalization.</p>
<p><b>3. What is the ROI you are expecting from a personalization effort?</b></p> <p>Would your online sales benefit from a one-to-one marketing approach? Would you be able to increase customer satisfaction? Note that there are important reporting and privacy management issues to consider that may add overhead.</p>
<p><b>4. What personalization models will you employ?</b></p> <p>As noted above, there are a variety of models, and they each have structural consequences. Do you have the database infrastructure to support a filtering or rules-based approach? More critically, which model or models do your target WCM packages support? A package that offers “personalization,” but strictly on a preferences basis, cannot be expected to collaboratively filter your visitors.</p>

(Chart 5.19) Author’s Checklist for “Collaborative Function Model’s” System Attribute: “Personalizing”

### 5.2.13 Privileging: The Access of Your CMS

Whether you manage an Intranet, Extranet, or public site, you may want to restrict access to certain content areas to authorized external visitors. See how your favored CMS packages approach this; some have built-in mechanisms for segmenting and authenticating external users.

Many CMS packages treat this as an extension of roles that internal actors play in the system, but it is really rather different. Unless they are actually contributing content themselves, consumers of information are likely to interact with your site very differently than internal authors and editors.

For example, external visitors have special usability needs with respect to authenticating, obtaining lost passwords, and understanding explicitly what areas may be off-limits to them.

Traditional access control lists for authenticating external users don't always scale very well. But as with internal Role Management, many companies have found that LDAP provides a useful, universal infrastructure for managing access for partners and preferred visitors. Those firms will want to seek out LDAP-compliant CMS packages.

You can use the default authentication system built into your web server (such as working with “ht-access” files in Apache) to control logins. This presents a very simple and convenient approach, but often means working with crude interfaces, and that can bring management headaches at large numbers of users. Web server authentication systems typically do not offer more advanced security features, like preventing simultaneous logins with same credentials.

<b><i>Author's Checklist for Privileging</i></b>
<p><b>1. How granular will the permissions need to be?</b></p> <p>You may have only one set of external users to authenticate, all with the same permissions. Or alternatively, you may need to account for multiple levels of users to multiple private content areas, or with different views to the same pages and content types depending on who they are. Make sure that your privileges system meshes with your approach to content management. If the latter entails burning static pages for publishing to a web server, then you will need page- or directory-based permissions.</p>
<p><b>2. Will you be selling online content or hosting a subscription service?</b></p> <p>If so, then you may need a heavier-duty privileges-management system. Some DRM packages can manage complex permissions systems for subscribers. Of course, managing logins is not the same as managing subscriptions (renewals, grace periods, notices, payment, and so forth); you'll probably need separate software for that.</p>

(Chart 5.20) Author's Checklist for “Collaborative Function Model's” System Attribute: “Privileging”

### **5.2.14 Caching: The Speed of Your CMS**

Caching describes a family of approaches to speeding up page delivery by keeping certain information “cached” in the server's memory or some other readily-accessible repository (like the file system or even the database).



Caching is not just for busy portal sites. Since CMS packages tend to be surprisingly voracious resource hogs, caching has become a critical performance consideration even for low-traffic sites that employ a CMS platform. This is yet another reason why many CMS packages have turned over publishing to application servers that employ, among other things, state-of-the-art caching systems.

In considering a CMS package, find out what rules govern any caching it may do, in particular the always by zantine art of cache-invalidation rules. You'll want to be able to tinker with the settings, depending on how dynamic your content is, and what parts of your site you expect to be heaviest hit. In general, caching can get very complicated very quickly, and you ought to consider you're your CMS supplier may not have a core competency here.

<b><i>Author's Checklist for Caching</i></b>
<p><b>1. How dynamic is your content?</b></p> <p>There is a direct trade-off here between performance and freshness. If you seek to achieve maximum caching, it may result in the system serving content that has already been updated. Alternatively, if you always want to serve the latest content on an up-to-the-minute site, the page generation process will experience greater overhead looking for the latest version. Most site owners need something in-between.</p>
<p><b>2. What will you likely need to cache?</b></p> <p>There are various levels that a caching system can operate: on files, web pages, objects, or elements. If the CMS uses file-based caching but you store and update your content as discrete elements outside the file system (e.g. in a database), you are not going to see the same performance improvements. The extent to which you are engaging in personalization comes into play here, since you may want to cache certain common page elements (such as images) to compensate for the extra processing involved in assembling a personalized page.</p>
<p><b>3. Do you anticipate needing to load-balance? At what level?</b></p> <p>Load-balancing across two or more web servers in front of your content repository offers a simple solution, but does not protect you from network problems to the datacenter or a critical failure in your database. A more robust solution puts your site at multiple datacenters, but different WCM solutions will work within this topology in different ways.</p>
<p><b>4. How much hardware do you anticipate involving in the final architecture?</b></p> <p>One of the reasons you may replicate in the first place is because CMS packages are hardware intensive. But keep in mind that most enterprise packages are charged by the CPU.</p>

(Chart 5.21) Author's Checklist for "Collaborative Function Model's" System Attribute: "Caching"

### 5.2.15 Syndication: The Sharing of Your CMS

The case for syndication is simple: you can obtain more value from content by making it accessible in more places. But think quality in addition to quantity when considering the advantages of additional venues for your content. For example, if most consumers of your

product enjoy closer relationships with your distributors, then you can make everyone’s lives easier by syndicating content to your distributors’ web-sites, where your materials can be meshed with theirs in a more compelling package.

This example prompts us to address the difference between traditional media syndication and B2B syndication. Many people think of syndication solely in terms of media or publishing companies – that is, when content *is* product. Syndication may be even more powerful when content serves as collateral to the product or service. If content is a key differentiator for your firm, then the ability to get it out to prospects and customers wherever they may be found could be critical to maintaining your unique niche and identity in the online marketplace.

The actual mechanics of content syndication are fairly easy, especially if you already store content in XML or have the means to transform your data into that format. Syndication standards remain somewhat gelatinous right now, but all of them – including the commonly used ICE and RSS – are XML-based.

Although designed for feeding news headlines RSS is well-suited to any circumstance where you require a lightweight format and want to drive visitors back to your web-site. The feed contains a series of news items, each with an article headline, short blurb, and hyperlink back to the complete document that resides at the syndicator’s web-site. Like most syndication formats, you store the article on your web server, where it can be retrieved, parsed, and transformed into suitable HTML by subscribing sites.

Fortunately, many CMS packages provide some basic syndication tools, if only the means to generate XML and HTML files for subscribers to pick up. Other packages facilitate integration with 3rd-party syndication infrastructure products or provide hooks into commercial syndication services.

Note that commercial syndication services and products provide a key value-add: subscriber management. To the extent you attract multiple subscribers, you are creating an additional channel that requires ongoing management (sign-up, renewal, cancellation, technical support). In short, you’ll want consider the syndication function within a broader syndication system. RSS is a nice syndication mechanism, but it won’t manage your subscribers.

<b><i>Author’s Checklist for Syndication</i></b>
<p><b>1. Will you be sharing content with partners?</b></p> <p>If so, syndication standards will make everyone’s life easier. Even within closed ecosystems, syndication is an efficient and simple way to share content. In the absence of true inter-enterprise CMS functionality among the vendors reviewed in the report, in fact, syndication may be the only stable way to collaboratively manage content.</p>
<p><b>2. What is the level of sophistication of the target sites?</b></p> <p>Unless they are sites like industry Net Markets that are used to receiving diverse feeds, you can assume that their ability to do things like parse XML may be fairly low. In many syndication services report which we have surveyed<sup>52</sup>, that their surveys show only 10-20% of their subscribers can do so today, but this number is growing</p>

(Chart 5.22) Author’s Checklist for “Collaborative Function Model’s” System Attribute: “Syndication”

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<sup>52</sup> In the research of Kerer C, he also points out see trend. Please see: Kerer C; Kirda E; Kurmanowytch R: A generic content-management tool for Web databases, IEEE INTERNET COMPUTING 2002, Vol 6, Iss 4, pp 38-42, IEEE COMPUTER SOC

### 5.2.16 Cross Media Publishing: The Variety-Show of Your CMS

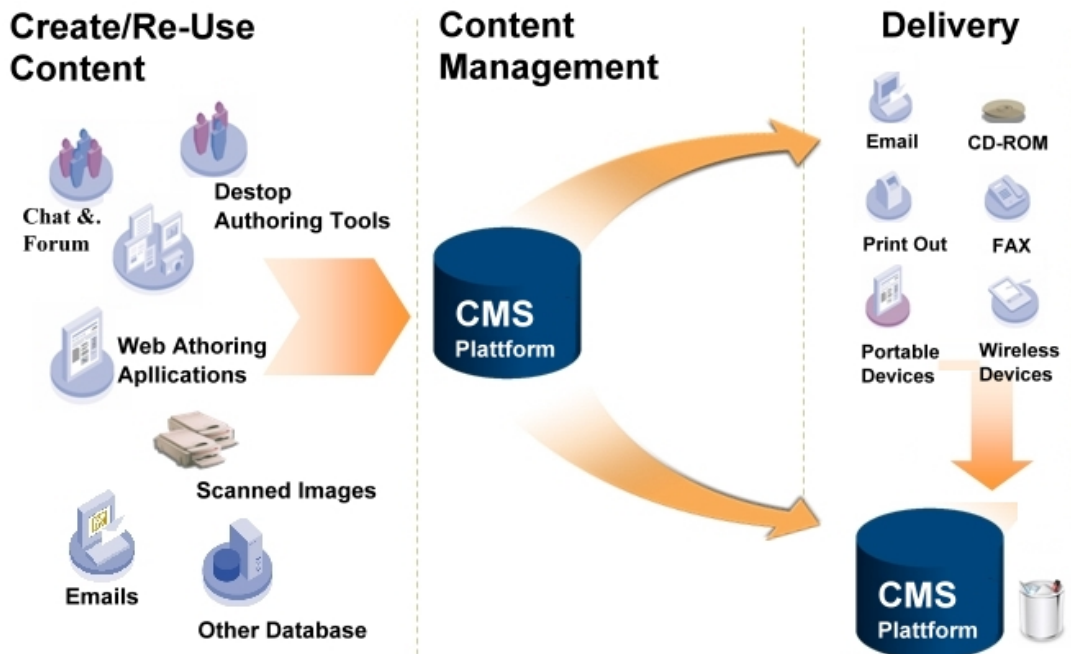
Whereas we addressed “Integration” of disparate content in the Production Dimension of the “Collaborative Function Model”, you could consider this feature as “Dis-aggregation” or a more fancy and buzz word “Cross Media Publishing”, that is, to break apart your web content for different delivery mediums beyond the web browser. These include wireless devices, e-mail, print, and CD-ROM.

The idea of “Cross Media Publishing” or let’s say, the vision of “Cross Media Publishing” is to make the multiple uses of one single content/document possible, on the CMS platform. This idea comes originally from the developers for the Media Asset Management, MAM and it has both economic and business strategy meanings. The developers believe that, only in this way can the modern media (to some degree as “quassi enterprise”) survive in this digitalized era and take full advantages of their “media assets”, or in another word, to create the “synergy”.

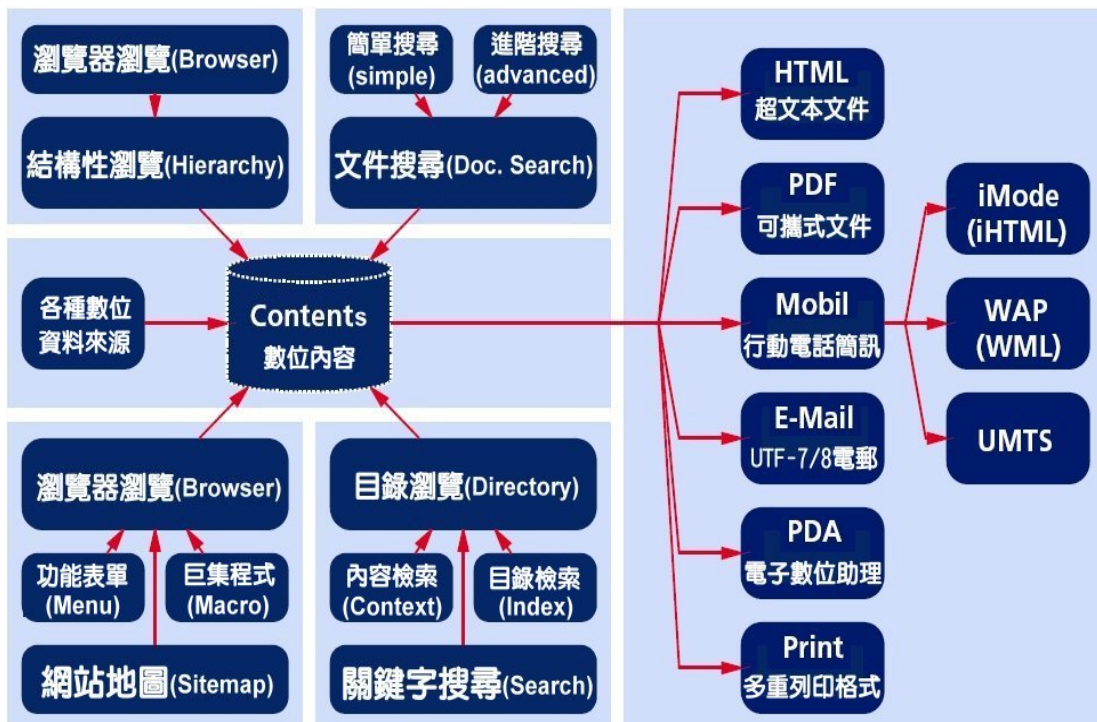


(Chart 5.23) The As-Is Situation of Content Delivery, BP of Documentum. You may find it in: <http://www.documentum.com>

As you can see in the chart which we illustrate (CHART 5.23 / 5.24 / 5.25): Chart 5.23 shows the AS-IS situations of the content publishing/delivery situations, which could be easily observed in most of the companies today (CHART 5.23). Through the cross media publishing based on the CMS platform, the American CMS vendor Documentum (since 2004, EMC Documentum) illustrates then in chart 5.24 the possibilities of content multi-delivery and publishing (CHART 5.24). As far as how CMS achieve this “cross media publishing is concerned, in chart 5.25, our CMS partner for the international cooperation project, the Infopark AG in Germany, offers an overview on the software language structure of its CMS solution NPS5.5. In this chart (CHART 5.25):, you may clearly identify the required software platforms, also from the programming perspectives, for cross media publishing based on CMS.



(Chart 5.24) The Vision of Cross Media based on CMS, BP of Documentum. You may find it in: <http://www.documentum.com>



(Chart 5.25) The Indexing Approaches and Delivery Platform of NPS5.5, both in Traditional Chinese and English  
This chart is “exclusive authorized” by the Infopark AG to privileged academic uses. Please see the appendix for more Info.

However, the most important consideration with respects to cross media publishing is that technology will likely be the least of your challenges. Just like what has been showed in chart

5.25 above, techniques for exporting content to wireless formats, email broadcasts, or for print layouts is well-understood and fairly transparent, especially if your content resides in XML. The more difficult problems revolve around developing and maintaining a content model that will support repurposing information in logical chunks, while being able to evolve flexible processes for dealing with different media. Based on our surveys, “wireless” and “print” are the most important factors that must be carefully considered and evaluated in advance:

#### **a.) Wireless**

Wireless might seem the most complicated of non-HTML formats, but in some ways may be the easiest to execute technically. The most common presentation standard, Wireless Markup Language (WML), is simple to master, and XML-to-WML conversion in particular is quite straightforward. Consider the screens below<sup>1</sup>. The source code for the WML “deck” resembles a simple well-formed XML document (which in fact it is).

Regardless of the technical ease of development, some WCM packages helpfully include WYSIWYG tools for non-technical staff to control the conversion to WML.

Although the initial enthusiasm for wireless applications in the U.S. has ebbed, it is important to note that in Europe and Asia adoption rates continue to grow as new technologies rapidly come online, and therefore the ability to seamlessly translate content into suitable wireless formats becomes more a necessity than luxury for anyone publishing in those regions.

Japan uses a technology called “i-mode”, which is similar, albeit more powerful, than the Wireless Access Protocol (“WAP”) used in North America. Unlike European and US content, which is written in WML, Japanese content is written in another markup language called cHTML.

When you consider the following best practices, it will become clearer that the structure of wireless card decks are really quite different than HTML pages:

- In Europe and North America, wireless lives a low-bandwidth environment, and the standard mobile phone displays 96x64 pixels. Design accordingly.
- Your standard “pages” should be broken across multiple cards, with each card short enough to be read quickly.
- Because text entry is currently tedious on a phone keypad, successful sites allow users to select options from menus rather than typing long strings of text.
- You need to label all buttons, with short, clear words that instantly indicate what will happen when they are pressed.
- The back button is not automatically available and must (if desired) be coded as a soft button by the developer.
- Your site should be menu driven, rather than text-entry driven.

What has been pointed out above is all the more reason to carefully segment your content into wireless-friendly chunks, and carefully consider the different information architectures required of the different media formats. The technical transformation from WML to XML or cHTML may be trivial; the planning beforehand is not.

Integration with e-mail systems is increasingly popular. Some CMS packages offer shortcuts for selecting and formatting content for e-mail, but if you intend to do mass mailings, we recommend finding specialized software or ASP services designed specially to do that. Sending broadcast email can be hard on your servers, your network, and other IT systems. Not surprisingly, the hosted CMS vendors offer comparatively advanced capabilities for integrating CMS repositories and mass e-mail campaigns.

#### **b.) Print**

Integrating print publishing is more complicated. Native web content tends most often to find its way back into print via PDF files, perhaps because the tools to do this are fairly mature. In contrast, converting from XML to word processing files is still a clunky process.

One possible solution is to address this by completing the “single-source” loop with a unified authoring environment – almost surely XML-based – that will publish successfully to all your digital and print venues.

However, this is tougher than it sounds, partly because the print world is not completely XML-enabled (let alone completely digitized), and partly because it is often very difficult to “roundtrip” back changes that are made in the pre-press environment back into the original repository, to maintain that sole source of the truth. In short, there is no right way to go from Web to print; it depends on which alternative is most efficient for your people and processes.

In the end, the ability to publish to CD-ROM used to be a fairly common requirement, but today is an afterthought for most Web publishers, and software vendors have taken the hint. Any package that offers the prospect of publishing site “editions” can of course write static pages to directory that can be burned to a CD. For packaged multimedia presentations, CMS vendors may point you to Macromedia Director and the like.

<b><i>Author’s Checklist for Cross Media Publishing/Delivery</i></b>
<p><b>1. What wireless formats will you need to support?</b></p> <p>There are a small handful of rendering standards for handheld devices, depending on the platform. Besides the widely-accepted WML, these include “Web Clipping” for the Palm line, cHTML for the Asian market, HDML for other devices, and more.</p>
<p><b>2. Will you be generating print materials from web-originated content?</b></p> <p>If so, you’ll probably want an XML version of your web documents that you can more easily import into desktop publishing systems. But first ask yourself: could the printout from a browser version of a printer-friendly page suffice? For some purposes, it might.</p>

(Chart 5.26) Author’s Checklist for “Collaborative Function Model’s” System Attribute: “Cross Media Publishing/Delivery”

## V. Conclusion:

This dissertation provides a very good compass for people who are interested in CMS, especially for enterprises who attempt to deploy a CMS in their own companies. However, just like the old saying goes: “There is no royal way to success!” CMS is not an all-can solution!

Therefore, in the end of this dissertation, also before the end of our explorative journey in CMS, we would like to point out “WHAT CMS WON’T DO?!” to eradicate the over- exaggerations of CMS vendors and the myths that enterprise tend to have for CMS. And perhaps, these points may also be good start points for researchers or software developers who want to improve the concepts or the systems of CMS.

### What a CMS Product Won’t Do?!

- **It won’t improve the intrinsic quality of your content.**

Placing a CMS underneath a site with inferior content is like (to paraphrase Joseph Stalin, the Russian Dictator) “putting a saddle on a cow.” Of course, the converse is true too: great content that is not properly organized, vetted, indexed, and stored can be like a riderless thoroughbred, unknown to its potential audience. A CMS can help your organization better control the quality of content before it goes live, but that’s no guarantee that anyone will actually want to read it.

- **It won’t edit your content for the web.**

Commercial firms are beginning to realize what media sites have already discovered: the online medium rewards those site owners who edit content toward shorter attention spans, at least at higher levels of a sitemap where people tend to graze impatiently. This presents a challenge for organizations that wish to “single source” their content and publish exact replicas in different formats. The web version typically needs additional editing, even if this just means additional paragraph breaks. Your CMS package can enable you to insert a copy-editing step in the web production workflow, but it cannot edit down your content for you. Perhaps this is a new role for your webmaster?

- **It won’t localize your CMS.**

Many CMS vendors partner with firms that will provide supporting technologies, but localization requires a lot of judgment calls, and not just in text translation. Expect labor-intensive work here. Your CMS package can enable you to create among superstructure across geographically-dispersed corporate sites, but it won’t localize your public presentation for you. That’s best left to your local teams.

- **It won’t automatically categorize your content, or generate vocabularies.**

With CMS, you have important content “chunking,” cleaning, mapping, and classification to do. Some automated tools can help get you started (especially on cleaning and classification), but eventually, this all becomes a very human exercise. You’ll want to undertake this work together with domain specialists who have critical knowledge of context and relationships.

- **It won't optimize your content for the online environment.**

You need to decide if your content is optimized for presentation in low-bandwidth, small-screen environment. If you can already produce XML representations of your content, great – now you need to decide which nodes (fields) to actually convert to WML. Title, date, and abstract nodes may be suitable, but have you accounted for the latter in your content model? You probably don't want to send the entire body of an article to your customers' cell phones (unless they request it).

- **It won't make other companies import your content.**

As we have mentioned repeatedly, syndication holds great promise even for non-publishers. But you cannot always make the horse drink. You need to establish the business case and make it as easy as possible for recipient to accept your content.

- **It won't provide a single-sourcing solution.**

Single-sourcing is the eternal beacon of Enterprise Content Management, but none of the major ECM players are completely there yet. Web CMS vendors remain even farther away.

- **It won't organize your content and navigation.**

A CMS package will enable you to control the consistency of your page structures and navigation. But your sitemap and navigational system are what you make of them.

- **It won't make your site more usable or improve the intrinsic presentation.**

Your site is ugly and mismanaged? Fix both. A CMS product can help you assemble, monitor, and archive your content, but if the interface is unusable for the very people you intended to influence, your investment in a new CMS might be for naught. A CMS can enable you to maintain the clarity and consistency of your interfaces and navigation, which will improve the usability of the underlying content.

- **It won't improve the effectiveness of code you write yourself.**

If you want super-high performance, you can procure a blazing fast application server, the best database money can buy, and put both on optimized hardware. But remember that most CMS packages require some level of customization or integration, and if you lay down bad Java code, leave database connections open, or write inefficient SQL queries, your system will suffer. When problems arise, developers tend to blame the software, but that's not always the right place to look. What a CMS can do, if implemented properly, is help you understand where performance bottlenecks occur when they happen, and enable you to manage your code builds as carefully as you manage your content versions.

- **It won't put a time value on your content.**

You need to figure out what to do with your content as it ages. Some content, like fine wine, actually improves in value over time. Most does not. The typical out-of-the-box CMS package tends only to assign a value to content