Knowledge Management is increasingly becoming an important area for every enterprise. Today the knowledge is in the form of content generated and used within an organization. Organizations face challenges in collating, tagging, identifying, storing, retrieval, reuse, archival and disposal of this content. Enterprise Content Management (ECM) aims at managing all of the unstructured information or content in an enterprise. ECM manages content or information that exist in an enterprise in different digital formats viz., text documents, spreadsheets, still images, audio and video files, and many other file types and formats.
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Introduction

Enterprises generate content as part of their day-to-day operations. This content is about their processes, customer interactions (proposals, costing, project plans, profiles and learning), interactions with the Government, etc. Today, this content mostly exists in the digital form namely text, images, graphics, audio, video, spreadsheets etc. The content is also generated throughout the enterprise and exists on personal computers, laptops, department servers, papers, and tapes. Organizations face challenges in collating, tagging, identifying, storing, retrieval, reuse, archival and disposal of this content.

Content generated by the organization, once effectively tagged and stored for efficient retrieval, forms the knowledge bank of the organization. This is not an easy task though. As more and more content gets generated storage even in the digital form becomes a challenging affair.

Enterprise Content Management (ECM) aims at managing all of the unstructured information or content in an enterprise. ECM manages content or information that exist in an enterprise in different digital formats viz., text documents, spreadsheets, still images, audio and video files, and many other file types and formats. ECM also helps to create content with common desktop applications like Microsoft Word and easy-to-use content authoring templates. It can also capture and incorporate existing content from a variety of sources. ECM also manages content from other enterprise applications such as Enterprise Resource Planning (ERP), Customer Relationship Management (CRM), and enterprise portals.

The main aspect of creating knowledge out of content that exists in an enterprise is adding intelligence by creating categorization schema, metadata, and tags that make search and retrieval of data faster and more efficient. The second aspect is generating and managing relationship between pieces of content, allowing one piece of content to have multiple identities depending on how it is used in various contexts and renditions. This is the 'object model' of content.

Content that is intelligently tagged and the content that has been developed, object model supports efficient repurposing of information. Providing ease in access and well managed content to all stakeholders of the enterprise, is effective management of knowledge.

ECM also controls the publishing of content through multiple channels. For example, a single piece of content may be published simultaneously on a web site, retrieved from desktops, broadcast as a fax, printed as a text document, and sent to a handheld wireless device.

All these functionalities serves just one purpose namely to leverage enterprise knowledge assets to facilitate organizational efficiency, cost reduction, prompt response to customers, changing market needs and a competitive advantage.
Enterprise Content Management System

Enterprise Content Management has several components that enable enterprises to manage content efficiently and effectively. These are Document Management System, Business Process Management, Forms Processing, Enterprise Report Management, Digital Asset Management, Records Management etc. Tata Consultancy Services (TCS) has developed a broad ECM landscape architecture based on Service Oriented Architecture (SOA) that is illustrated in the following diagram:

is the review, revision, and approval process for any piece of content according to user-defined business rules. Truly robust solutions allow you to manage.

ECM components needs to be supported by infrastructure components such as portals, collaborative tools, desktop applications, email management, etc. The service oriented architecture enables these multiple applications to be managed through services which are common thus enabling the enterprise to leverage the ECM infrastructure for various departments / applications that an enterprise deploys.

Document Management Systems

Document Management Systems (DMS) provides facility to capture, track and store images of paper documents. The images are categorized and associated with meta data so that they can be easily retrieved, moved within an enterprise, archived or destroyed based on a criteria set within an enterprise or a business unit. DMS also provides check-in, check-out, storage and retrieval of electronic files such as word processor, power points, spreadsheets, PDF documents etc.

DMS is made up of software designed to manage all types of documents, including scanned, electronic and paper. Documents are stored in an ECM repository that facilitates search, retrieval, printing and distribution.
The users can check out i.e. retrieve content (word processing document, power point or excel) from the ECM repository, make changes, and save the changed document as a new version (check in), all without leaving the native application. This enables users to reuse existing content that exist within an organization rather than work afresh every time they need to create something such as a presentation or a case study or a proposal etc. Thus the knowledge gets stored, reused and distributed within an enterprise.

**Workflow**
Workflow is defined as the automation of a business process where documents, information or tasks are passed from one user to another for action, according to a set of procedural rules. Workflow software products, like other software technologies, have evolved from diverse origins. While some offerings have been developed as pure workflow software, many have evolved from image management systems, document management systems, relational or object database systems, and email systems. Workflow systems offer many features / functionality that enable enterprises to capture and reuse knowledge that employees possess. It also helps directing the work to a set of highly skilled employees wherever they may operate from within an enterprise. For instance, the claims processing officers can sit at a central back office and handle all claims from across the world. This can further be classified as auto claims executive looking at only auto claims while the property and casualty executive looking at property and casualty claims. This leads to improved efficiency through automation and elimination of many unnecessary steps, better process control through standardized working methods, flexibility by enabling re-design and faster training of users in line with changing business needs, and business process improvement by streamlining and simplification.

All these will lead to improved customer service, better monitoring through analysis, reporting and optimization, shortened cycle times and reduction of cost per transaction.

**Forms Management**
Forms management is the process of data capture of hand written or machine printed data from well defined forms through accurate and efficient process so that business-critical information from forms, documents and electronic data streams for use in database, workflow, document, content and other information management systems. Forms processing technology automates the processing of millions of forms maximizing the accuracy and value of information, speeding the capture process, increasing productivity and significantly reducing the cost as compared to the earlier manual operations. These technologies have been adopted by industries such as insurance, financial services, government, manufacturing, retail, business process outsourcing etc. These can be used for processing all types of forms, including medical insurance claims, credit applications, mutual fund enrollments, tax returns, orders and invoices etc. These can also be used for applications that need to scan, index and archive less-structured documents, such as correspondence, regulatory filings, legal briefs and resumes regardless of the source of the data namely paper, faxes, scanned images or electronic data streams.

Scanning, image processing, image quality control, recognition to read machine print, handprint, cursive writing, marks and barcodes on forms and documents with unparalleled speed and accuracy are the functionalities of this technology. Fielded data and full text recognition technologies can be included. Free form recognition allows one to capture data from loosely structured forms, such as invoices and waybills, without creating a unique template for each form type. Multiple recognition engines and custom voting algorithms can be configured to further improve recognition results.

Forms technology thus is a way to capture data from paper, web forms and electronic data streams so that the data is used in the back-end ECM and other applications in the organization for either data processing applications or data mining or getting data into an enterprise content management system.
Web Content Management
An enterprise web site or portal is much more than a storefront or static digital brochure. It is a medium through which all known and unknown stakeholders namely customers, prospects, partners, suppliers, and employees interact with the enterprise. Through the web site partners, prospects and competitors learn about products and services of the enterprise. It enables your employees to be more efficient and effective in their everyday work.

A web site or portal that is powered by Web Content Management (WCM) system is capable of delivering dynamic, highly-personalized, multi-lingual content to individual customers, partners, and suppliers around the world. This will enable the knowledge of the enterprise to be effectively shared or used by all stakeholders. WCM solutions automate the complex process of creating, managing, and publishing content to web sites, portals and web applications in multiple languages and locales and for diverse audiences. WCM solution also empowers non-technical users to create, manage, and publish their own web content without the need to understand the complexities of technologies such as HTML or XML. An effective WCM solution eliminates the web team bottleneck and allows this group to streamline the entire web production process, thus enabling the enterprise to capture, manage and effectively use the knowledge of an enterprise.

Digital Asset Management
Today, graphics files, photos, presentations, design layouts, streaming audio and video, and other rich-media assets alongside traditional documents are part of the content or knowledge that an enterprise generates or uses. To efficiently manage this digital content, organizations look at software applications designed specifically to manage digital assets. Digital Asset Management (DAM) delivers business value and Return On Investment (ROI) through innovative and specialized methods of storing, organizing, distributing, and tracking digital media across multiple delivery channels. DAM provides businesses with the ability to leverage digital content efficiently along the supply chain through production, postproduction, and distribution processes.

DAM solutions provide enterprises in all industries with powerful capabilities for promoting products and services, educating employees, and establishing global brand recognition. This happens through the streamlining and unification of the management of all multimedia and image-rich content.

Enterprise Reports Management
Report management is the process of electronically capturing, indexing (adding intelligence), archiving and distributing reports to improve access to critical business information.

As business operations expand across multiple locations and lines of business, enterprise reporting requirements grow in scope and complexity. The information that was once maintained in a single system and routed to a single destination, must now be captured from a variety of different sources, in an increasing number of file formats. In addition, different sections of reports need to be routed everywhere from user workstations to network printers, and from wireless devices to conventional retrieval processes.

Traditionally, organizations have relied on paper-based processes to support these requirements. These processes were adequate when operations were nominal. But as enterprises reach a global scale, they impair the accessibility and usability of critical corporate information. To reduce operating costs and ensure that appropriate business users can extract the maximum value from report content, organizations need a designated output and report management solution.

Enterprise Report Management system transform report content into meaningful business intelligence, empower business users with multi-channel distribution, reduce operating costs, eliminate wasted materials, enable resources to focus on the most valuable tasks, increase accuracy and efficiency, and promote security and customer service.
Records Management

Records Management provides services that relate to the creation, utilization, maintenance, retention, disposal and preservation of records. This office operates a records storage center, microfilming unit, and microfilm storage vault. It establishes records retention and destruction schedules and actively encourages adherence to those schedules. Record, be it electronic or physical is any document, content or object that is important to the organization and must be recorded and retained according to law, regulatory statute and/or business policy. Records Management is the activity of ensuring that content is kept (retention) for the appropriate amount of time and then destroyed or archived (disposition). Sarbanes-Oxley (SOX), HIPAA, Patriot Act, PRA, NASD, NRC, FDA 21 CFR Part 11, DoD 5015.2 and PRO II are some of the compliances that organizations have to comply with and are part of the business processes. These have become very important since 911.

Physical records are managed similarly to electronic records. Records can have both electronic and physical content elements. Meta data will add intelligence to the physical records where it contains meta data and location reference for the physical object. ECM technology provides all functionality to control, manage and track records.

Collaboration

Collaboration and content management are about getting work done — faster and better than ever before. Web-based collaboration tools are fast becoming the preferred way for knowledge workers to communicate, coordinate, and collaborate with each other. These tools enable a dynamic and flexible environment for bringing people together, allowing them to focus on a complex goal, deliverable, or outcome.

With a unified and integrated enterprise platform that enables best-of-class collaboration and content management, companies will realize a greater return on investment from both technologies. Organizations will be able to derive benefits through increased productivity, cost savings, and faster reaching time to the market. Integrating ECM with collaboration enables teams to work dynamically toward a common goal while capturing, storing, and archiving the content that is produced during collaborative processes. A single solution integrating these two key technologies allows distributed teams to more effectively plan, strategize, make decisions, and build consensus as they design new products, coordinate their supply chain, engage clients, and work on other key business initiatives.

As the content is stored in an ECM repository, it is available to the entire enterprise. Individuals outside the project team can now search for, reference, reuse, or publish this information, eliminating redundant work while leveraging best business practices.

Search

Today we are witnessing information glut. There is more information out there that can be accessed from anywhere, anytime and by anyone. This information glut on the other hand has made searching for a simple content far more difficult. Searching for the information that one needs is literally like looking for a needle in the haystack. So the need of the hour is intelligent searches that fetches information fast, accurately and returns a very meaningful set of results.

There are host of organizations creating efficient search tools that can cater to this new generation user. The new tools include meta data enabled search, full text search, semantic search and also context enabled search.

XML technology is also enabling to create and organize data in an intelligent fashion. As the tools for creation of content in an intelligent way become more pervasive and the new generation search technologies become available, the user will be able to search, find and reuse the right information quickly and accurately. Thus enabling an enterprise to use the knowledge more effectively.
**Knowledge Maturity – 5iKM3**

It is observed that technology alone cannot enable an enterprise to be a knowledge enabled enterprise. While technology plays an important role in Knowledge Management (KM) in an organization, it is equally or more important to look at people, processes and how technology is used to enable people and processes to create, use, reuse, share, protect, and retire knowledge within the enterprise and also with all the stakeholders. Thus the three identified pillars of KM are:

- People: people and culture
- Process: process, policy and strategy and
- Technology: technology and infrastructure

It is observed that the state of knowledge maturity can be achieved by systematically addressing the three pillars of KM and by continuously upgrading the KM maturity to reach a state where it gets embedded in the business processes. This is a path of continuous improvement and must be governed by a strong maturity framework, which has the ability to assess and benchmark the various aspects of people, process and technology in a holistic manner.

The maturity model 5iKM3 has been evolved by keeping in mind all these aspects of KM. This framework describes each state of maturity and addresses its objective. Further, it is able to relate the KM initiatives with the perceived business benefits of each state.

**Need For A Maturity Model**

There is always a benchmark and model to assess and evaluate the state of acceptance and maturity of any business initiative which can or has the potential to impact the business process and delivery. KM is now one of the most important business decisions that impact all the touch points of business delivery. The concept, however abstract it may sound, has now a formal basis and there are tools and technologies available for the assessment and evaluation of KM in an organization. Organizations are now moving from the basic intent of capturing the explicit and tacit knowledge to integrating the various applications that are currently managing the transactional details leading to business knowledge with the document and content management systems.

However, it is highly unlikely that all the knowledge in the organization can be managed and harnessed in one giant leap. The most significant change that needs to happen along with the convergence of the applications is the change in the mindset and culture within the organization.

In order to assess these changes and their impact, it is important that there is a strong framework, which is able to address the people’s mindset and culture effectively. The maturity in KM is a volatile state. One needs to be highly motivated and keep the KM governance model agile in order to ensure that the organization remains in the desired state of KM maturity. Any slippage in governance and the motivation level of the people, no matter how strong the processes are or how much the technology supports the initiative; there is always a scope for losing the higher state of maturity.

We believe that people constitute the maximum portion in the knowledge management initiative. It is now well accepted that knowledge management is 70% people, 20% process and 10% technology (Excellence model and knowledge management by Dilip Bhatt, Principal consultant, ICL Ltd., UK, ©2000) or that the people to process and technology ratio is 70:30. We further believe people cannot be addressed in isolation and culture greatly influence people. This shows that people and culture are greatly dependent on each other, and that process and technology play the role of facilitator and enabler respectively. This is why the TCS KM philosophy emphasizes on managing mindsets.

However, with the KM gaining focus, the organization can harness the organizational knowledge to increase the operational efficiency, reduce rediscovery effort and enable innovation. KM helps in optimizing the
resources and processes to maximize the returns in all aspects like return on investment, return on customer and return on people (ROI, ROC, ROP).

To benchmark the knowledge management maturity, five states (5i) of maturity have been identified.

1. Initial: Organization has no formal processes for using organizational knowledge effectively for business delivery.

   Organization Speak: “We may have lots of knowledge but we do not know how to harness it in a structured manner for business benefits.”

2. Intent: Organization realizes the potential in harnessing its organizational knowledge for business benefits.

   Organization Speak: “We know we have lots of knowledge and we are moving in the direction of harnessing the same.”

3. Initiative: Organizations have knowledge-enabled their business processes and are observing its benefits and business impact.

   Organization Speak: “We need to leverage knowledge from all the touch points and we have made a start; however we are cautious.”

4. Intelligent: Organization has matured collaboration and sharing throughout the business processes that results into collective and collaborative organizational intelligence.

   Organization Speak: “We are able to harness knowledge from all the touch points in the organization and realizing the business benefits out of it.”

5. Innovative: Organizational knowledge leads to consistent and continuous process optimization giving it a business edge.

   Organization Speak: “We have institutionalized the knowledge and are able to innovate and optimize the business processes”.

These states, as the names describe, are fairly easy to comprehend. Also, the states start with initial, which accommodates the organizations even without any formal KM processes. The model suggests that journey to the top state begins at the time the organizations show the intent for going the KM way.

The key operational processes that need to be carried out to convert the tacit knowledge to explicit knowledge in an organization and exploit them are: create, capture, organize, store and use/reuse. The following table provides a snapshot of these key process steps in the various maturity states in an organization:
<table>
<thead>
<tr>
<th>Process</th>
<th>Initial</th>
<th>Intent</th>
<th>Initiative</th>
<th>Intelligent</th>
<th>Innovative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create</td>
<td>Knowledge creation is done but not acknowledged</td>
<td>Knowledge creation is acknowledged and there is an effort to channel the same</td>
<td>Knowledge creation is given a thrust</td>
<td>There is no opportunity lost in the knowledge creation</td>
<td>Knowledge creation is a joy</td>
</tr>
<tr>
<td>Capture</td>
<td>There are no formal processes for the capture of knowledge or the capture of knowledge is overlooked.</td>
<td>There is an effort to capture the knowledge but there is no formal process</td>
<td>There is a defined process to capture the knowledge at various touchpoints though they may not be exhaustive</td>
<td>The capture processes are well in place and all touchpoints are being addressed effectively</td>
<td>Capture processes are well integrated in the business processes</td>
</tr>
<tr>
<td>Organize</td>
<td>There is no formal structure to organize the accumulated knowledge</td>
<td>There is no formal process</td>
<td>There are defined processes to organize and store the knowledge in a structured way</td>
<td>The knowledge is well organized to cater to all types of needs</td>
<td>Organisation of knowledge assets is optimised</td>
</tr>
<tr>
<td>Store</td>
<td>Is ad hoc and based on elementary tools</td>
<td>There are some defined repositories but based on elementary tools</td>
<td>There is a logical central repository and process based access</td>
<td>The storage is well defined and available for access from anywhere anytime</td>
<td>Storage follows anything, anytime, anywhere paradigm</td>
</tr>
</tbody>
</table>

Table 1: Snapshot of Key Operational Processes w.r.t Maturity States
Note: 5iKM3 is the TCS proprietary KM maturity model developed by Dr. Santosh Mohanty and Mr. Manish Chand
About Knowledge Management Practice
The TCS-KM Practice has executed multiple assignments across verticals and geographies over the years. The gathered expertise has emerged as its multidimensional approach to Knowledge Management implementation known as SIGMARG™. It describes the approach, methodology and a delivery model for successfully conceptualizing, designing and executing a KM initiative in any organization.

About Tata Consultancy Services (TCS)
Tata Consultancy Services (TCS) is among the leading global information technology consulting, services and business process outsourcing organizations. Pioneer of the flexible global delivery model for IT services that enables organizations to operate more efficiently and produce more value, TCS focuses on delivering technology led business solutions to its international customers across varied industries.

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