

# The Ways of Knowledge Management

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## Abstract

*This paper summarizes the experience of an R&D Center: the Center for Knowledge Systems (CKS) at the Instituto Tecnológico y de Estudios Superiores de Monterrey, Mexico. The CKS's mission is to study the knowledge economy and to develop systems which enable individuals and organizations to develop sustainable strategies within that economy. Our work consists mostly of contracted industry projects. From the income of those projects, we fund our own basic research. The purpose of this paper is to share our experiences and gain fresh inputs from colleagues working on the understanding and management of knowledge.*

*The CKS focuses on three major areas of knowledge management: organizational learning, intellectual capital and value addition. These areas show an increasing level of complexity and innovation. As we progress on this path, we find newer territories and less points of reference. We have drawn a map of the knowledge systems field in order to navigate our way forward. We constantly redraw this taxonomy, based on an action-research approach to our own knowledge construction.*

*A basic CKS tenant is the commitment to experimentally apply to ourselves the most progressive management principles we assert. Since the virtual organization is one of the most comprehensive of such principles, we operate through an intentional virtual design. Knowledge exchange in virtual teams, management of virtual learning networks and the very concept of virtuality are part of our day-to-day concerns.*

*Through this article, our structure and function is described and, in doing so, some conclusions on the development of knowledge systems for industry will be drawn. Rather than reading, we are interested in sustaining a dialog with those having similar interests and experiences.*

*Key words: knowledge economy, organizational learning, intellectual capital, value addition, virtual organization.*

## Two Levels of Experience

Through this article, I share the experience of an R&D center devoted to knowledge management. In doing so, I describe some achievements and struggles in building our technology base. I also describe our own efforts in becoming a knowledge organization. In the spirit of the Conference, I regard this as an input paper for fruitful interaction with other participants.

From this experiential perspective, I focus on the following issues: first, the increasing degree of contradiction between business-driven knowledge and the structural constraints of school-based education. Second, I discuss the relevance of

process-capable learning design and describe our experience in the development of high-performance organizations. Finally, I outline our own way of working as we pursue the maximization of intellectual capital and value-addition.

## **The ITESM University Network**

«ITESM» stands for «Instituto Tecnológico y de Estudios Superiores de Monterrey», a private technological university founded in 1943 in Monterrey, an industrial city in Northeastern Mexico.

ITESM is a non-profit educational organization supported by private business. It is a university network consisting of 26 campuses in 25 Mexican cities. The Institute has a faculty of 5,000 and a student body of 70,000. ITESM is a founding member of Mexico's National Association of Higher Education Institutions and is currently accredited in the U.S. by the Southern Association of Colleges and Schools.

All 26 campuses are linked via a telecommunications and telecomputing satellite network. Three C-band channel for digital TV transmission and a KU channel for interactive voice and data are used. Two campuses have uplink facilities and all 26 have downlink classrooms. Most of the programming consists of graduate, undergraduate and faculty development courses. These courses are produced in response to internal needs. Most undergraduate and graduate courses are part of traditional curricula.

## **The Background**

Our story starts with a concern for effective distance learning. In 1990, an opportunity to develop a distance education graduate program emerged. Responding to the mainstream tendency to define an educational program on the basis of its hard technology base, (e.g. «master courses by satellite») an initiative emerged to define a graduate program on the basis of knowledge value-addition: a master program for professionals at work.

Professionals working full- or part-time and seeking a quality master's curriculum, find difficult to fulfill the academic requirements (fixed time and structure) of a school-based system. The challenge was to design a graduate program which empowered individuals and local groups to learn at their own pace and in multiple modes, and which satisfied academic standards of the school-based system. Tension between working and learning-time, normally seen as a constraint, became an area of opportunity. Course activities were related to professional duties and vice versa. Students managed their own learning process. An open network of on/off-line resources supported flexibility and quality.

Hence, the Sinapsis Graduate Program was created. To this day, it has four master's programs, with approximately 600 students. It reaches over 30 receiving sites, some contracted by industries or other universities. It is beginning to expand to other countries in Latin America.

## **The Birth Of The CKS**

Despite Sinapsis Graduate Program's quantitative success, we soon reached the limits of the school-based system. School management is about invariant performance and set schedules. One can only get so far in demanding flexibility and response time from academic programs. Soon, regulatory, administrative and governmental structures which sustain the school model, demarcate innovation.

It became clear that, in order to deliver knowledge to the workplace when and how it was needed, it took more than stretching the capacity of the university system to reach out. In order to catch up with the speed and direction in which knowledge changes, industry had to take the lead. We had realized that categories and values relevant to the workplace are often incompatible with those of the academic world (Carrillo, 1994).

Current institutions for education, employment, training, dissemination and research, constitute the knowledge management infrastructure of modern society. The prevailing educational design for professional certification and knowledge preservation, conditions which favoured the emergence of medieval universities, now threatens the survival of higher education. The conservative nature of a preservation system works against the innovative nature of knowledge flow in postmodern society. The classroom, once seen as the space to nurture personal development is increasingly perceived as a prison for learning.

In fact, the social significance of knowledge has shifted from the cumulative and disciplinary concept of academy to the dynamic capacity to aggregate value which characterizes business. Both the wine and the leather-bottle are anew.

So, beyond state-of-the art digital satellite telecommunications, our efforts began to focus on the dynamics of value addition in an information economy. Our whole administrative approach changed from off-the-shelf quality delivery to customized design. We realized that no reform to current educational structures would be enough (or at least, timely) to cope with the knowledge needs of postindustrial society. We decided to start developing knowledge support systems which did away with school-based methods and to design ad-hoc learning programs which could be evaluated in terms of business results and relevance to life. Efforts concentrated in the design of on-the-job learning systems, as well as techniques to translate critical business performances into instructional objectives.

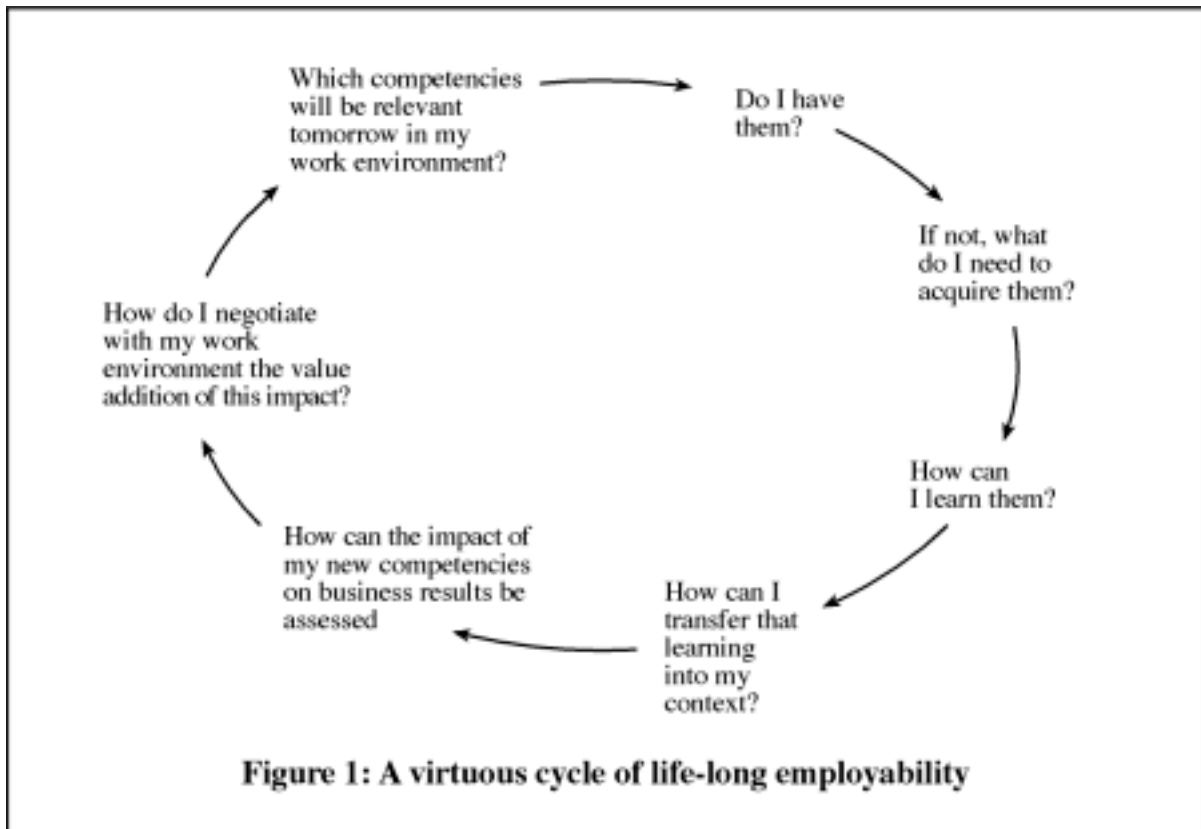
In september 1993, The Center for Knowledge Systems begun to operate. The mission we undertook is «To study the Knowledge Economy and to develop systems which enable individuals and organizations to develop sustainable strategies for that new environment».

A further reason for making the Knowledge Economy the focus of our work is straightforward: right now, the largest proportion of wealth generation comes from information-based businesses. And whereas we account to the cent our traditional assessts, we ignore how to manage knowledge. The needs and opportunities are enormous.

## **Customized learning Systems**

The first area of technical development at the CKS has been the management of organizational learning. By working closely with client companies in diagnosing their personnel development needs, we design jointly with them the programs which best suit their business goals and corporate culture. High performance companies are increasingly receptive to this approach.

Considering an ideal organization as one in which every member, minute by minute, is doing exactly what adds the most value to the attainment of a shared vision, we refer to the following basic sequence of core competency development (fig. 1). The sequence is expressed in terms of life-long employability and learning. Whether or not a permanent position is occupied, is becoming irrelevant. The issue is to continuously balance value exchange between every individual and its environment. Note the pattern is similar for renewing the technology base, and therefore market presence, of an organization.



Depending on factors such as the extent of strategy deployment, the technical evolution of internal management and the level of the participants, we start at different stages of the cycle. Some companies have performed careful job analysis and have well-defined learning needs. Other companies still need to determine their core competencies.

Following this path implies some major conditions: a) each person undertakes responsibility for their own development; b) a learning environment supports each of the stages; c) design minimizes the experiential gap between learning activities and work improvement.

We have learnt some lessons inherent to this approach. To propitiate condition a, each participant must develop effective communication up the authority line. In order to ensure that the three conditions are met, we often include a «Zero Module» (before technical content modules), where competencies such as self-esteem, assertiveness, job function analysis, self-management of learning, and problem-solving are developed. Individual awareness and commitment to personal development is a powerful driver of learning. On the other hand, we have found assessment of the whole process rather tricky. «Level 4» measurement, although technically feasible (e.g.: Basarab and Root, 1992) is of little significance unless value-based accountability is implemented. Meanwhile, we found mentor-led self-

assessment and learning contracts extremely useful and very responsive to fast changing strategies.

In order for the approach to work, the whole management must focus on high performance. Managers have to become mentors who negotiate goals and facilitate development. Before signing a contract with us, the company makes a commitment towards this whole approach. Since they and us agree personnel development is not a delegable function, they continue to be responsible of a process we will only facilitate. By making this process as natural and fluent as possible, management time demands are minimal and rewarding. Along this line, our programs rely increasingly on internal capacities (content expertise, instructional design, facilitation, assessment, media production, program management) and our support tends to become more strategic. Ideally, all managers develop each capacity within its business unit or outsource it.

## **Structure and Function**

The center is structured to maximize the parameters of virtual organizations, including flexibility and response time (Davidow and Melone, 1992). Since our operation is based on contracted R&D projects, we function mostly through multifunctional teams. A function/project matrix relates each person's recognized competencies with the internal or external clients of each project.

Most of our projects fall within three major areas of knowledge management: organizational learning, intellectual capital and value addition. Two strategic and two operational units support our activities: the Advanced Learning Lab and the Knowledge Management Consortium, on the one hand, and the Information Technology and Administrative units, on the other.

We've had a continuous flow of projects, despite the deceleration of Mexican economy during 1995. We have worked with national and transnational corporations, in service and manufacturing. Our projects range from a discrete problem-centered workshop, to a \$5.5 USD million design of a corporate university.

Administratively, CKS is a cost and revenue center. No institutional funds have been invested in its development, nor has a regular budget been allocated to it. The Institute provides us the space and infrastructure (and, above all, its reputation as an outstanding technological institution). The Center, in turn, hands over a substantial overhead as a percentage of all contracted projects and pours in intellectual capital and advanced technologies into the Institute's knowledge-base. The remaining funds sustain our operation and R&D efforts.

Throughout its three years of existence, CKS has had remarkable financial successes. It has consistently yielded the best yearly income of all ITESM R&D centers, some of which have a substantial institutionally funded infrastructure.

An administrative challenge for the CKS, as for any value-driven research center, is to conceive and negotiate sustainable terms of financial interdependence. In fact, the management of R&D and the very nature of science are also challenged by a knowledge economy (Odlyzko, 1995). In doing so, we must develop our technology-base in one of the most demanding areas of knowledge management: the accountability of intellectual capital. Therefore, the field of value addition is as vital to ourselves as we believe it is to a knowledge-based economy.

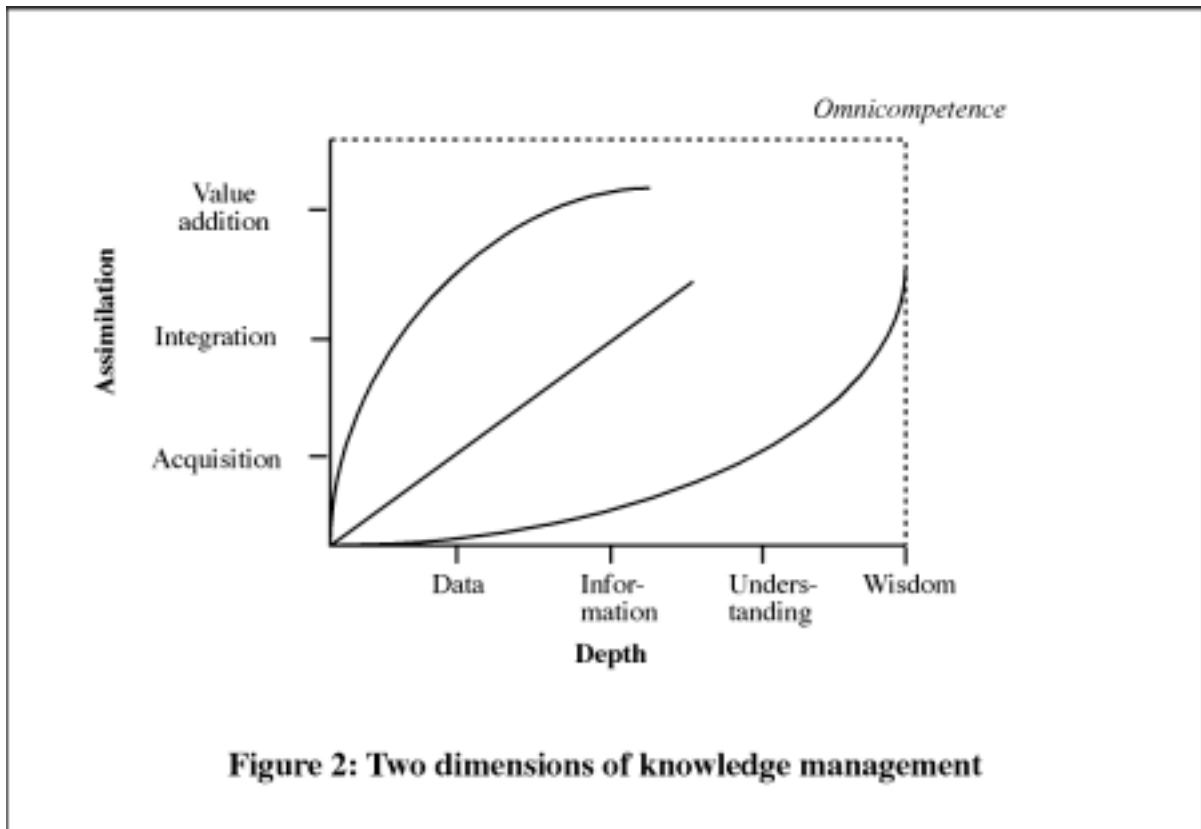
## **From Organizational Learning to Value Addition**

A key concern since the time we started Sinapsis has been to integrate learning with life-relevant competencies. Knowledge, in our view, has to do with the articulation of human experience. The more an individual or organization makes sense of its environment, and the more competent it is to behave accordingly, the more knowledgeable. Since adaptive knowledge implies an open parameter of adequacy, it obviously acquires an evolutionary significance. In this sense, Ackoff's (1994) concept of omnicompetence would be equivalent to the attainment of wisdom. As one of my colleagues states, «being able to get» becomes, «the new *raison d'être* of homo sapiens as a politico-economic animal» (Laszlo, 1995).

Omnicompetence is alien to the dominant business culture. We are more familiar with entropic structures, finite-resource economy, cost-based accountability as the creatures of capital management. They are responsive to control and standards. These are genetically different from self-regulated environments, qualitative economy, and value-based accountability as the children of knowledge management. They respond to empowerment and open space.

In order to navigate the mostly unexplored territories of knowledge management, we set three landmarks. As mentioned before, work at CKS is organized around three major areas of knowledge management: organizational learning, intellectual capital and value addition. We have substantial experience in the first, some in the second and incipient in the third. As we progress in these virgin territories, we encounter less company.

From our perspective, the ladder of knowledge management entails progress in two dimensions of knowledge: assimilation and depth.



**Figure 2: Two dimensions of knowledge management**

Assimilation corresponds to the extent that acquired knowledge becomes new competency. In traditional education, that is seldom achieved or even pursued. Knowledge assimilation implies a better adaptation, a capacity to behave differently, i.e. in a more sustainable way. The emergence of new patterns of response in the context of evolutionary learning has been one of the most fundamental concerns of experimental psychology .

Knowledge depth, in turn, refers to the degree that pieces of knowledge connect with each other, hence evolving into new structures. Distinctions between data, information, understanding and wisdom move along this scale.

These two dimensions, establish basic coordinates for the advancement of knowledge. The more knowledge means a capacity to enact an ideal state, and the more knowledge relates to wider realms of experience, the more it empowers omnicompetence.

## **Towards A Virtual R&D Organization**

A basic tenant of the CKS is the commitment to experiment ourselves with the most progressive management principles we assert. Since the virtual organization is one of the most comprehensive of such principles, we operate through an intentional

virtual design (Carrillo, 1993; 1994 b). That means we have a network structure, where the core full-time staff has a decreasingly important weight. Most of our collaborators are consultants who live near the action. Our network expands and contracts as project-based teams form and dissolve.

We take increasing care in the selection and development of our associates. Eventually, the associates should become the consciousness of the Center. Figure 3 represents this aspect of our process of virtualization. This process integrates the idea of the «shrinking core» and «leveraged organization» developed by The Institute For The Future (1994), Charles Handy's (1994a) concept of «The Donut Organization» and the increasing popular concept of «Open Space» (e.g.: Rao, 1994).

We started as a network which relied on the driving force of its nucleus. We are evolving into a space of free associations which changes constantly on the basis of R&D lines and contracted projects. Eventually, unlike Handy's concept, the center will have more topological than operational meaning.

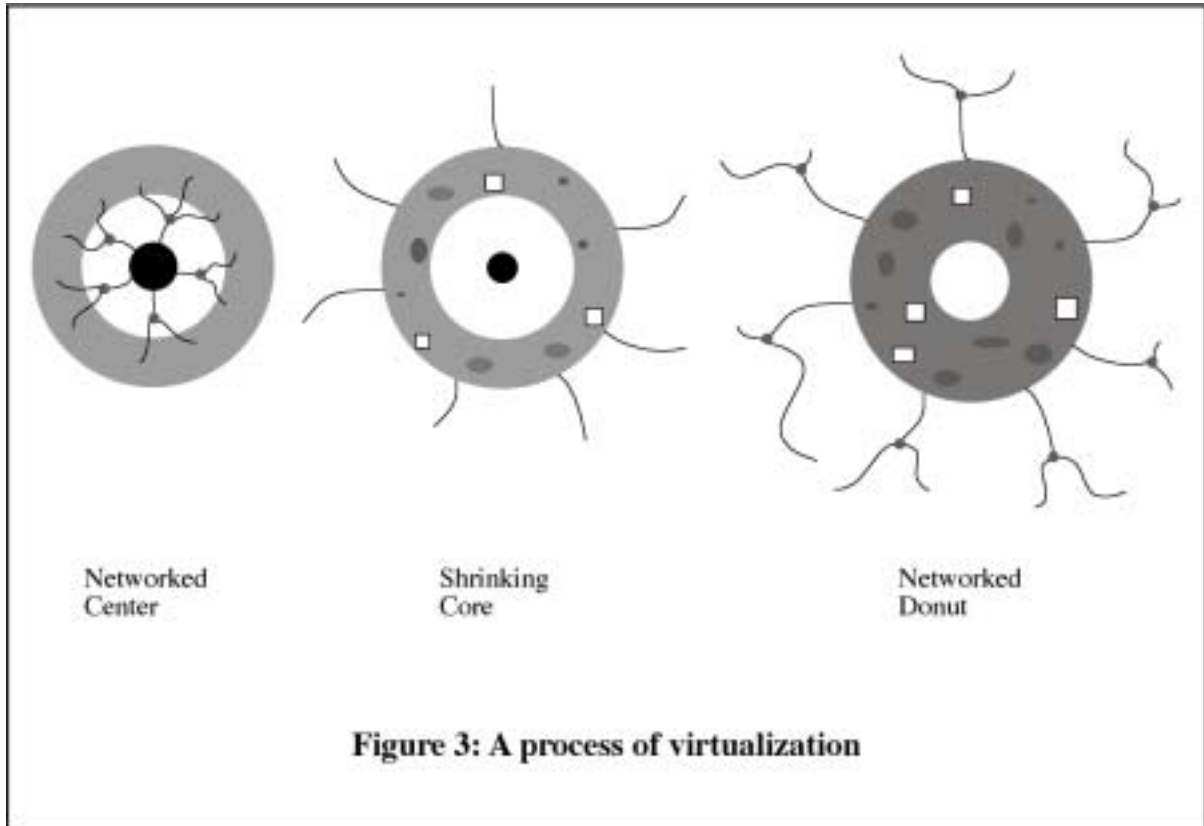
Our current understanding of virtual design indicates the primacy of effective communication and trust. Communication can be constantly improved through assertiveness, function analysis, active listening and opportune feedback. So, we try to develop these competencies and provide support with state-of-the art telecommunications.

Trust, we believe, can and should be managed. Trust can be regarded as the epitome of postmodern management and is beginning to be recognized as such (Handy, 1994). Whereas trust can be seen as a desirable but given trait of character, it can also be seen as the behavior pattern resulting of a particular array of interpersonal conditions. Other related patterns, such as cooperation, competition and sharing have been widely studied by social psychologists. Trust can be regarded as the outcome of a particular distribution of available value. Perceived distributive justice generates trust. Trust can be enhanced by the empowerment to think, decide and act. In both senses, trust is a prerequisite for virtual operation.

One of our internal lines of research has to do with management of virtual networks: how knowledge flows in virtual teams how can that knowledge be structured on-line, how identity and sense of purpose can be fostered, are some of our concerns. We realize that our capacity to understand and facilitate these processes will determine our own survival.

This dual condition of researching our own practice has lead us to look for ways to assimilate a scientific perspective in our daily work. Having resisted to distinguish the «researchers» from the rest of the personnel, we are trying to build systematic research into the daily work of every member of the Center. Hence, action-research

approaches have been the object of our attention and commitment. Nevertheless, we still have to sort out the contradictions between rigour and use (Argyris, 1980). So far, no systems we have tried have passed the test of sustained application.



We are trying now some on-line project management systems with built-in capacity to keep reliable records of relevant actions. The idea is, by constantly feeding new processes into our knowledge base, management of current projects would entail accurate recording and sharing of relevant data.

### **Knowledge Structuring And Value Addition**

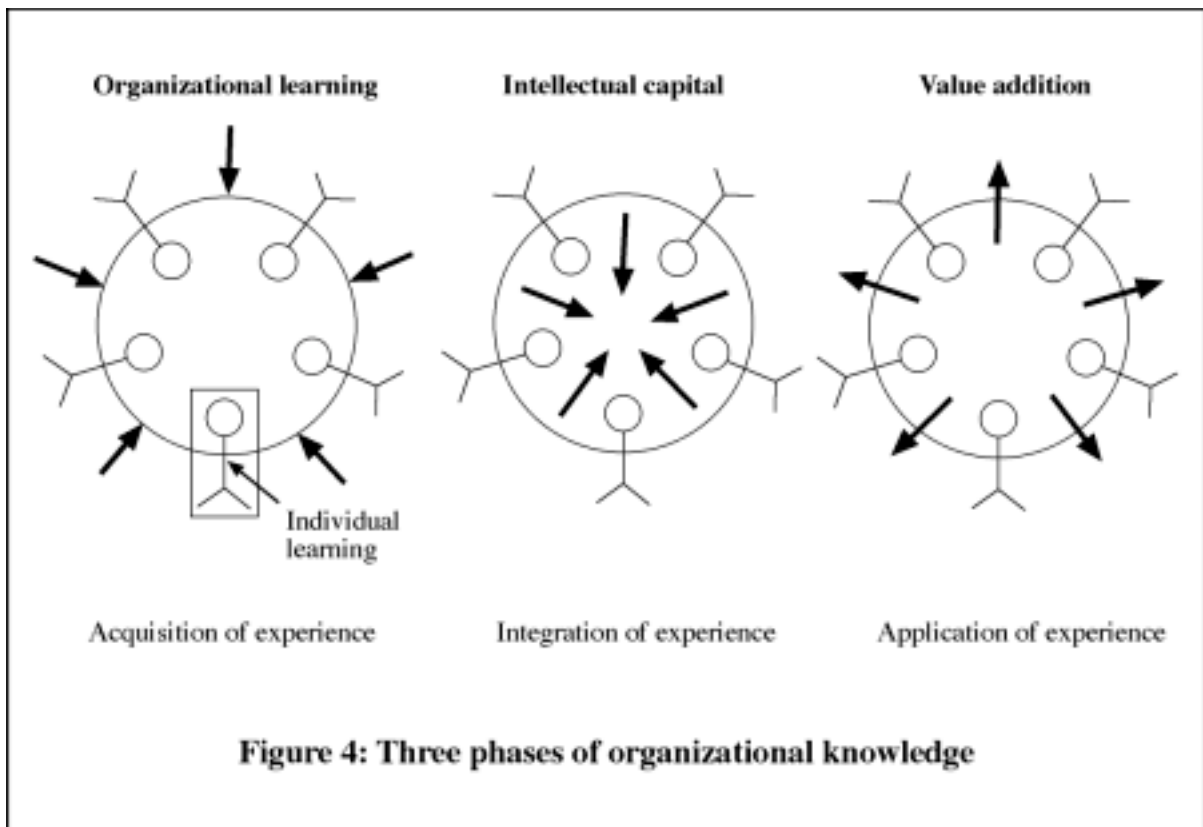
Management of Intellectual Capital (MIC) and Value Addition (MVA) are the other two technical areas of the CKS. In MIC, we study and develop systems to help organizations identify, structure, record, store, retrieve and exploit their live wisdom. We concentrate on the wealth of knowledge possessed by individuals, active in the processes or cumulated in collective and individual experience. Our purpose is to maximize the benefits of this potential, generally wasted.

While we develop an integrated system for MIC, we dealing with individual projects, both external and internal. One is to structure our own knowledge base. We are

integrating a platform which includes a master project-management database, an information structure for our internal network and a bridge to the WWW. We are also helping companies to develop de capacity to gather strategic information, to structure areas of their knowledge base, or to improve their research methods.

The MVA area, in turn, is even more new and elusive. Our purpose here is to study and develop systems which help organizations redesign their administrative base to become virtual organizations, i.e. 100% value- driven. We are in the process of creating an internal culture of value-driven performance. We have associated with a major international company to develop jointly a computer-based system which would help managers track and make decisions about key elements of a value-based operation.

We have distinguished MIC and MVA from Organizational Learning only to impulse technical development in these areas. Knowledge Management can be seen as the process of virtualization throughout organizational learning. It implies knowledge construction, assimilation and utilization. Utilization reconstructs knowledge and so on.



A learning organization is one in which not only individual learning is managed, but one in which each and every acting unit learns systematically. Thus, learning of each part and the whole is managed. The acquisition of experience can also lead to its integration, i.e. intellectual capital. MIC is something else than personnel management for knowledge can also be in the form of, say, an electronic knowledge base. It goes beyond memory, for it entails more than recording. Memory per se, has no intrinsic value (you can store intellectual garbage). Memory is not about accumulation (just as ideal inventory keeping became zero-inventory, effective memory might become just-in-time knowledge). Learning, memory and knowledge are all about capacity to negotiate an ideal state with our environment.

Until experience becomes successful practice, it has no adaptive value. Thus, knowledge management has meaning only as a complete cycle (Figure 4).

## **Finding The Ways Of Knowledge Management**

CKS values and beliefs can be summarized in two statements; a) every person has the social right and duty to make the most of herself; b) up to now, most of the potential of individuals and organizations has been wasted due to the epidemic incapacity to master our own development. Given the emergence of the knowledge economy, there is an unprecedented opportunity to empower the development of individuals and organizations.

The knowledge economy is bound to materialize not because current leaders are empowering human development. Microeconomic forces are making it impossible for organizations and societies to cope with the rate of market change. It is because of this that the learning imperative is breaking out of its school-mode cocoon. But since it is happening anyhow, the opportunities for visionary leaders to understand and manage knowledge are enormous.

We are only beginning to grasp the potential of knowledge management. By understanding the social functions which once were adequately met by current educational, managerial, financial and scientific institutions, we might be able to untap human potential, both individual and collective.

Mankind is perhaps at the dawn of a new era as fundamental as the emergence of the capacity to handle tools or of spoken language. All past human development might begin to look like mere rehearsals of the true possibilities of human nature. The very fact of realizing that, might mean the emergence of a global consciousness.

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