EP 2010

EP2010 – THE FUTURE OF ELECTRONIC PUBLISHING TOWARDS 2010

A strategic study on the future of research into publishing, content and knowledge technologies

DOSSIER on Content & Knowledge Management Systems

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Authors: Wernher Behrendt, Guntram Geser, Andrea Mulrenin, Siegfried Reich

Salzburg Research Forschungsgesellschaft m.b.H.
Forschungsbereich Informationsgesellschaft
Jakob-Haringer Straße 5/III, A-5020 Salzburg
tel +43-662-2288-901; fax +43-662-2288-222
e-mail: e-p2010@salzburgrresearch.at
internet: http://www.salzburgrresearch.at
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2 Introduction

2.1 Background to the EP2010 study

In October 2002, the former Information Society DG’s Unit D1, Electronic Publishing, commissioned a strategic study entitled “The Future of Electronic Publishing towards 2010” (EP2010). The focus of this study was to draw up a road map for relevant technology research and development for the interactive electronic publishing industry. Since then however, triggered by internal restructuring of two units, Electronic Publishing and Knowledge Management, to form Knowledge Management and Content Creation (KMCC), the EP2010 study has had an “interesting career” shifting its focus towards the research issues surrounding Knowledge and Content Technologies for a prospective Knowledge Based Economy in 2010. The shift occurred by consensus of all stakeholders including those representing interactive electronic publishing, which is also reflected in the new title of the study, “The Future of Research into Publishing, Content and Knowledge Technologies for the Knowledge-Based Economy”.

Despite the changed focus, the original objectives have proven a good choice that still sits comfortably with the ground covered in the work.

2.2 Objectives

The primary objective of EP2010 is to provide key orientations for policy makers and input to concrete implementation measures. In particular, the study aims at...

Providing information for policy makers in Information Society DG – Unit E2, Knowledge Management and Content Creation

The remit of the Information Society DG’s Unit E2, Knowledge Management and Content Creation is very wide – policy makers need a roadmap of major research strands, technologies and possible emerging markets in order to assess the effectiveness of funding measures that can only be springboards for private sector investments. This kind of "governance" through strategically placed funding requires an undistorted picture of the RTD landscape.

Fostering dialogue between industrial and public sector stakeholders

Fulfilling the vision of Europe as a leading knowledge based economy will require, both regulatory and funding support for technology research and development. Policy makers need a thorough understanding of the interplay between the potential shortcomings of regulatory frameworks, and the effectiveness of RTD in markets where such regulatory inhibitors exist. The knowledge management and content creation area needs to identify the major fault lines that exist within its field. Examples for such fault lines are differences between US and EU law with respect to software patents and different approaches (and commercial interests) with respect to copyright legislation in the digital domain which may affect the roll out of research results. Although aware of those issues, it was decided to not cover regulatory and legal issues within this study as they clearly lie outside the remit of Unit E2.

Giving input towards the evolution of RTD work programmes

The actual success of the RTD programme rests on the willingness of researchers to take up the challenges, and on the willingness of the private sector to invest in the proposed RTD programme. One major traditional industrial constituency of the Knowledge Management and Content Creation unit (KMCC) has in the past been the publishing sector. For the Sixth Framework Programme, researchers and industrials in knowledge technologies are entering into the frame. The key concepts of a knowledge based economy need to be defined in more detail before investors buy into its vision. Major shifts in research agenda may be required to address some of the challenges. For example, natural language generation may be more interesting and have larger industrial uptake than natural language recognition. As knowledge and content technologies converge there is a need for infrastructures that are able to support both the creation of knowledge and its packaging as content.
Therefore, based on a thorough analysis of current technologies, markets and trends, the intended contribution of the EP2010 study is threefold:

- Firstly, develop a Research Map of those themes of investigation that impinge on KMCC;
- Secondly, derive from the larger visions of Semantic Web, Ambient Intelligence, and new forms of Content Generation and Distribution a set of Recommendations that implement the Research Road Map; and
- Thirdly, investigate the buzz word concept of “Smart Content” to test whether it could provide a coherent vision for longer term research lines in KMCC.

2.3 Structure of the EP2010 study

The EP2010 study consists of seven thematically focused dossiers that create the argumentative basis for this Summary Report. These dossiers are: Recommendations for Research, Research Road Map, Smart Content Vision, Situation Analysis of the Interactive Media Sector, Digital Games and Learning, Content and Knowledge Management Systems, and finally, Knowledge Markets.
In the dossier on Recommendations for Research, we outline the research recommendations in more detail by providing the reasoning behind our arguments as well as assessment, following a matrix that evaluates recommendations with regards to their leverage effect for the commissioning Unit, their timeliness and contribution to EU competitiveness as well as their impact on becoming the most competitive knowledge-based economy. Furthermore, the dossier provides additional recommendations on various issues that we consider important and worth keeping on the radar, yet, which did not “pass the threshold” to be included into the Summary Report.

The research recommendations are closely related to the Road Map for Research, which on the one hand highlights the future research fields in the area of knowledge management and content creation and on the other hand suggests how to tackle those research challenges by implementing three research strands:

- *foundational* research addressing “grand challenges” such as human-like systems behaviour,
- *applied* research in content-driven domains such as broadcasting, and
- *co-operative systems* research addressing the systems integration aspects and interoperation of across systems platforms at a semantic level.

The last dossier that takes a strictly technology-driven research perspective is entitled “Smart Content”. With the smart content concept we intend to introduce a unifying vision for knowledge management and content technologies and any activities pertaining to digital content value chains. Making a first step towards a hype-free definition of smart content, the dossier outlines desirable features (and behaviours) of smart content for users, tries to identify the technical requirements and the architectural characteristics of a “smart content system”, and finally, presents an abstract technical view on the core properties that would support most of the above.

In contrast to the strict RTD perspective that we have adopted for the first three dossiers, the last four dossiers try to underpin the suggested research road map from a market perspective.

In the Situation Analysis, we first set the scene by describing the development of the interactive media sector, outlining the situation from 1998 until today, and then providing a hypothetical preview for 2010. In the situation analysis we take a closer look at the factors that influence future development, the general economic, legal and political framework, the demand as well as the supply side, and finally point out the major trends that will influence development towards a knowledge-based economy.

Digital Games & Learning investigates one of the most promising application areas for future publishing, content and knowledge technologies, highlighting the fact that there is much to learn from the games industry when it comes to developing engaging learning products and environments. The RTD challenge for game-based e-learning environments lies in the careful match of pedagogy and technology in high-end environments, which demands a systematic analysis and exploration of the interdependencies of knowledge structures (e.g. ontologies), learning processes (e.g. single vs. multi-learner settings in collaborative problem solving), and presentation (e.g. dynamic, 3D and real-time forms of presentation).

The dossier on Content and Knowledge Management Systems takes a closer look at the current providers of knowledge and content management technologies, who are also potential carriers and partners for future RTD in the field. However, despite knowledge and content technologies still being on the business agenda, the market is clearly dominated by US companies. This situation led us to the conclusion that European RTD effort should be planned and targeted at the next generation of these technologies, instead of trying to win the current technology round.

Finally, Knowledge Markets examines a more recent trend, the emergence of electronic knowledge market places on the web. As knowledge management means a considerable investment for companies, organisations today are increasingly looking for opportunities to capitalise on their knowledge assets by trading them in knowledge market places. Yet, success for those marketplaces is not a foregone conclusion. The dossier looks at the five key challenges that influence the success of electronic knowledge trading and analyses a range of current knowledge markets, which allows to draw conclusions and make recommendations with regards to future research.
In addition to the dossiers, the EP2010 study also provides access to a Knowledge Base which comprises a selection of primary research papers and studies that underpin the arguments made within this study, and link to external resources for further reading. All these resources can be found on the EP201 web site at http://ep2010.salzburgresearch.at/ as well as the EP2010 CD-ROM.
3 Summary of dossier

Content & knowledge management is on the business agenda. Not only in companies and institutions where data is doubling every 12 to 18 months, but, due to the general “information overload” also on a global scale. There is clear evidence of an up-take of knowledge management (KM) in corporations. Today, knowledge is recognised as a strategic resource and one of the key drivers is the fear to miss business opportunities.

The present economic “downturn” also impacts on content & knowledge management vendors, who are called for to quantify the value of the systems to their customers. Therefore, return on investment, productivity, assistance in compliance and accountability issues are today’s keywords. Customers also want to have the ability to start small and scale up.

However, overall spending on Content Management Systems (CMS) is growing, and analysts expect that content management and retrieval software spending will outpace the overall software market by 2007.

This dossier includes an overview of companies that matter in KM, based on the 2002 and 2003 selection of KMWorld. The overview shows a clear dominance of US-based companies not only in market leadership, but also in velocity and impact of innovation in KM.

The dossier also looks into and names systems that represent the leading-edge in Enterprise Content Management Systems (ECMS). “Tailgating” EMCS are other systems like portal servers and Digital Asset Management Systems that are integrated. It is also noted, that managing the content life cycle will be “the next big thing”. The keywords for the content industries here are re-use and re-purposing of digital assets.

The dossier also addresses the “&” in content & knowledge management, i.e. the area where standard CMS and knowledge technologies overlap. At present, these are mainly solutions that allow for gaining some “intelligent” results from automatic identification, gathering, structuring and organising of information from huge volumes of content. This only represents a fraction of the overall knowledge management cycle, as depicted in a detailed diagram.

Finally, the dossier highlights some points that are important with respect to strategic funding of European RTD in content & knowledge technologies. These points are:

- US companies are clearly in the lead with respect to complete, leading edge enterprise CMS, not only in technological terms, but also with regard to their already installed, worldwide customer base.
- There are strong and dynamic US RTD players in content & knowledge technologies, which already have established relationships with the leading US vendors.
- Given the above, effort in funding of RTD in content & knowledge management technologies will most likely lead to solutions that can be implemented “on top” of systems of US-based companies, and their customer base.
- Such solutions need to be capable of scaling massively with regard to content volume, performance, and users – small “test-beds” will not do.
- While successes in building “basic” (enterprise) content management systems are unlikely, there seems to be some room left “at the high level of the game”, i.e. in advanced knowledge technologies.
4 Recommendation for research

The results presented in this dossier are related to the Summary Report, and in particular, to Recommendation 16, which states:

For the area where content management systems and knowledge technologies strongly overlap, focus on RTD projects that tackle the next big markets in which current technology will eventually fail and paradigm shifts will occur.

US companies are clearly in the lead with respect to complete, industry-strength content management solutions, not only in technological terms, but also with regard to their already installed, worldwide customer base. Furthermore, there are strong and dynamic US RTD players in content & knowledge technologies, which already have established relationships with the leading US vendors.

The above recommendation therefore includes: "Don't try to win this game, plan your strategy for the next game!" For conceiving such a strategy, identify very advanced promising fields, i.e. the next big markets where current technology will fail and paradigm shifts will occur.

Such a field where current technology will reach its limits is, for example, that full text search is unable to "understand texts":

- "this is NOT a page about XYZ"
- "this WAS a page about XYZ, but it has moved to ..."
- "this WILL be a page about XYZ, when my mom gives the money for a server"

Knowledge management systems are based on document management systems and have neither got much overlap with database systems nor with media content systems. Therefore, all three current technologies need "kludges" when they need to work together.

The next game here might be novel content management systems whose content indexing is ontology based and whose search mechanisms are unified with respect to the ontology.

Paradigm shifts, which will affect the position of the current players, might occur in knowledge level understanding of content. For text, this would mean understanding the difference between cases a, b and c above. For video content, it might mean finding the football scenes that lead to a goal as opposed to those that only show a shot missing the goal.

Research money could be spent strategically on cognitive psychology, linguistics and tackling unresolved AI questions. This requires well educated researchers who are typically trained in at least two disciplines. It is not a matter of technology, it is a matter of breakthrough theories.

Europe has at present, not got the scientific work force! It is unclear whether the US have, either.
5 Content and knowledge management systems in businesses: a status-quo report

Content and knowledge management systems are on the business agenda. Not only in companies and institutions, but on a global scale. Over six hundred million people now use the Internet, compared to three million in 1994. They can access billions of web pages, with millions of new pages added every day. Information tends to be abundant and shows an increasing rate of obsolescence, which leads to a situation of information overload and knowledge shortage. What is scarce is the capacity to find and use valuable information. In the business world, according to an estimate of IBM, the amount of corporate data in the world doubles every 12 to 18 months; only 15 per cent of this is structured data, and the rest is simply digitised and stored.

5.1 Differences between management systems

Before we look into recent developments in the implementation and use of content and knowledge management systems, an explanation of the main differences between the various types of systems seems appropriate. While observers of the market state an increasing convergence between the systems, one can distinguish them with regard to the kind of tasks they handle particularly well.

We use the term Content Management Systems (CMS) to represent the most general category. A CMS provides a company with an infrastructure that integrates both structured and unstructured information. Basically, it is a set of co-ordinated technologies that allow the quick and efficient storage, retrieval, and reuse of digital files that are essential to the organisation.

In comparison, a Digital Asset Management Systems (DAMS) typically focuses on specialised asset types such as graphics, logos, and layouts that might be used in marketing applications or advertising. In addition, many DAMS are adding capabilities to handle rich media such as audio, video, and streaming media files. The DAMS helps to capture, catalogue, secure, and re-use these assets through assembly and publishing services.

An Enterprise Content Management System (ECMS) should be capable to handle all types of content, including business documents, Web-based content, e-mail, electronic transactions, and - to a lesser degree - rich media, wherever they reside on the distributed intranet of the enterprise. Therefore, the system requires the ability to provide access to multiple content sources via a strong integration layer. Other common features are support for portals, workflow and business process management tools, and the ability to search and categorise content.

Knowledge Management (KM) Systems are designed to help an organisation maximise value from its intellectual or knowledge-based assets. Such applications provide a platform for capturing, organising, and distributing organisational knowledge, or focus on more specific areas such as indexing, extracting, and summarising information. In addition, KM-systems support the collaboration and sharing of information between knowledge workers in various forms.

5.2 Evidence for an up-take of KM systems

Evidence for an up-take of knowledge management strategies and supporting systems is provided by several market surveys. A survey that has been carried out for Standards Australia (Clark and Rollo 2001), has looked into the use of knowledge management (KM) in leading international corporations. It highlights that there exist several distinct corporate KM strategies:

- Firstly chemical and pharmaceutical companies and other organisations with significant sunk investment in research and development, seek to leverage the intellectual capital they already
possess. For example, by utilising existing patents more effectively and speeding up the process of patent application.

- A second group of companies engaged in manufacturing in highly competitive international markets such as Texas Instruments in consumer electronics, or Ford and General Motors in automobiles, seek to use knowledge management techniques to enhance and speed up the process of best practice sharing across multiple international production sites. (In this mode, knowledge management partly represents a further advance of total quality management).

- A third group of companies with large client bases such as banks and insurance companies, utilise knowledge management to improve data mining and exchange between different functions and managers of the company in order to build up new customer relationships and pursue further business opportunities with existing customers.

- Finally, professional service companies such as large accountancies and management consultancies, employ knowledge management to create knowledge networks that allow the ready sharing of knowledge from complex assignments to the application of state-of-the-art solutions to particular client problems.” [Clark 2001]

A recent study by KPMG (2003) observed a growing awareness of the importance of knowledge management not only on the level of corporations. Within a few years, knowledge management (KM) developed from being the “next big thing” in the area of information and content management systems to becoming part of the business agenda. Knowledge is now more broadly seen as a strategic asset, thanks to the “evangelism” of leading business writers and journalists from the trade press. KM is now “explicitly linked to missed business opportunities” which is a strong driver. After KM has reached “maturity”, KMPG sees the following key challenges ahead: Showing business benefits, motivating the workforce to use KM, keeping top management involved; embedding knowledge management in daily work processes; using best practices in daily work routine; ensuring involvement for maintaining the knowledge; unifying the different KM approaches in the company.

The study reports:

- **KM as strategic asset / missed opportunities**: 80% of respondents consider KM as strategic asset; 78% believe that they are missing out on business opportunities by failing to successfully exploit available knowledge; businesses estimate that 6% of revenue as percentage of annual turnover is being missed from failing to exploit knowledge effectively.

- **Average KM spending / ROI**: Spending is less than 2% of revenues, 64% say ROI is unknown.

- **Benefits**: 50% report clear financial benefits; non-financial benefits mentioned include: quality improvement (73%), increased teamwork (68%), increased speed and responsiveness (64%), better decision making by front line workers (55%).

- **What do companies use KM for**: 83% say to realise synergies among units; 74% to achieve higher customer added value; 70% to improve quality; 67% to reduce cost; 63% to accelerate innovation; 26% to reduce exposure to risks.

- **Areas where KM is employed**: Service delivery: 53%; marketing and sales: 53%; operations: 51%, human resources: 43%; R&D: 43%; strategy: 36%; distribution channels: 32%; procurement: 26%.

### 5.3 Strategies of CMS vendors in the “downturn”

The fact that the economy shows a “downturn” also impacts on content management system vendors. In particular, they need to look for ways to make their solutions more “palatable” for customers. The main strategy of vendors is finding ways to keep the business growing until the economy turns around [cf. Miller, 2003].

More specifically, there are three groups of strategies revolving around the need to quantify the value of the systems to customers – over and above their obvious ability to manage content:
• to show a clear path to measure ROI, e.g. by taking advantage of the systems’ ability to track and quantify productivity internally through content workflow reporting capabilities; furthermore, showing ROI in-house for other projects not necessarily directly related to content management;

• to demonstrate how the system supports compliance and accountability issues, in particular, due diligence with regulatory requirements;

• to give customers the ability to start small and scale up, e.g. through module-based solutions that allow customers to purchase only the pieces they need right now, and add larger components later, when the budget provides room for bigger purchases.

It is not that the market for content management systems has ceased to grow, in fact, it grows. For example, in 2002 “IBM alone had a 26 percent increase in revenue in its content management portfolio, with 29 percent in the fourth quarter”.1 But, there might be a message here to, at the moment, not to expect too much enthusiasm of content & knowledge management system vendors for investment in medium/longer-term RTD projects.

5.4 A huge growth in CMS ahead

In April 2002, a Jupiter Media Matrix survey reported that more than 50% of the companies surveyed planned to invest in a new document, content or media management system until the end of the year. What drives a good part of this investment is a company’s intent to cut the effort technical personnel ends up spending with supporting non-technical knowledge workers.

A report by International Data Corporation analysts forecasts that in 2003, “strong demand for the latest content technologies, including multimedia and multi-format search and text mining, will drive investment. IDC agrees that many companies are willing to make large investments in the technology, and that large, enterprise-scale content software will account for most of this spending.” The analysts also expect that content management and retrieval software spending will outpace the overall software market by 2007. [cf. Advisor.com, 2002]

Why content? In fact, the phrase content is king is now becoming true with respect to the spending of businesses on content management systems. In a first phase, companies have invested a lot in managing transaction information (customer orders, interactions with vendors in the supply chain, etc.) “The next area to tackle - and it’s very top-of-mind in all the reports and surveys we see - is how we go to the next level and handle other forms of information. If you look at any organization, somewhere between 80 and 85 percent of the information is content. All the investment up to this point has focused on how you manage the other 20 percent, the transaction information.” (Deb Taufen, IBM, quoted in [Advisor.com, 2003b])

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6 Companies that matter in knowledge management innovation

The table below provides a compilation of KMWorld’s 2002 and 2003 lists of “100 Companies that Matter in Knowledge Management”. KMWorld is an US based KM information platform. It has published such lists since 2000, which they conceive, in the words of Hugh McKellar (2003), KMWorld’s Executive Editor, “as a way to identify some of the organisations leading the way in the knowledge economy”. The lists are compiled on the basis of discussions with analysts, different vendors, KM practitioners, and editors from other media.

KMWorld’s definition of “companies that matter” is that they “best exemplify velocity and impact of innovation” in this area of technology, or rather technologies. KMWorld’s view on KM goes much beyond technology. McKellar summarises their perspective: “Knowledge management is an attitude, not an application, and that’s what we’re celebrating with this list: Acknowledging and discovering an organisation’s information assets and maximising their use and reuse in every conceivable practical way is, simply, sound business. KM is the umbrella under which other disciplines fall, among them business intelligence, collaboration, competitive intelligence, content management, customer (and partner) relationship management, document management, expertise location, portals, unstructured data management workflow and so on.”

In his introduction to the 2002 list, McKellar mentions that with publishing such a list they are “setting ourselves up to take the heat that comes from including one company and excluding another”. Their goal is to improve dialog, with the lists representing “work in progress” in gaining an ever more thorough understanding of the scope and impact of KM.

The following table primarily serves as an overview of technology companies which are deemed “to matter” in KM. While the selection of the companies understandably has been done mainly by US-based experts, it is not only focused on the US. The big European names Siemens and SAP show up in the overview (although Siemens did not make it to be included for 2003); furthermore there are, for example, Baan; SER Systems AG; Hyperwave; LexisNexis, or Butterworth-Heinemann which belongs to Elsevier Science.

But overall, the overview shows a clear dominance of US-based companies in what KMWorld understands to be organisations leading the way in the knowledge economy, and, in doing so, exemplify velocity and impact of innovation. This does not necessarily mean that those companies are themselves involved in leading edge research in knowledge and content technologies, but rather excel in gaining a competitive advantage by optimising their information systems through integrating such products. For example, Inktomi and Verity use Inxight’s LinguistX Platform (a natural language processing engine that offers multilingual text functionalities), and Factiva integrated Inxight’s categorisation technology in a solution for automatically classifying news items. Also, of course, LexisNexis or Butterworth-Heinemann do not develop KM products, but put them to good use in their information services.

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2 Consulting companies, of which KMWorld in 2003 lists 10, have been excluded.

Compilation of KMWorld’s 2002 and 2003 lists of "100 Companies that Matter in Knowledge Management": [http://www.kmworld.com/100.cfm](http://www.kmworld.com/100.cfm) (list for 2002 is no longer available online):

<table>
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<tr>
<th>Companies present 2002+2003</th>
<th>New companies on the 2003 list</th>
<th>Companies present only on the 2002 list</th>
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<td>80-20</td>
<td>AEA Technologies</td>
<td>American Prod. &amp; Quality Center</td>
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<td>Applied Semantics</td>
<td>Antarctica Systems, Inc.</td>
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<td>BEA Systems, Inc.</td>
<td>AWD: DST Technologies</td>
<td>BCI Knowledge Group</td>
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<td>Butterworth-Heinemann</td>
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7 The state of affairs in content & knowledge management systems

An article in the Elpub.org’s Analytic series Digital content RTD perspectives (Elpub.org, 2002), gives a very brief summary of the state of affairs in content management, which the article sees to be “the main area of current attention”. It states: “Web content management systems are still in the transition between written-to-order and off-the-shelf. Systems tend to be either expensive and over-kill or cheap and nasty. Their complexity leaves many potential users in the cold. At the other end of the business - the storage and control of major AV repositories, integrated with control of related rights and delivery into the value chain, the major companies are only at the beginning of the trail. The transition of the public holders of material (national libraries, museums, research institutes and universities) from paper to digital is very patchy and may not really be addressing the key questions of volume and delivery. Between these extremes lies the vast mass of company information and knowledge, where even document management systems are yet to make a significant impact.”

The assessment is right in its judgement that there is a big gap between off-the-shelf solutions for organisations with smaller budgets and industry-strength suites for large corporations. In fact, in recent years the supply-market between the two has somewhat dried out. This explains part of the situation that organisations often tend to spend too much on a content management system which for them is not cost-effective, although they could do with a much leaner system (cf. Advisor.com, 2002). What the Elpub.org article underestimates is the leading-edge in content management systems.

In this final chapter we look into
- what makes leading-edge content management solutions strong,
- where content & knowledge management systems match (i.e. what is the “&”),
- and, finally, make some points related to strategic funding of European RTD funding in content & knowledge management technologies.

7.1 The leading-edge in CMS: Enterprise content management solutions

The leading-edge content management solutions (CMS) are those were the money is, i.e. Enterprise CMS (ECMS). The only problem is that ECMS vendors tend to confuse matters by suggesting that they offer end-to-end solutions that can handle any type of content or content-related application, which is not the case. For example, ECMS do so far not manage content like music or videos as well as a Digital Asset Management System.

The following short brief builds on work that has been carried out by Doculabs (http://www.doculabs.com), an independent consulting and research firm with a ten years track record in assessing technologies. The solutions named are all from North-American vendors, which should not come as a surprise as they are clearly dominating the Content Management System’s arena. European solutions do not show up because there are none which can stand the test against US systems. For example, ECMS do so far not manage content like music or videos as well as a Digital Asset Management System.

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Turning now to Enterprise CM solutions, we want to note just a view points (cf. West, Foust, Klima, 2002): Strong ECM solutions come from divine, Documentum, FileNET, Interwoven, Stellent and Vignette. By end of December 2002, the vendors with the broadest ECM focus have been Documentum and FileNET. Their strength is in offering a growing set of packaged applications. Other significant players in the ECM market include BroadVision, Day Software, FatWire, and Gauss. The trick with most ECM solutions is that they build on integration (as opposed to built-in or re-packaged functionality from third-party vendors). Such integration are primarily made to portal servers from, for example, BEA, Citrix, IBM, Plumtree or SAP. To support some of the specialised content management functions of Digital Asset Management Systems, ECM solutions need further integration, for example with technology from Convera, Artesia, or MediaBin.

The next big thing in content management will be the content life cycle. Once organisations get a handle on their immediate goal of automating and streamlining content processing, many will try to gain the long-term benefits of content life cycle management, i.e. from content creation to longer-term digital asset archiving. Industries with heavy regulatory requirements, e.g. pharmaceuticals and financial services, already are forced to have such systems in place. For the media industries, the driver are not so much regulatory requirements but the capability to re-use and re-purpose content more strongly and effectively.

7.2 The “&” in Content & Knowledge Management Technologies

Many content management system vendors claim that their systems manage knowledge, when in fact the systems shovel data that are mostly text, business transaction data, images, and sometimes videos. The graphic below shows the knowledge management cycle as conceived by David J. Skyrme, a renowned British thinker, writer, and consultant in KM.

![Knowledge Management Cycle Diagram]

Source: Based on Skyrme, 2001.
All of the different elements in the cycle can be supported through information and communication technologies, albeit at present only to a limited degree. Most of the work required to come to reasonable results on which task critical decisions can be based, remains with humans. However, there are certain areas where current knowledge technologies already come to some intelligent results, namely in identifying, gathering, organising and structuring information.

There already exist a few promising knowledge technologies on the market, which are increasingly used in corporate KM. To pick just three examples from our overview of KMWorld's companies that matter in KM:

Applied Semantics, which in April 2003 has been acquired by Google: Applied Semantics' patented CIRCA Technology utilises linguistic processing algorithms in combination with an extensive ontology, a database of more than 500,000 concepts and their relationships to other concepts. Based on this ontology, the processing engine has the capability to categorise, summarise, and keyword tag unstructured information with high degrees of accuracy and consistency [cf. http://www.appliedsemantics.com/pdf/CIRCA_datasheet.pdf].

ClearForest has developed a platform and products that read vast amounts of text, extract relevant information specific to user requirements and provide visual and interactive summaries of relationships between companies, people and events.

TheBrain, one of the smallest companies (26 employees) named in the overview, offers with its BrainEKP an enterprise platform solution that is designed for sharing and linking a variety of data sources into a collaborative workplace, which represents a visual knowledge map to be shared by an entire enterprise. Recently it has embedded Convera's RetrievalWare search technology into BrainEKP. Its client list includes, among others, Ford, GlaxoSmith-Kline, and the United Nations. [cf. Misek, 2003].

Despite the overall dominance of US vendors in the field, Europe can feature some thriving (mostly small) companies active in knowledge technologies. Some of them were also involved in 5th Framework Programme projects. Companies that have already knowledge management suites or specific applications on offer are, for example, empolis (Germany, with around 200 employees one of the bigger companies) or Ontopia (Norway), which both strongly build on Topic-Map technologies. Ontoprise (Germany) has developed semantic web tools (e.g. OntoEdit). SER Systems (Germany) offers products such as SERbrain which classifies and extracts information as well as supports context-based search. SER Systems shows up in KMWorld's top-100 list.

Finally, there are some points to be made related to strategic funding of European RTD in content & knowledge technologies:

- US companies are clearly in the lead with respect to complete, leading edge enterprise CMS, not only in technological terms, but also with regard to their already installed, worldwide customer base.
- There are strong and dynamic US RTD players in content & knowledge technologies, which already have established relationships with the leading US vendors.
- Given the above, effort in funding of RTD in content & knowledge management technologies will most likely lead to solutions that can be implemented "on top" of systems of US-based companies, and their customer base.
- Such solutions need to be capable of scaling massively with regard to content volume, performance, and users - small "test-beds" will not do.
- While successes in building "basic" (enterprise) content management systems are unlikely, there seems to be some room left "at the high level of the game", i.e. in advanced knowledge technologies. Such technologies may, in particular, be found where applications show knowledge level understanding of content, and are capable of carrying out complex tasks based on this understanding.
8 References


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Knowledge Management Forum: http://www.km-forum.org


