

# A Model of Technological Platform for the Knowledge Management Organization

Nieto B. W, Luna A. C, Ramos R. J.

**Abstract**—This paper describes an experience of research, development and innovation applied in Industrial Naval at (*Science and Technology Corporation for the Development of Shipbuilding Industry, Naval in Colombia* (COTECMAR) particularly through processes of research, innovation and technological development, based on theoretical models related to organizational knowledge management, technology management and management of human talent and integration of technology platforms. It seeks ways to facilitate the initial establishment of environments rich in information, knowledge and content-supported collaborative strategies on dynamic processes missionary, seeking further development in the context of research, development and innovation of the Naval Engineering in Colombia, making it a distinct basis for the generation of knowledge assets from COTECMAR.

The integration of information and communication technologies, supported on emerging technologies (mobile technologies, wireless, digital content via PDA, and content delivery services on the Web 2.0 and Web 3.0) as a view of the strategic thrusts in any organization facilitates the redefinition of processes for managing information and knowledge, enabling the redesign of workflows, the adaptation of new forms of organization - preferably in networking and support the creation of symbolic-inside-knowledge promotes the development of new skills, knowledge and attitudes of the knowledge worker

**Keywords**—Management Knowledge, Information and Communication Technologies, Knowledge Worker.

## I. INTRODUCTION

THIS paper describes an applied research experience in Colombian company COTECMAR Marine. Through the processes of research, development and technological innovation, based on theoretical models related to organizational knowledge management, technology management and human talent management and integration of new technology platforms such PKM (Portal Knowledge Management). For facilitating the creation of environments rich in information, knowledge and content that supported collaborative strategies accelerate its mission statements, seeking further development in the context of research, development and innovation of Naval Engineering in Colombia, so that forms a basis very different from traditional generation assets of the knowledge COTECMAR. One of the strategic priorities in any organization is the integration of information and communication technologies, supported on emerging technologies (mobile technologies, wireless, digital content via PDAs, and content delivery services on the Web 2.0 and Web 3.0) that facilitates the redefinition of the processes of information management and organizational knowledge enables workflow redesign, adaptation of new forms of organization, preferably in a network (Networking) - and support the creation of symbolic products inside-

knowledge - and promotes the development of new skills, knowledge and attitudes on the part of the knowledge worker (K-worker). Given this scenario of organizational adaptation, is of high importance to establish a model of sustainable strategy to any process of transformation and adaptation in the context of an emerging economy supported with information and knowledge infrastructure.

In this regard the organization as a body of knowledge and in this case COTECMAR should rethink processes of transformation, reorganization, redesign and create virtual processes that foster an organizational realignment to facilitate the construction of an architecture of knowledge, supported mainly in mission statements for knowledge management, structures, and IT infrastructure [1,2] such as: Web applications, e-groupware environments, document repositories, content repositories, project repositories, P2P communication tools, data mining tools, mobile devices, global accessibility, high performance, standardized structures, to generate, distribute, share and brokering knowledge and support a knowledge architecture.

## II. TECHNOLOGY BASED ARCHITECTURE FOR PKM AT COTECMAR

The structural component of Information Technology and Communication for knowledge management is structured on the basis of a technological architecture (see Figure 1), which consists of a model of superimposed layers, the first layer is the organizational information infrastructure (hardware, software and communications) which is the support base for the operations of connectivity.

The second layer of information architecture (corporate memory) which is the organizational database, repositories of files and content in general is finally layer structure in a document management system which interacts with databases Information System Organizational. The third layer is the collaborative environment of which is rooted in the different environments individual, group and corporate to streamline processes such as e-groupware. In the fourth layer have the k-networking type applications through which highly virtualized services are provided to facilitate the creation of communities of practice, virtual learning or interest, using technologies such as e-learning and social networking type Elgg or Myspace, Facebook etc. The fifth layer is a mixture of the organization's corporate portal and the portal for knowledge management is the tip of the iceberg and the layer is visible to all users and stakeholders of the organization, which has been implemented on a Content Management System (CMS). Finally the proposed architecture is sought that is sustainable over time, which would promote social virtual processes (e-

society) [3], [4] and in turn becomes a new economic approach to social development through knowledge management.



Fig. 1 Architecture Technology for PKM

### III. THE PKM SERVICES MODEL

It takes as a starting point for creating the model of the PKM, a service structure that enabled the identification and selection of information technology and communication (ICT) more suitable for supporting the knowledge management processes and dynamic environments defined from architecture. Table 1 shows the different categories of services, their description and implementation technologies.

TABLE I MODEL SERVICES PKM

Category	Description	Technologies ICT
Content Management Services	<ul style="list-style-type: none"> <li>Lessons learned</li> <li>Outreach R &amp; D</li> <li>Establishment of communities practice, learning, virtual</li> <li>Content navigation</li> <li>Content Creation</li> <li>Content Publishing</li> <li>Maintaining content</li> <li>Metadata Management</li> <li>Content syndication.</li> </ul>	CMS
Repositories of Information Services or Institutional Memory	<ul style="list-style-type: none"> <li>Capture your data in any format - text, video, audio and data</li> <li>Distribute over the web</li> <li>Search and retrieve information objects</li> <li>Preserves the information objects</li> <li>User Management</li> <li>Implementation of standards for metadata, Ontologies.</li> </ul>	DMS
Collaborative Services	<ul style="list-style-type: none"> <li>User Management</li> <li>Project list</li> <li>Task List sorted</li> <li>File Repository</li> <li>Contact List</li> <li>Calendar</li> <li>Discussion forums</li> <li>Permission-based</li> </ul>	SYSTEMS E.GROUPWARE

	Resources.	
Social networks and learning	<ul style="list-style-type: none"> <li>e-Learning</li> <li>Social Networks</li> <li>Communities of practice.</li> </ul>	<ul style="list-style-type: none"> <li>Social Networks</li> <li>Communities of practice</li> </ul>
Messaging and communication services	Instant Messaging ** Virtual PBX	IMS, P2P
Publishing Services	<ul style="list-style-type: none"> <li>Blogs</li> <li>Wikis</li> <li>Forums.</li> </ul>	BLOGGER, FOROS, WIKIS

The service model is the conceptual and methodological basis of the services architecture. The visibility of the model is materialized through the integration and juxtaposition of information technologies and their applications, in any event by setting a learning organization that allows harmonize and streamline media-structures, information architecture, learning objects, document management, information repositories, social software implementation, through which sets out the appropriate transformations for the generation of knowledge.

Figure 2 shows the design of services PKM, which originates from the Architecture and Model described above. The design consists of five layers, the first represents the connectivity service, it is responsible for meeting the demand of user interface, which can be dispersed within and outside the organization, as well as identification and authentication through the environment of the PKM.

In a second layer of services include application servers comprising: the Web server, the database server, server motherboard applications and an integrated operational services remain active under the monitoring of the Platform Manager which facilitates release of the portal services PKM, which interacts with a third layer called Web applications or services platform serving as a container, which has been implemented on a content management system CMS. In the fourth layer have specific services DMS, LMS, GROUPWARE, social networking, which eventually become visible on a five layer called PKM Portal, located in [9].

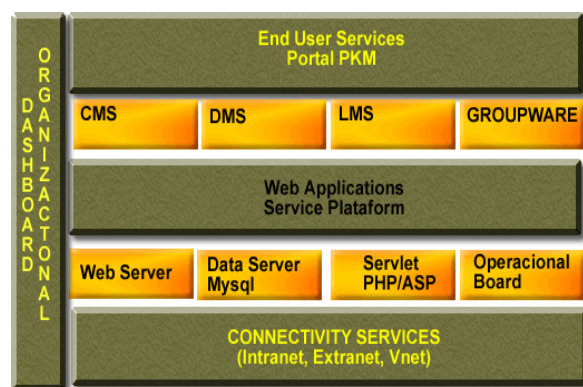


Fig. 2 PKM Services Model

### IV. DESCRIPTION OF THE PKM-COTECMAR

A portal is an application that allows users access to a range of services associated with various knowledge management initiatives, materialized from the generation of content and publication, and facilitate the presentation, display, exhibition, subscription, notification, collaboration, distribution, security and data integration, information, content and knowledge. The PKM for COTECMAR becomes a technology implementation that supports the processes of generating, disseminating, and using knowledge brokering for their own purposes of collaboration and knowledge management.

## V. NUCLEAR COMPONENTS PKM-COTECMAR

*The Content Management System (CMS):* aims to develop an initiative framed socialization of knowledge in the field of content management, which is originated from individual environments, corporate group and facilitating the publication processes, knowledge sharing in areas such as: Lessons learned (success and failure), development of knowledge products (goods and digital services), customer knowledge, knowledge management and processes of human talent in science communication. The inclusion of metadata, version control, configuration rules managed by an administrator user, audit, authorized access, alert management news or information content to authorized users are key's to this initiative.

*Document management systems (DMS):* Content management is a critical initiative for knowledge management that helps organizations manage important information objects and other unstructured, such as images, XML components, podcasts and emails. Additionally, this initiative is to develop processes that facilitate role managing the entire life cycle documentary, integrating schemas that allow search, retrieval of information objects and facilitating their distribution, and control access to the various users of knowledge.

*Taxonomies of knowledge:* The representation of knowledge is incorporated from the definition of an ontology or controlled vocabulary of the organization, to structure a Semantic Web associated with PKM, Knowledge representation is certainly important in knowledge management (KM). The challenge is to put the tools of representation in the hands of managers, the features that must have these tools are: The main element for the representation of knowledge is an information object that represents some fact and contains two structural elements of meta-information and content, which are organized into collections according to a metadata standard (Dublin Core) and classification, and have a standard digital format, stored in document repositories, and are used and managed by user groups. Metadata is information about the data represented by the same document, similar to what is a bibliography card for a book [Heery, 96]. The objective of the metadata in the document management system is to facilitate search and navigation for the end user.

*E-groupware environments:* Another of the systems that support knowledge management initiatives in the PKM of what constitutes COTECMAR platforms such as e-groupware. It is basically a software which the environment is on a site that provides the tools that empower participants to create, edit, share and publish their ideas, tasks, projects, commercials and other, through documents or other digital objects (images, text, video, music etc.). Contribute to the generation of media

spaces with different themes and multiple threads, allowing the opportunity to collaborate on projects asynchronously or synchronously, typically provide other features include chat rooms, discussion forums, share and manage files, share components as: calendars, blogs, wikis, Web page publishing, surveys and tests, within the desired characteristics of collaborative tools in the context of knowledge management (KM) includes the use of tools for group work. Among the features of such technologies include creation of shared documents, knowledge representation, mail, forums, digital newsletters, task management, project management, control and monitor them. Regularly are tools that allow you to perform tasks shared by working groups with restricted access levels-

*Communities of Practice (COP):* Communities of practice are a group of people who share an interest, a set of problems or a passion for a topic in particular, can also be defined as social groups formed for the purpose of developing a knowledge specialist, sharing learning based on reflection of practical experience using a virtual space on the Web. In a community of practice becomes explicit the informal transfer of knowledge within social networks and groups offering a formal structure that allows you to acquire more knowledge through shared experiences within the group. Finally, the group's identity is strengthened, to reinforce learning as a process of participation and shared leadership.

*A Learning Management Systems (LMS):* Knowledge Management Initiative which supports the Comprehensive Learning System COTECMAR a platform for support through the approval processes that promote skill development and individual and corporate responsibilities.

A Learning Management System (LMS), can be defined as a software based on a Web server that provides modules for tracking and administrative processes required for learning and teaching system, simplifying the control of these tasks. The administration modules allow, for example, set courses, register students, record experts, researchers, and teachers, allocate resources to a participant, bring progress reports and other aspects. Within the organizational learning situations that may develop following proposals are highlighted by [Welsh, 2001], see Figure 3.

Situación de aprendizaje	Formación tradicional	e-Learning
Completamente sincrónica	Sesión típica donde intervienen estudiantes y un formador, existe acuerdo en lugar, tiempo	La sesión se desarrolla en tiempo real a través de Web utilizando herramientas de audio-video-texto.
Parcialmente sincrónica	Grupo de estudiantes se reúnen fuera del horario en lugar específico para desarrollar una actividad	Grupos se reúnen mediante un Chat o usan software de comunicación para desarrollar una actividad (x lugar)
Asincrónica	Los estudiantes completan tareas asignadas individualmente fuera del aula, fuente información sus textos o la biblioteca física	Los alumnos descargan contenidos y recursos de información desde la Web, el tutor proporciona asistencia vía correo, acceden a información.

<sup>96</sup> Welsh T., An Event Oriented Design Model For Web\_based Instruction. En B. Khan, Web Based Instruction, Nueva Jersey, 2001

Fig. 3 Model Welsh

*Organizational Portal:* Represents the corporate virtual image, aims to facilitate communication processes and service delivery front of the organization helps to create the workplace on demand, serves as a channel for providing front-end applications (messaging, enterprise content, catalogs and general information) which can be accessed via the Web by

providing concurrent access. The organizational portal becomes an easy tool to establish points of interaction, collaboration (calendar, people search), transactions (business intelligence, not included), and management of information (digital goods and services, data visualization) and the point of entry into the portal for organizational knowledge management.

In this case, the portal provides the multiple functions and relationships that can arise between a company employee (E2B), employee to employee (E2E) (collaboration), a company employee (E2C) (Directory of Experts virtual classroom). The knowledge management portal includes features for organizing content, business intelligence, transaction management, customer intelligence, supplier intelligence, warning services, and provision of learning materials, content management, workflow, personalization and collaborative activities. Corporate portals facilitate the conversion of information into knowledge to facilitate organization, navigation, visualization and heuristic interaction with employees or other information.

#### VI. ICT TOOLS FOR KM PROCCES WITHIN THE PKM

The starting point for technology assessment was subject to a strategic business analysis [5,6] of the organization, identifying the different mission statements, strategic, administrative associated with organizational knowledge management, integration of a solution depends substantially organizational strategy, organizational culture, alignment of corporate goals and indicators with targets and indicators of the IT component and of course the effective administration of IT resources aligned with the processes of knowledge management.

The selection of KM tools for implementation of knowledge management portal COTECMAR, was based on an analysis of various technology platforms associated with content management, document management, e-groupware environments, project manager, manager of bloggers and generating portals, tools such as Alfresco, Drupal, Joomla, KnowledgeTree, Moodle, Dokeos, Wordpress, subtitle, Elgg, dotproject, Gantproject and Wikipedia were assessed and analyzed. Also within this technological integration was taken into account as proposed by [8] [9] who promote a framework for auditing the processes of knowledge management model called the "8 Cs". This is shown in Table 2.

TABLE II FRAMEWORK PKM

KM Framework	
Connectivity	What kind of devices, bandwidth, interfaces, technologies and tools are available to knowledge workers when they are in your office or on the go?
content	Knowledge assets that are relevant to the context of its processes and what are their strategies for encoding classify, archive, retrieve and track use?
3. Community	What are communities of practice that are aligned with your business, and that organizational support is to identify, develop and exploit?
4. Culture	His organization has a learning culture where employees share their knowledge and mutual trust to support a knowledge management?
5. Capacity	What are your strategies to build knowledge focused on the ability of employees, through workshops, mentoring, teaching, publishing, editing and e-

	learning?
6. Cooperation	Your employees have a spirit of open cooperation and organization works with knowledge management head-on with its business partners, industry consortia and universities?
7. Commerce	That trade and other incentives, to promote the practical use of KM? Contribution is valued as acceptance and use of knowledge assets?
8. Capital	What percentage and amount of revenues are invested in their KM practices are measured and used as monetary benefits and qualitatively
Source Rao, 2004	

#### VII. IMPLEMENTATION OF PKM FROM ICT TECHNOLOGIES

The implementation of the PKM is harmonized with the architecture, service model and the nuclear components of the PKM described above. Its implementation is under a client / server multi-layer, with each layer flows with any other closely, infrastructure initiatives based substantially open, free software, open standards and a services model focused on the Web [7] in the Figure 4 displays the respective implementation. The first layer: consists of the technological infrastructure which has the function of providing communications services and data transfer and information at this level we have: type data networks Wan, Lan, Wlan, WiFi, CP, Can with the passive and active equipment associated with network connectivity. The second layer: the form of Web Services standards and open initiatives, responsible for structuring the information architecture and ensure interoperability between different services, the Web server, the database manager, the pre-processor integrated services that include support for the integration of any service platform. The third layer: The infrastructure consists of Web-based applications, there may be services such as LMS, CMS, DMS and collaborative environments and building services native Internet content that adopt the standards of the W3C (WWW Consortium) and standards for metadata.

The fourth layer: it has the tools and infrastructure to support the educational processes that are characterized by easy personalization, customization, among the tools that support this layer we have: e-mail, forums, blogger, the Wikis and Web 2.0 tools. The fifth layer: it has the interest groups, general community who access content services and digital goods and services (courses, books, news, mail service, lists, blogs and others), require an authentication and authorization to enter the service.

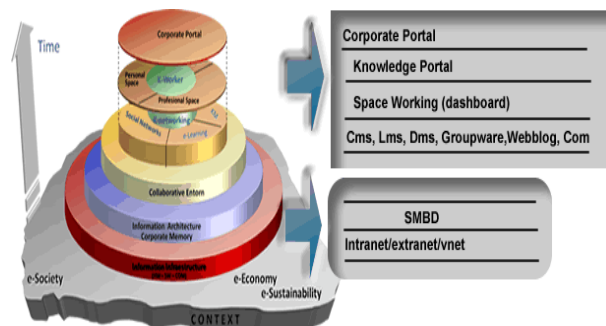


Fig. 4 Implementation of the PKM COTECMAR

### VIII. FRAMEWORK PKM

The PKM space is supported on a framework for business collaboration that combines two key aspects: an emphasis on KM processes and emphasis on the practice of KM. Graphically we can see in the following manner:

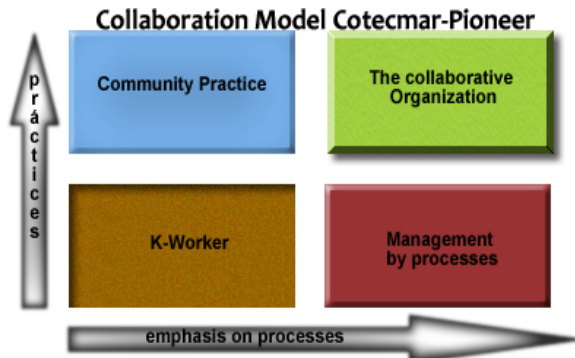


Fig. 5 Framework PKM

### IX. WORKSPACE OF THE PKM

The Workspace provides a workspace where individuals and workgroups can carry out their individual and group collaborative tasks. This space is an environment that can be organized, customized, which can bundle various teams, projects, tasks that can address various organizational topics, thus creating a collaborative work environment, the workspace is shown below in Figure 6.

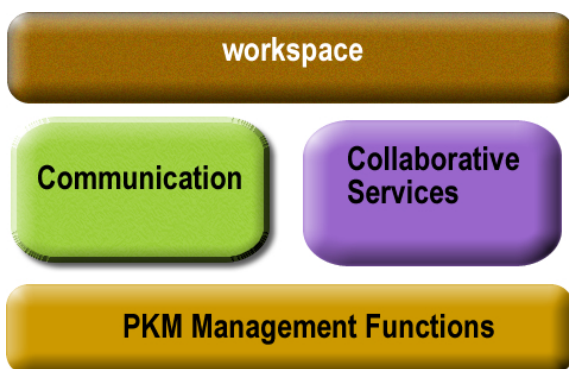


Fig. 6 Workspace PKM

### X. CONCLUSION

The management of organizational knowledge emerges as a key strategy for organizational learning, helping to raise individual skills, group and organizational. Knowledge management impacts all organizational levels (operational, tactical and strategic). The creation, distribution and brokering of knowledge sharing provides a qualitative change in the nature of work becoming more competitive organizations.

Information and knowledge technology (IKT) is a strategic alternative for development of skills and individual skills, group and corporate knowledge management, although they are conceived as tools, not hide the possibility offered to

create work environments and scenarios different from the conventional, encouraging work and virtual learning (e-working, e-learning), likewise the creation of communities of practice, virtual, digital and digital social networks to have transformed fully the processes of communication and business collaboration.

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**Nieto Bernal W. PhD.** Research Professor of the University of North, Department of Systems Engineering. (Colombia)  
E-mail: [wnieto@uninorte.edu.co](mailto:wnieto@uninorte.edu.co) or [nietowilson@gmail.com](mailto:nietowilson@gmail.com)

**Luna Amaya C. PhD.** Research Professor of the University of North, Department of Industrial Engineering. (Colombia)

**Ramos Ruiz JL. PhD.** Research Professor of the University of North, Department of Economics. (Colombia).