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## ENGINEERING PERSPECTIVE OF AGENCY FOR KNOWLEDGE MANAGEMENT SYSTEMS

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### Abstract

Organisation, interaction, coordination and knowledge are abstract- constructs but agents and their actions are goals-constructs presented by Chester Irwing Barnard in modern management theories and knowledge management.

It is like Tuomela theoretical constructs use for presenting abstract entities and observation concepts which are perceptual because they can be measuring as variables of business events.

The Barnards abstract constructs help us to understand concept of agency which used in more deferent fields like economics, sociology, psychology, design and software systems implementing at engineering management.

Agency as molecular unit of organisation can be every department within a company, whole companies within a market, nations, or communication unit on the global level.

At the same time agencies can be software tools, robots and individuals as agent-atomic unit of agency.

On the agency concept we develop concept of knowledge and actions.

Agent is every entities-human and software agents with abilities for communication and agency without communication have not existence.

Knowledge management systems have become a part of the standard terminology with meaning for ordinary, end user of knowledge. Knowledge codification is a process stage in which the "captured" knowledge is being organized and presented in a way suitable for transfer and effective usage. Organizational part is usually in a form of decision tree, decision tables, or frame, but the codification must have such form and structure that it can build a knowledge base, make knowledge more accessible, explicit, and easy to adopt. From the knowledge management point of view, the codification turns tacit knowledge into explicit, and from the information system point of view, it turns unwritten into written information. Regardless of the point of view, the codification makes corporate-specific knowledge (tacit and explicit) clear, accessible, and useful for decision making, no matter what form it has. Within job integration, the most important goal is to associate KM projects with identical corporate objects that add value to the company. The utmost emphasis is on the intellectual assets, company clients, and users.

*Keywords:* constructs, agents, agencies, software and human agents, ontologies agencies, artificial agencies, ontologz engineering. knowledge transfer, diagrams and mechanisms of knowledge mapping, tacit and explicit knowledge codification, codification tools for knowledge transfer, knowledge constructors

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## 1. META-CHANGE OF ENGINEERING MANAGEMENT CONCEPT

The magic word in management is success. But that's not a one-time event that is placed in a known or wanted destination, but a process which can be viewed from many aspects. More than thirty years ago the main target objects of the business success were profits, costs, production, and labour. Today, the answers to questions on success, if they even can be found, have changed a lot and they lead to other questions. Almost each of our jobs and organization models, management concept, terminology, and the entire language system, have changed a lot, or rather, developed and broadened. Although, many of traditional words are still used, they have completely new context and different nuances of meaning which are brought by a series of new words that describe the digital world of business. Many of the old rules for value creating are no longer valid. Attention must now be focused on different things, new questions that search for new bases must be learned, new principles, and new tools that support sustainable economic success and bring true prosperity and well being for all.

In management, the parts outside the whole or the whole without parts are not the most important, but their inter-dependence and dynamic relations with a completely new understanding of what that means.

Someone said: "Maybe what we really need is less to manage, and more to attend". The term attend has many meanings (which are far from what is suitable for managers and leaders in the current socio-economic environment): "to pay attention", "to beware", "to participate in something", "to focus", "to focus one's attention and thoughts". The question "Where should one

"attend" in order to access the success and the creation of a better future?", can be answered with "changing perspectives, goals, and behavior, creation of new relations, new strategies, identity, purpose, language, and new organizational forms", shortly, "a global learning journey".

In engineering management, we must quit learning in which one focus point is searched for, one leader or one answer for a problem, but force the learning about model making that has to be:

1. Operational, what is necessary is a high level of understanding how digital networks and technologies support people in creating, organizing, and accessing daily knowledge they need to accomplish their tasks and to make good decisions.

2. Tactical, what is necessary is a high level of understanding how social networks such as knowledge networks and knowledge communities help in creating, disseminating, and utilizing knowledge and innovations.

3. Strategic, what is necessary is a high level of understanding one's own organization as a participant in multiple business networks where intangibles are important for relation building and improvement of interactions.

4. At all levels, for employees, especially for leaders, it is necessary to learn new ethical perceptions of success for network organizations, and modes of conversation, which is very important.

That's why the central area of learning is related to the network principles and their application in practice. We talk about technology networks, networks of people, value and business networks.

Networks create the models of organization for living systems, which are far more complex for control or engineering jobs in management and they require

broadening of engineering capabilities and intelligence, both individually and collectively.

The former questions point to the evolution of management thinking, which flows from the capability of managing things, which are physically complex, to the work with new things which are organically complex. That is the meta-change, or the change of traditional engineering skills into new skills which are necessary for the organic world of living networks. Practically, meta-change means that in every area it is necessary to develop new tools, new practices, and new ways of thinking to support the living networks of business, economy, society, in ways that lead to success for all who "attend" or participate in the network dynamics.

In those networks, the future belongs to the jobs based on knowledge as an infinite individual and organizational resource. In the era of the great battles for markets, every resource must be utilized, especially knowledge, of management as well as of employees, and organizations are those which need to elicit the maximum of knowledge and cooperation from and for each person.

## **2. AGENCY AS A MOLECULAR UNIT OF ORGANIZATION**

The concept of organization emerged in times when most businesses were bureaucracies designed as hierarchies. According to some criteria, the boundary of business organizations was, and it mostly still is, determined on the basis of who were its employees or members. When they are employees, they are at the organization center (within it), and when they aren't, they are outside its boundaries - within its

environment.

Different focuses on organizations affected their evolution. Traditionally referring Barnard's definition of organization, in which it is said that it is "a system of consciously coordinated/harmonized activities or strengths of two or more persons" (Barnard, 1938), has its corresponding encyclopaedia definition according to which "an organization is an administrative and functional structure" (Webster's Universal Encyclopedic Dictionary). The American Heritage Dictionary defines organization as "a structure through which individuals systematically cooperate to conduct business".

Newer definitions have a different point of view for the construct "structure".

Verna Allee (2003) defines organization as "a complex adaptive social system where people are in systematic cooperation in order to achieve a common goal", with an explanation that this definition at the first place puts social system instead of structure, because, "organizational structure cannot exist without a social system which creates and supports it".

Most concepts present in modern management theories and knowledge management were improved by Chester Irving Barnard (1886-1961). Barnard suggested two types of constructs to use in organizational modeling:

- \*Abstract constructs - such as organization, interactions, coordination, and knowledge;

- \*Objective constructs - i.e. agents and their actions.

These types of constructs precisely match what Tuomela refers to as theoretical concept and observational concept. He knowingly gives an argumentation for

defending the necessity of theoretic concepts in science. According to him, observational concepts are perceptive (they can be measured or they are directly connected to measurable factors), while, on the other hand, theoretical concepts are not tangible and are made for presenting abstract entities which are necessary for understanding observational concepts.

In his work about structural and functional observations of agencies, Barnard concludes that "individuals act according to their own personal motivations, objectives, and capabilities". When individuals have goals for which they admit they are beyond their personal capabilities, they demonstrate the will for cooperation. Coordinated cooperation occurs in a form of identified common goals. Barnard made an important difference within the principles which characterize organization.

We recognize two alternative principles by which people are referred to as - objects which are manipulated, or subjects which need to be satisfied. Both principles are valid as foundations for organizational models. All traditional models put people as objects which are manipulated, and organization environment was believed to be static, while dynamic environment requires adjustable and varying agencies.

Cherns (1987) suggested ten principles for accomplishing socio-technical design of agencies:

1. Compatibility: local and organizational objectives can come to a conflict, which obstructs knowledge dissemination. An agency must be designed to store different objectives so that its components are forced to cooperate.

2. Minimal job specification: on the contrary of classical design principles, where each detail of working activities is

determined beforehand, the socio-technical school suggests minimization of the task specification. "What matters is what is done, not how!" The flows and dynamics of knowledge in organizations are supported by the concept of minimal specification.

3. Disaccord control: an agency must efficiently respond to changes in the environment. That's accomplished by providing the components (agency components) over and over again with competence to follow the environment and autonomy to accordingly keep the working routines up-to-date.

4. Boundary setting: an agency must be designed to improve knowledge dissemination, not to impede it.

5. Information flow: this principle is closely related to the former one. Agencies must be designed so that information can always efficiently get to the locations where it is needed.

6. Power and authority: if the harmonization of local and organizational objectives is taken as an assumption, agents must be offered an adequate level of power and authority, to support their autonomy so that themselves can regulate their activities based on local as well as global knowledge.

7. Multi-functional principle: just like agencies have to adjust to the environmental changes, individuals have to adjust to the environment and organizational changes.

8. Conformability support: "people should be paid for what they know, not for what they do", this is a very clear statement about the value of local knowledge in organization.

9. Transient organizations: In essence, agencies are dynamic, and continuous changes and adaptations are its natural consequence. Tendency toward stabilization of organizational structure is a delusion and

should be avoided.

10. Incompletion: the consequence of the former principles is that the agency design can never be "completed". Continuous redesign should be taken as a norm.

Significant changes in perceiving organizations can be found with Peter Drucker, who, in 1988, aroused an attractive theme on knowledge society.

In encyclopaedia definitions about the notion of "society" we find that it is "a continuous and cooperative group whose members constructed a model of relations through interaction with each other". Therefore, the knowledge society is a group of people or organizations whose members affect each other on the basis of their knowledge. According to that visions, traditional "commanding and controlling" societies have been replaced with societies based on information and knowledge for which Drucker suggested interesting prototypes, agencies.

An agency (knowledge society for mediating) is (nowadays) a comprehensive term for describing a prototype of organization. Knowledge and action concepts are based on the concepts of agencies, while knowledge management is based on these concepts.

The essence of knowledge management is how agencies do the following:

- ♦ Create and collect knowledge - i.e. how agencies measure and keep the productivity in innovations and creativity, identify weaknesses in their competencies and decide how to correct them (for example, employing experts in specific fields, such as staff training, implementing new technologies, revising supportive systems or support systems, etc.);

- ♦ Store and keep knowledge (often referred to as "organizational learning") - i.e.

how knowledge can be kept within agencies once it is captured;

- ♦ Acces and utilize knowledge - i.e. how agencies identify relevant parts of knowledge when facing new situations and challenges and what is necessary to build a structure such that those parts of knowledge can be efficiently utilized when needed;

- ♦ Distribute and disseminate knowledge - i.e. how is knowledge distributed across an agency, different parts of agencies hold different skills and capabilities. This gives a new dimension to the acces and usage of knowledge, requiring the parts of agencies to be capable of communicating to each other, to demonstrate the needed capabilities, problems that can be of interest to other agencies, and the solutions to the problems as well.

Distribution and dissemination of knowledge are important, complex, and multi-aspects. Among complicated factors for knowledge distribution is heterogeneity of agencies. Agencies can be natural or artificial, they can be autonomous or made of other agencies, agencies have different capabilities, and those capabilities can be very dynamic.

In order to communicate, agencies must understand each other, more precisely, agencies must be able to understand and take a good use of each other's knowledge. Also, they must be able to identify the similarities between their knowledge and other agencies knowledge, as well as between the tasks that should be performed and capabilities that enable that performing.

### **3. TYPES, PROTOTYPE, AND CONVERSIONS OF KNOWLEDGE**

Knowledge is a highly rated term, "the phenomenon of complex, subtle, multi-

aspect, and holistic nature" without consensus-determined meaning. In a great number of definitions, some authors highlight different aspects of knowledge, so the former, working definition, differs from a number of general definitions which can be found in philosophy books or encyclopedias. It has been created with no intent to be the general definition of knowledge, but to be directed toward understanding the knowledge management system, a relatively new trend in changing the business basis, paradigms, and relations. In the univers of changes, the most changable of all are jobs, which we observe as two-dimensional structures - content and context. In the content dimension of the job structure, the main categories are skills and knowledge, which is explosively being evolved and enriched as an individual, but also as organizational resource. Knowledge is an infinite resource which generates new job integrations and evokes dominant economic models which are based on scarce resources. Business bases are changing their directions from material levels and physical objects toward the cognitive level and generative values. The base of good business relations has been and will be confidence, although the central activity is neither competition nor complete cooperation, but "veritable negotiation, in every moment, everywhere, and everyone".

Conversation is the basic source of new knowledge, and in every conversation knowledge is re-ennobled. Relations and bonds in business conversation are visible for all participants in the digital world, because business arrangements are taking place on a public scene and they include social cognition and collaborative intelligence. Knowledge cannot bloom if there is not confidence, and "the prolific soil

of good relations enables the rich harvest of creativity, innovations and learning".

In a known saying "today working means learning", H. Owen (1995) notices that "the main activity in every job is learning".

From that aspect we categorise individual knowledge as conceptual, which is obtained by learning from books and at school, and as heuristic, which is obtained from experience and mentors.

The domain of conceptual knowledge is the domain of scientific facts and formalizations which are included into the first notions and definitions, axioms and theorems, scientific concepts and laws, rules and procedures, methods and methodologies, theories and deep theories.

The domain of the heuristic, or conversation generated and experience derivated knowledge is the domain of attitudes and skills, habits and values, intelligence and wisdom implemented in multi-dimensional opinion and orientations, in the methods of observation and analysis, estimations and evaluations, in decisions, models and projects which are realized in business practice.

Some authors observe knowledge as "a way or channel of action which has a powerful influence on the subsistence and succes of business organization", and that is what the knowledge management systems has been developed for. Their developement is based on the propositions of understanding the division of knowledge into tacit and explicit.

Tacit knowledge is very hard to describe or express, it is complex and "stored in people's minds". It is not usually expressed by descriptions, but in principle by demonstration and "it includes such things as skills". Tacit knowledge is like human skills, "identified and placed in the form that

connects those who need skills with the very sources of the skills". The sources can be the events of knowledge sharing in conversations, or organized manuals, yellow pages, or other means.

"Explicit knowledge can easily be written and coded, relatively easy articulated and communicated", and "it lies in formula, texts, or technical documents". Explicit knowledge is organized, categorized, registered, visible, useful and available, for example, using the company intranet.

In literary works, tacit and explicit knowledge are observed as two most important types of knowledge, and they are combined into four forms of conversion:

1. Conversion from tacit toward explicit knowledge which leads to socialization, and experience is what creators or constructors of knowledge look for in heuristic knowledge. The two important tools of heuristic knowledge are observation (on-site observation - direct and by participating, observation of physical objects, internet observations, measuring psychological reactions, and content analysis) and practice (at the strategic, tactical and operational level of jobs with function and task analysis).

2. Conversion from tacit toward explicit knowledge which implies externalization, explanation and clearance of tacit knowledge through analogies, models, and metaphors. Explicit knowledge can then be stored within knowledge bases or storages for day-by-day usage.

3. Conversion from explicit toward tacit knowledge - which is internalization or adjustment of explicit into tacit knowledge. An example is learning how to ride a bicycle with continuous returning to the beginning.

4. Conversion from explicit toward tacit knowledge, which is more or less combining, reorganization, categorization or assortment of different trees of explicit knowledge in order to acquire new knowledge. An example is the assortment of an administrative file of employees according to age (up to 65).

Therefore, socialization, externalization, internalization and categorization are the four target modes of conversion of tacit and explicit knowledge in the processes of creating new knowledge. From that aspect, heuristic knowledge can be interpreted as "a part of acquired knowledge, which requires group work, recognition of the values of tacit knowledge and support for socialization and internalization, and acquired knowledge requires experience, too, that is with time being constructed into skills". Human experts associate conceptual-tacit knowledge through heuristic knowledge.

As a modern frame for analysis and conversion of knowledge can also be used "knowledge prototype", in which knowledge is observed as a continuum of series of states - forms or aspects - from data, over information, obtained or learned knowledge, applied knowledge, intelligence and wisdom, to the communities of knowledge and learning.

<p>KNOWLEDGE PROTOTYPE is not a hierarchy structure, but network continuum that has no hierarchy. It is just a FRAME FOR CONCEPTUALIZATION of some aspects of KNOWLEDGE CONTINUUM.</p>
<p>* <b>Knowledge form-aspect</b> * <b>Type of learning</b> * <b>Performance focus</b> * <b>Time perspective</b> * <b>Conscience-level</b>  * <b>DATA</b>-Instinctive *Data gathering -Feedback *Momentary *Receptive-Feelings  *<b>INFORMATION</b> *Irreflexive *Procedurality-Efficiency *Very short *Physical sensitivity  *<b>KNOWLEDGE</b> *Self-consciously reflexive *Functionality-effectiveness *Short-term *Consciously reflexive  *<b>APPLIED KNOWLEDGE</b> *Systematic *Productivity-Management *Mid-term *Communal  *<b>INTELLIGENCE</b> *Integrative-Deutero learning *Optimal integration *Long term *Structural  *<b>WISDOM</b> *Generative-open interactive *Renewal-Integrity of Relations *Very long term *Ethical  *<b>COMMUNITIES</b> of knowledge and learning *Synergic *Cooperation *Beyond time-Intergenerational *Universal</p>

Each of these aspects has its own correspondent learning type (instinctive, without reflection, with conscious reflection, systematic with understanding, integrative-deutero learning, generative, synergic), performance focus (data gathering with feedback, efficient procedures, effective functions, management productivity, optimal integration, integrity of relations and renewal, cooperation where the end goal is confidence), time perspective and the level of conscience development of its user (emotional, physical sensitivity, consciously reflexive, communal, structural, ethical and universal conscience).

The new organizational knowledge and learning communities include social, interpersonal, financial, management, legal and marketing systems. Within those systems "all roles of knowledge take place" and they are connected to intranets of some firms. For this purpose the notion of knowledge and its conversions is observed within the frame of knowledge management context.

The procedure of knowledge management can be recognized in the following system processes of job integration::

- ◆ Processes of the documentation management systems, which enable employees in some companies to find relevant documents for some specific task, decision, or enterprise.
- ◆ Discussions (of forum type) which goal is the promotion of knowledge spreading within some firms,
- ◆ Processes of the contribution tracking system - performance and capability of individuals or teams, and identification of the relevant resources and their capabilities for accomplishment of the given tasks, jobs and enterprises, and
- ◆ Explorative research of knowledge

bases which "enable employees to renew their knowledge from earlier processed, similar cases" in order to find solutions for the momentary business tasks.

These items in the knowledge management procedure represent very loose conceptual frame, in which the first is based on codification, and the rest is based on knowledge personalization. The work on knowledge codification includes more than just codification scheme and tools. That means the codification stage planning, planning of usage of specific tools for work with the frames of program environment and creating the most efficient usage of time and talent of the knowledge constructor and experts in a specific knowledge field.

#### **4. THE KNOWLEDGE CODIFICATION FORMS**

Knowledge codification is a process of organizing and coordination of knowledge in a form and structure that is suitable for its user. Organizational forms of codification are usually in a form of knowledge maps, decision trees, decision tables, or frame. Knowledge coordination represents the way in which knowledge sharing is organized in the organization. The idea of codification is to make the right knowledge available for the right users at the right time, i.e. at any time and at the right, i.e. at any place of its usage. Forms of codification are numerous and they depend on the type of knowledge and its specifications. The two main forms of codification can be viewed from the aspect of knowledge management procedures and from the aspect of information systems. From the aspect of knowledge management, the codification turns or converts tacit into explicit knowledge in a form that is available



for the members of organization. From the aspect of information systems, the codification converts unwritten into written information.

Therefore, the works of conversion one type of knowledge into another, and of job integration, which also include the integration of information and transactions, are becoming highly sophisticated and feasible with knowledge codification technology. Regardless of the point of view, with codification, organizational-corporative-specific knowledge (tacit and explicit) is becoming clear, available, and useful for decision making and creation of added values, regardless of the form. The most important goal is job integration or "to connect knowledge management projects with identical corporate objects which add value to the company", and the end emphasis is on intellectual assets, company's clients, and users.

More broadly understanding of the position of knowledge codification can be achieved by analysing Figure 1, in which the codification is presented as a link in the organizational knowledge management system.

The four key questions, which must be answered before every knowledge codification process, are associated with the following entities:

- ◆ OBJECTIVES of business processes which must be accomplished with organizational knowledge codification or for which company objectives will coded knowledge serve?

- ◆ KNOWLEDGE which is available (present, useful, transferable) and its meaning for the identified business objectives, or, which knowledge exists in the company to signify those objectives? Knowledge codification requires explicit

meaning of the knowledge and precisely determined objectives before it just simply enables access to the knowledge.

- ◆ VALUE of the existing knowledge for codification or how useful is the existing knowledge for codification? One of the ways to make the existing knowledge useful is with knowledge maps - to present in a diagram the logical trace to the end destination - knowledge storage.

- ◆ MEDIA or tools for codification. The mapping of corporate knowledge is an essential part of the codification process. In order to accomplish a work, an engineer must identify the type of knowledge - prolific versus schematic, tacit versus explicit, knowledge based on rules (procedures) versus knowledge based on structure (frames), etc.

Codification of TACIT KNOWLEDGE into a knowledge base is not simple because of its complexity and long period of time needed for development and internalization in human experts minds. Simultaneously, certain knowledge is more art than science, and art is hard to codify into rules and formulations. Different styles of experts can hardly be described or externalized as a series of rules and formulations, as a part of codified knowledge. The intuitive experience of one expert or maturation of human knowledge during time are becoming problem fields in codification of tacit knowledge. That is why special skills of heuristic knowledge are necessary for effective codification of tacit knowledge.

For that reasons, tacit knowledge is codified on the basis of mid-experts who possess tacit knowledge and engineers who collect that knowledge. There are different types of experts: procedural type, who progresses procedurally explaining, narration type, parental type, or salesman type, who

sells his way of problem solving. An engineer must evaluate the style of expressing of that expert type and according to that he must adopt methods of adoption and codification of knowledge.

## 5. AGENCY ONTOLOGY AND KNOWLEDGE AGENTS

Effective communication requires that different agencies use a shared terminology, this has been misnamed shared ontology. The subject of ontology is existence, and existence can be considered from three viewpoints: absolute, subjective and social. Committing to an ontology makes sense from the last two viewpoints, i.e. from the subjective viewpoint, where an agency has an ontology which means that its existence is defined with certain entities and relations among them. The entities in a communicating world are represented by agents, and therefore for a communication to occur it is necessary for an agency to use one ontology in a social interaction and to show the willingness to cooperate and communicate.

An agency without communication is an agency without existence.

By a definition, "an agent is an entity in a communicating world in a specific context", and that context is provided on the principles of organizational knowledge coordination. The notion of coordination, according to encyclopaedia definitions, is a harmonic functioning of the pieces or components so that effective results of the whole can be achieved. Organizational knowledge coordination is, therefore, a harmonic "functioning" of the component knowledge of one agency for effective achieving of their reach.

From the former discussion we can see

that organizations result from agents actions and agents are not the consequences of organization building. Agencies, by Drucker (1988) and Binney (2002), have humans for their fundamental agents. However, some agencies are based on software, i.e. software based agencies are agencies whose fundamental agents are not humans, but software agents:

a) Software agents composed of conventional programs for the production of new data out of the formerly collected, selected and edited data - the knowledge for generating data types such as calculations, financial analysis and reports, balance sheets and other applications;

b) Software agents composed of expert systems - specialized programs which consists of explicit knowledge of human experts, for performing very important tasks. With the group of data represented in adjusted forms, an expert system performs activities in a way similar to a human expert with a comparative degree of efficiency;

c) Software agents are meta-programs composed of certain programs with the capability of adjusting its behavior to the dynamics of the data built into them.

Technologies which build such programs are generally called learning machines; among the most popular learning programs are those based on the neuron networks which architecture is inspired with the organization of biologic nerve system.

The essence of this viewpoint is that organizations are composed of agencies, which are, finally, composed of agents.

Every action is generated by an agent, every agency capability is formed with the capabilities found in agents, and it is similar for goals and motivation, too.

According to Hendel (1997), "agents are objects which proactively operate and

express autonomous behavior, hence they cooperate with each other through negotiation".

Russel and Norving (1995) define the notion of rational agent as "anything that can be viewed as something that perceives its environment through sensors and affect that environment through effectors". The rational agent is the one who performs the right things.

## 6. CODIFICATION TOOLS AND PROCEDURES

Knowledge codification organizes and presents knowledge before it becomes available to users or authorized persons and it must be of such form and structure that it can build knowledge base, make it available, explicit and easy to accept. 1

Some codification schemes are pictorial, some are tabular, and some are descriptive register of facts. Knowledge can be categorized, described, modeled, mapped, or built into rules and recipes in codified schemes: knowledge maps, decision tables, decision trees, frames, rules, and intelligent software agents.

Knowledge map is a codification visual representing, but not for knowledge storage. It is a directory oriented toward people, documents, and storages - a highway leading to the location of knowledge.

Diagrams of knowledge maps are directed toward inter-human relations, processes, and knowledge in bases of the projects of special fields or of the entire company.

Building the map requires three steps:

\*developing the structure requires knowledge;

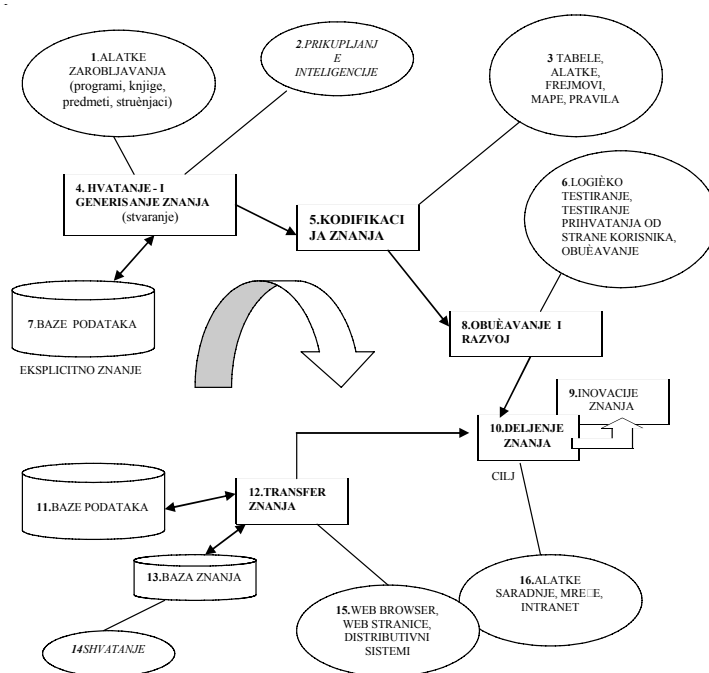


Figure 1: Knowledge codification in KM system of life cycle

1. CAPTURING TOOLS(programs, books, objects, experts), 2. INTELLIGENCE GATHERING, 3. TABLES, TOOLS, FRAMES, MAPS, RULES, 4. CAPTURIN- AND GENERATING of KNOWLEDGE (generating), 5. KNOWLEDGE CODIFICATION, 6. LOGICAL TESTING, TESTING OF ACCEPTING BY THE USER, TUITION, 7. DATA BASES-EKSPLOCITE KNOWLEDGE, 8. TUITION AND DEVELOPEMENT, 9. KNOWLEDGE INNOVATIONS, 10. KNOWLEDGE SHARING, 11. DATA BASES, 12. KNOWLEDGE. TRANSFER, 13. KNOWLEDGE. BASES, 14. UNDERSTANDING, 15. WEB BROWSER, WEB STRANICE, DISTRIBUTIVNI SISTEMI, 16. COOPERATION TOOLS, NETWORKS INTRANET

\*defining the knowledge required for a specific job; and

\*comparing employees relations according to the job requirements.

The measurement of a good map is clarity, purpose, ease of use and accuracy of content. Although the technology is present in its application and availability, sole technology cannot be the guaranty that the knowledge map will be accepted and effectively used inside a company. It can be placed as a quadruple structure of knowledge suitable for evaluation of competency of the employees and identification of tacit and explicit knowledge in the structure for each competency: at the level of employee, at the level of some specific job, at the level of a department or sector, and at the level of the entire organization - company.

By comparing what the company knows with the required knowledge, the hole of knowledge is measured. On the opposite of that, by comparing the "what must be done" strategy with what the company can do, the strategic hole is measured. In other words, the knowledge map describes company's strategy versus ordinary company knowledge base and presents missing knowledge which is supposed to ensure successful realization of the strategy.

2. Decision tree is a hierarchically arranged semantic network which consists of nodes, (which represent objectives) and connections (which represent decisions or the results of decision making and problem solving). Decision tree is read from left to right, with the root (base) on the left side. Each node, except the basic node, is an example of the original objective. It is closely related to the decision table.

3. Decision table includes - the list of conditions with its particular values, and the list of conclusions for which the derivation is

based on statements which include that conclusion. Inference is procedure of making conclusions, and the conclusion machine is the "brain" of the system based on knowledge; a group of computer programs that adjusts reasoning based on the rules of knowledge base so that the solution or advice could be generated

4. Frames present the knowledge about some specific idea at one place or a combination of declarative and operative knowledge about entities in the real world, such as employees, persons, type of a person. They are based on the idea that people make conclusions by analogy to build new systems taking earlier collections of structures from the memory. A frame has two key elements - slot and display and can contain information about different aspects of the situations that people describe

\*A slot is a specific, descriptive object or attribute of the entity, while display is an object or slot value that can be an array, integer, or an indicator for an instance of another frame. A frame has an instance when all of the slots are supplemented with the values. For example, in the HR knowledge base, some slots are "instructor", "a unique feature of an employee verification", and "tuition confirmation".

Problem solving technique, which is used by the system based on the frames, is called compatibility, comparing, in which the values assigned to the observed entity are compared to the values of the slot of the observed frame. With adequate compatibility, the system based on frames records that an instance occurred.

5. Rules are conditional statements - statement that are easy for understanding and recording, and they determine the action that will be taken when certain conditions are true. They also express relations between

parameters and variables. In the dictionary of expert systems, production rules are also called premise-action, cause-consequence, hypothesis-action, condition-action, test-result, IF...THEN, or IF...THEN...ELSE.

The action is the other component of the rules, separated from the premise by the word THEN. The action sentence consists of a statement or a series of statements separated by AND or by commas (,) and is realized if the premise is true

6. Knowledge agents are software programs located in a computer system which are capable of performing autonomous actions in a suitable way. Intention is not to replace human intelligence, but to be supported by intelligent agents

## 7. SUMMARY

An agency is the central construct in the language of knowledge modelling, and an organization can be characterized as a hierarchy of agencies, with a carefully designed structure of action channels.

Managers have recently revealed the analysis of social networks, which have been used as a tool only by sociologists and academic researchers. It has now become the tool for business analyses, too.

The agencies performance must be evaluated with "reliability" and "effectiveness". These two factors have been given a new, precise meaning by Barnard:

\*effectiveness measures a degree to which an organization achieves its goals;

\*reliability shows a degree to which an organization manages to avoid unwanted by products in process of achieving its goals.

An ontology is an explicit specification of a conceptualization.

"Only artificial agencies admit complete, explicit representations of their conceptualizations" and "only artificial agencies built on normative theories of information, knowledge and action can have their conceptualizations specified".

The development of artificial ontologies implies their standardization and design of developing methodology, what is a subject of a new engineering discipline, frequently called ontological engineering.

Artificial ontologies are only a collection of data, without inner meaning given to them. That's why in a broad use of artificial ontologies there occur technical restraints.

Sharing information among artificial software agencies is a problem, because the source and resources needed to synthesize one piece of information can determine whether it can be shared, and information sharing is not only a question of communication, but also of mutual confirmation of skills and capabilities of agents for solving the problems of dichotomy between data and information, which occurs even in artificial agencies.

Another problem is that some referees do not have appropriate data to be represented by, e.g. "the part which includes artificial ontology can be senseless for someone who is not trained to use a specific aditor of artificial ontologies used for encoding of that part, or someone who is not aware of the context or wanted interpretation of the symbol in that part of the code".

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