KNOWLEDE PROCESSES INOVATION – DYNAMIC APROACH TO CHANGES OF ENTERPIRSE IN THE KNOWLEDGE ECONOMY

RADISLAV JOVOVIĆ, Fakultet za pomorstvo u Kotoru
VESELIN DRAŠKOVIĆ, Fakultet za pomorstvo u Kotoru

Abstract: *This article provides an introduction to fundamental issues in the development of knowledge-based enterprise. After placing emergence of the new science discipline - knowledge based economy in historical perspective and proposing a theoretical framework, the authors deal with improvement of knowledge processes in a enterprise. They go on to deal with some of the major issues concerning the dynamic models of knowledge; and its integration into business processes. We will present our research based on the latest literature and our insight.*
Keywords: *knowledge, information, codification, intellectual property, externalization, internalization*

Abstrakt: *Rad razamtra fundamentalna pitanja u razvoju preduzeća zasnovanog na znanju. Nakon sagledavanja nove naučne discipline ekonomije znanja s aspekta istorijske perspektive i utvrđivanja metodološkog pristupa, autori se bave mogućnostima poboljšanja procesa znanja u preduzeću. Oni u tom pravcu razmatraju glavna pitanja koja se odnose na dinamičke modele znanja i integraciju znanja sa poslovnim procesima. Prezentovaće se istraživanje koje je zansovano na rezultatima najnovije literature iz ove oblasti i samih autora.*
Ključne riječi: *znanje, informacija, kodifikacija, intelektualno vlasništvo, eksteranlizacija, internalizacija.*

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1. Historical perspective

Knowledge has been at the heart of economic growth. The ability to invent and innovate, that is to create new knowledge and new ideas that are then embodied in products, processes and organizations, has always served to fuel development. And there have always been organizations and institutions capable of creating and disseminating knowledge. Knowledgebased economy, however, is a recently coined term. Transformation economy to new economy can be analyzed at a number of different levels.

The crux of the issue lies in the accelerating (and unprecedented) speed at which knowledge is created, accumulated and, most probably, depreciates in terms of economic relevance and value. This trend has reflected, inter alia, an intensified pace of scientific and technological progress. It has a host of ramifications and gives rise to many new challenges. A new kind of organization is spearheading the phenomenon: know-ledge-based communities, i.e. networks of individuals striving, first and foremost, to produce and circulate new knowledge.

Many scholars (e.g., Drucker 1995) assert that knowledge represents one of the very few sustainable sources of comparative advantage, and the practice of knowledge management (KM) takes the power of knowledge to the group, organization and even enterprise level (Davenport and Prusak 1998). Based on work (Brown and Duguid 1998; Nissen 1999), we accept knowledge as transferable entities (e.g.,electricity, fluids, manufactured items, cargo) that leads us to conceptualize this phenomenon in terms of *flow*.

The research described in this article builds upon and extends current theory pertaining to knowledge flow and focuses, in particular, on investigating its dynamics to improve design of business processes. Leveraging the good understanding of knowledge processes, we extend theory that can lead to broder approach to innovation knowledge processes. This article begins with background on knowledge management models. Continue with describing the most known kwledgeflow models, upon which we reflect to identify possibilities to design knowledge processes which will be suitable for knowledge economy. The contribution of this work

is summarized along with key fundamentals of knowledge based enterprise.

2. Knowledge Management Models: a State of the Art

The following sections present a brief insight into the knowledge management aproaches.

SECI (Nonaka)

Ikujurio Nonaka articulated a model of "knowledge creation" in a series of articles and books dating from the early 1990s. The SECI (Socialization, Externalization, Combination, Internalization) model first appeared in 1991 and attained recognition as a useful and rigorous approach to describing the ways knowledge is generated, transferred and recreated in organizations. In brief, the model incorporates the following:

- Two forms of knowledge (tacit and explicit),
- An interaction dynamic (transfer),
- Three levels of social aggregation (individual, group, context),
- Four "knowledge-creating" processes (socialization, externalization, combination and internalization).

The model proposes that a "knowledge-creating company" consciously facilitates the interplay of tacit and explicit forms of knowledge. This is accomplished through systems and structures, and a corporate culture, which facilitate the interaction of four knowledge-creating processes, per the following:

- Socialization: the sharing of tacit knowledge between individuals through joint activities, physical proximity;
- Externalization: the expression of tacit knowledge in publicly comprehensible forms,
- Combination: the conversion of explicit knowledge into more complex sets of explicit knowledge: communication, dissemination, systematization of explicit knowledge,
- Internalization: the conversion of externalized knowledge into tacit knowledge on an individual or organizational scale. The embodiment of explicit knowledge into actions, practices, processes and strategic initiatives.

Critical for Nonaka is the interaction dynamic between forms of knowledge and levels of organization. He proposes that the spiral resulting from the exchange of tacit and explicit knowledge across different organizational levels is the key to knowledge creation and recreation. The prescription is that companies should recognize the importance of this interaction dynamic and imbed the mechanisms that make it possible.

The N-Form Organization (Hedlund)

Gunnar Hedlund introduced the notion of the N-Form corporation in 1994. He proposed that the N-Form corporation goes beyond the M-Form in that it better accommodates the emerging imperatives of knowledge-based organizational design, drawing its synthetic wisdom from the, "…gray zone between economics, organization theory and strategic management" (Hendlund 1994, p. 74). Hedlund suggests that a principal attribute of the model is its conjoint analysis of two sets of concepts: tacit/explicit knowledge, and four levels of social aggregation. He injects into these a set of dynamics related to knowledge creation, development, transfer and use, yielding a structure that is built around 3 basic dimensions:

- Two types of knowledge (tacit and articulated), and within each type three forms of knowledge (cognitive, skill, embodied),
- Four levels of carrier (individuals, small groups, organizations, the interorganizational domain),
- The dynamics of knowledge transfer and transformation, which are articulated by the following processes:
  - Articulation and internalization, the interaction of which is reflection,
  - Extension and appropriation, the interaction of which is dialogue,
  - Assimilation and dissemination which refer to "… knowledge imports from and exports to the environment" (Hendlund 1994, p. 76).

Hedlund lays the foundation for his dynamic model by distinguishing between types, forms and levels of knowledge. In brief, he juxtaposes tacit and articulated knowledge (attending closely to definitional issues) with different levels of social aggregation. This results in a classification scheme that assumes cognitive, skill-based and embodied forms of knowledge exist in both tacit and articulated forms across the range of organizational levels. On this foundation Hedlund then situates the dynamics of knowledge transfer and transformation. Knowledge transfer, storage and transformation are presented as a set of processes whose interactions, across the different types and levels of knowledge,

privilege knowledge creation and, in turn, argue for the N-Form organizational design.

Knowing and Knowledge (Earl)

Michael Earl's more recent works propose a set of heuristics that situate the CKO / knowledge function within organizations and prescribe its activities. One distinction he makes, often discussed by others, is that of data, information and knowledge. Earl proposes a classification and writes, "Trite and imperfect as this classification is, it suggests that knowledge comprises expertise, experience, knowhow, skills and competence…" (Earl 1998, p 7). Going further, he recognizes two organizational states that are relevant to Knowledge Management: knowledge and knowing. Earl proposes that an organization may usefully concern itself with the creation, protection and leveraging of its knowledge assets by attending to four functions:

- Inventorising: mapping individual and organizational knowledge,
- Auditing: assessing the nature and extent of planned ignorance and then developing knowledge through learning activities,
- Socializing: creating events which enable people to share tacit knowledge,
- Experiencing: addressing the problem of unknown ignorance by learning from experience, action and handling unusual situations.

The OK Net and the OCS (Carayannis)

Elias Carayannis has recently proposed a "… synergistic symbiosis between information technology and managerial and organizational cognition" (Carayannis 1999, p. 219) whose conjunction is Knowledge Management. IT is approached as a valueadding technological infrastructure, managerial / organizational cognition as the "… capability for individual and collective reasoning, learning, emoting and envisioning," and Knowledge Management as "… a sociotechnical system of tacit and explicit business policies and practices" (Carayannis 1999, p. 219). In general terms Carayannis attempts to define the systems and structures, both real and virtual, which would allow an organization to maximize the efficiency and effectiveness of its cognitive processes. The crystallized form of this effort is termed the Organizational Knowledge Network or OK Net. Carayannis specifies a number of concepts to lay its foundation and among them, the key elements of metacognition, metalearning and meta-knowledge. A familiar theme in the organizational learning community, Carayannis states that the relationship between knowledge (K) and meta-Knowledge (MK) is critical in Knowledge Management. He defines a 2 X 2 matrix which, "… consists of successive knowledge cycles where an individual or an organization can transition or traverse 4 stages of awareness and ignorance" (Carayannis 1999, p. 224).

Three Pillars of Knowledge Management (Wiig)

Karl Wiig is one of the pioneers in the field of Knowledge Management and was among the first to publish a series of texts that assembled managementrelevant concepts focusing squarely on the topic. His overarching framework is based on three pillars and a foundation. Wiig proposes that the foundation of Knowledge Management is comprised of the way knowledge is created, used in problem solving and decision making, and manifested cognitively as well as in culture, technology and procedures. On this foundation he situates three pillars which categorize the exploration of knowledge, its value assessment and its active management. This framework summarizes the main areas on which a KM initiative should focus.

A Model of Intellectual Capital (Edvinsson)

Leif Edvinsson of Skandia achieved notoriety in the field of Knowledge Management after being named the first CKO in 1991. He publicized his work within Skandia and later developed his thinking in a series of publications. The focus of Edvinsson's interest is intellectual capital management and the valuation of knowledge assets. His core model is a scheme for organizing a firm's assets, which defines four major components of intellectual capital and their interactions for value creation:

- Human capital relates to a firm's human resources, including the knowledge and knowhow that can be converted to value. This is said to reside in people, organizational routines and procedures. Intellectual assets include codified, tangible or physical descriptions of specific knowledge to which the company can assert ownership rights and readily trade in disembodied form.
- Structural capital relates to the firm's supporting infrastructure. This is defined as both physical infrastructure (building, computers, etc.) and intangible infrastructure (history, culture, management).
- Business assets are defined as the structural capital which a firm uses to create value in its

commercialization process (processing facilities, distribution networks).
- Intellectual property relates to the intellectual assets of the firm for which legal protection has been obtained.

The dynamic aspect of this model relates to the creation of value, for which Edvinsson proposes there are two fundamental sources. The first are those innovations which are generated by the firm's human resources into legallyprotected intellectual assets, and the second the products and services which result from the commercialization of innovations.

The Ecology of Knowledge Management (Snowden)

David Snowden, who directs the Cynefin, IBM's Centre for Organizational Complexity, has developed an approach to implementing Knowledge Management programs in a series of articles that rest, in general terms, on a foundation of cognitive science, semiotics and epistemological pragmatics. In these works, Snowden elaborates an actionoriented knowledge system that embraces four major elements:

- Explicit / Tacit knowledge,
- Knowledge assets,
- Trust,
- The certainty / uncertainty of decisions relative to (a) objectives and (b) causal relations.

Decision matrix and the model suggest that organizations will manage four types of transitional activities:

- Sharing explicit knowledge through systems and structures,
- Sharing tacit knowledge through psychosocial mechanisms,
- Transforming tacit to explicit knowledge through BPR, documentation and related,
- Releasing tacit knowledge through trust and its dynamics. The balanced and adapted management of explicit and tacit knowledge is said to lead to Knowledge Management ecology within a firm.

Knowledge Management Processes (Inkpen & Dinur)

Andrew Inkpen and Adva Dinur, of Thunderbird and Temple University respectively, introduced an empirical model of Knowledge Management designed to explicate learning and knowledge transfer between partners in strategic alliances. They begin with the idea that, "…the firm is a dynamic system of processes involving different types of knowledge" (Inkpen & Dinur 1998, p. 454) and go on to explore how firms acquire and manage new knowledge, particularly with respect to alliance arrangements. The model they propose distinguishes between tacit and explicit knowledge and holds that a key challenge is the conversion of tacit individual knowledge to explicit organizational competence. They state that, "… organizational knowledge creation should be viewed as a process whereby the knowledge held by individuals is amplified and internalized as part of an organization's knowledge base" (Inkpen & Dinur 1998, p. 456). Knowledge conversion, creation and learning occur in a multilevel context that invokes different processes depending on the level in play. At the individual level, interpretation and sensemaking are key; at the group level, integration; and at the organizational level, integration and institutionalization.

Intellectual Capital Management (Van Buren)

Van Buren, a senior associate with the Research & Enterprise Solutions unit of the American Society for Training and Development (ASTD), has reported a model developed by the ASTD Effective Knowledge Management Working Group, a virtual organization composed of Knowledge Management practitioners in various industries. This group has created an intellectual capital management model whose goal — much akin to a benchmarking exercise — is a standard set of measures that can be used to assess Knowledge Management activities across different companies. The model includes two sets of measures:

- Those pertaining to intellectual capital stocks, including (a) human capital, (b) innovation capital, (c) process capital and (d) customer capital,
- Those pertaining to financial performance and business effectiveness.

The starting point resides in the firm's stock of intellectual capital, the identification of which serves as input for knowledge management processes and enablers. Despite their lack of visibility, these are held to constitute, "… the critical leverage points for enhancing the firm's Knowledge Management capability" (Van Buren 1999, p. 76). The critical Knowledge Management processes, which are imbedded in the firm's activities and initiatives, are held to be the (a) definition, (b) creation, (c) capture, (d) sharing and (e) use of knowledge. The enablers are, in brief,

those corporate functions/systems/structures, which define, leverage and structure the firm's activity: leadership, corporate culture, communication, technology processes, human resources policy and so on. This therefore highlights the interaction of processes and enablers, all of which is placed in the context of a firm's business strategy: Knowledge Management efforts should be driven by strategic intent rather than the reverse. Outputs are made as concrete as possible through measures associated with financial performance and changes in the stock of intellectual capital. Van Buren suggests a range of financial performance measures including markettobook value, return on equity, revenue per employee and value added per employee. He suggests a total of 50 intellectual capital measures distributed across four categories - human capital, innovation capital, process capital and customer capital - and including such items as educational levels, time in training, the number of copyrights and trademarks, average age of patents, IT accesses per employee and annual sales per customer.

A Taxonomy of Knowledge Management (Jovović & Drašković)

We suggested that four dimensions cut across many of the discussions:

- Time: referring to a linear and simplified representation of cognitive process, including the (a) mapping, (b) acquisition, (c) codification, (d) storage, (e) application and (f) transformation of knowledge or its elements;
- Type: referring to tacit and explicit knowledge;
- Level: referring to different levels of social aggregation;
- Context: referring sensemaking, in that no knowledge element has any meaning outside of a given context.

Knowledge Management has always been rooted in the individual and his or her behavior, the formalization of the field has shifted attention upwards in the Map towards systems and structures that encourage the generation, transfer, application and reinvention of knowledge in a company. Much of this shift has been occasioned by the information technologies that facilitate one-to-one, one-to-many, and many-to-many communication. Innovation is becoming the dominant activity, its sources evermore varied. Another reflection of the aforementioned gear change is the growing speed and intensity of innovation. There are two main ways in which breakthroughs come about: first, through formal research and development work offline (i.e. isolated. and .sheltered, from the regular production of goods and services); second, through learning online, where individuals learn by doing and, as a rule, can assess what they learn and hone their practices for what follows next. This can be an extremely potent form of knowledge production in many professions. Meanwhile, the need to innovate. is growing stronger as innovation comes closer to being the sole means to survive and prosper in highly competitive and globalized economies.

For further purposes of this article, four important concepts from the KM literature are summarized:

- knowledge hierarchy,
- information technology,
- knowledge-based systems, and
- knowledge management life cycle.

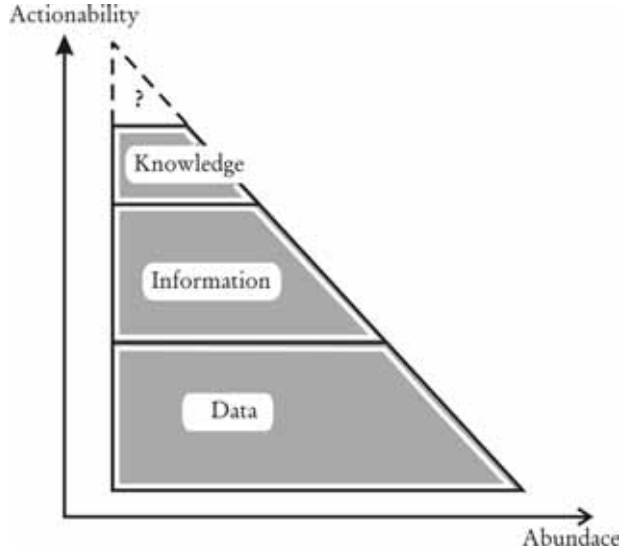
Four "knowledge-creating" processes (socialization, externalization, combination and internalization are the most important knowledge processes which have to be improved in knowledge based enterprise. Innovation all of these processes is possible trough information technologies, knowledge based systems, and redesign management life cycle.

We seem that is very important step in building new knowledge processes conceptualize hierarchy of knowledge, information, and data. Many scholars (Davenport and Prusak 1998; Nissen et al. 2000; Von Krough et al, 2000) conceptualize a hierarchy of knowledge, information, and data. As illustrated in Figure 1, each level of the hierarchy builds on the one below. For example, data are required to produce information, but information involves more than just data (e.g., need to have the data in context). Similarly, information is required to produce knowledge, but knowledge involves more than just information (e.g., it enables action). We operationalize the triangular shape of knowledge hierarchy.

This hierarchy using two dimensions-abundance and actionability-to differentiate among the three constructs. Briefly, data lie at the bottom level, with information in the middle and knowledge at the top. The broad base of the triangle reflects the abundance of data, with exponentially less information available than data and even fewer chunks of knowledge in any particular domain. Thus, the width of the triangle at each level reflects decreasing abundance in the progress from data to knowledge. The height of the triangle at each level reflects actionability (i.e., the ability to take appropriate action,

such as a good decision or effective behavior). Converse to their abundance, data are not particularly powerful for supporting action, and information is more powerful than data.

Figure 1. Knowledge Hierarchy



Knowledge hierarchy provide base for putting information technologies on the right place in the knowledge processes. Current information technology used to support KM is limited primarily to conventional database management systems (DBMS), data warehouses and data mining tools (DW/DM), intranets/extranets, portals and groupware (O'Leary 1998). Arguably, just looking at the word "data" in the names of many "knowledge management tools" (e.g., DBMS, DW/DM), we are not even working at the level of information, much less knowledge. Although (esp. Web-based) Internet tools applied within and between organizations provide a common, machineindependent medium for the distribution and linkage of multimedia documents, current intranet and extranet applications focus principally on the management and distribution of information, not knowledge per se. It is reason to use knowledge-based systems.

Construction and use of knowledge-based systems (KBS) can make knowledge explicit and its application direct. Key KBS technologies include applications such as:

- expert systems and intelligent agents,
- infrastructure and support tools such as ontologies, knowledgebases, inference engines, search algorithms, list and logic programming languages, and
- a variety of representational formalisms (e.g., rules, frames, scripts, cases, models, semantic networks). Much deeper than just their names' sake, KBS are predicated on the capture, formalization and application of strong domain knowledge

This considering has important implication on the design of knowledge processes and its interaction within organization. Conceptually, there are tree organizational flows:

- Physical flow,
- Information flow, and
- Knowledge flow.

All flows are in dynamic interaction through time. Knowledge flows trough time in sycles.

Nissen et al. [2000] observe a sense of process flow or a life cycle associated with knowledge management. After integrating survey of the literature (e.g., Despres and Chauvel 1999; Gartner Group 1999; Nissen, 2002), we see that Amalgamated Model of knowledge life cycle is more complete; it consists of six phases:

- Create knowledge,
- Organize knowledge,
- Formalize knowledge,
- Distribute knowledge,
- Apply knowledge and
- Evolve knowledge.

3. Knowledge flow

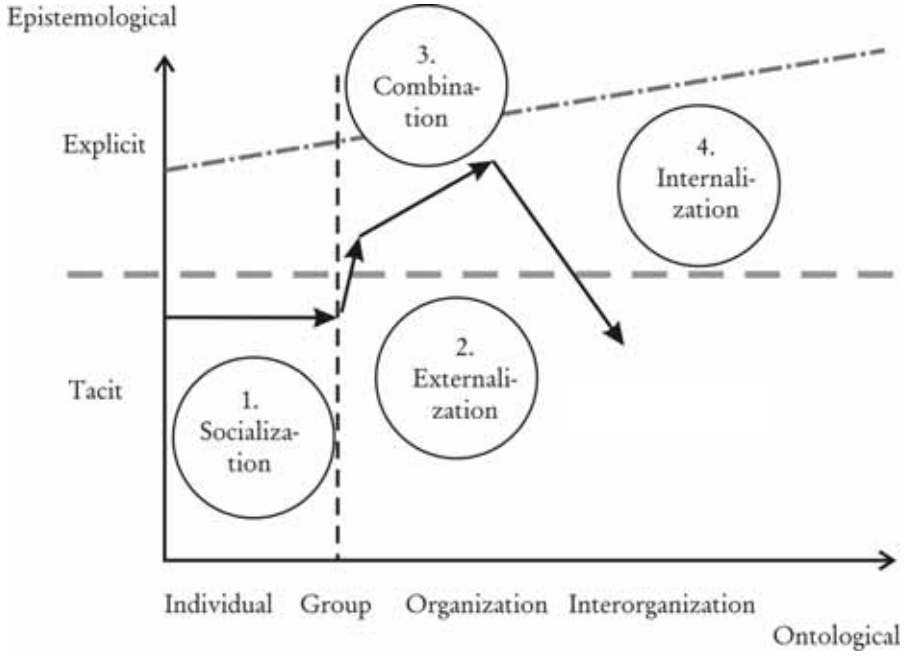
One of the bestknown theoretical treatments of knowledge flow to date stems from Nonaka

(1994) in the context of organizational learning. This work outlines two dimensions for knowledge:

- epistemological, and
- ontological.

The epistemological dimension depicts a binary contrast between explicit and tacit knowledge. Explicit knowledge can be formalized through artifacts such as books, letters, manuals, standard operating procedures, and instructions, whereas tacit knowledge pertains more to understanding and expertise contained within people's minds. The ontological dimension depicts knowledge that is shared with others in groups or larger aggregations of people across the organization. Although this aggregation of organizational units appears arbitrary, in the enterprise context, it could clearly apply to small teams, work groups, formal departments, divisions, business units, firms and even business alliances or networks. As shown in Figure 2, Nonaka uses the interaction between these dimensions as the principal means for describing knowledge flow. This flow is roughly characterized through four steps. First, Nonaka asserts that new knowledge is created only by individuals in the organization and is necessarily tacit in nature. The first flow of knowledge is then theorized to occur through a process termed socialization, which denotes members of a team sharing experiences and perspectives, much as one anticipates through communities of practice. Socialization flow is noted as vector 1 in Figure 4 and corresponds to tacit knowledge (i.e., along the epistemological dimension) flowing from the individual to the group level (i.e., along the ontological dimension - Nissen 2002).

Figure 2. Nonaka Knowledge Flow Theory



(*Source*: Adapted from Nonaka 1994. and Nissen 2002)

The second flow of knowledge (vector 2) is theorized to occur through a process termed externalization, which denotes the use of metaphors through dialog that leads to articulation of tacit knowledge and its subsequent formalization to make it concrete and explicit. The third flow of knowledge (vector 3) is theorized to occur through a process termed combination. Combination denotes coordination between different groups in the organiza-tion-along with documentation of existing knowledge-to combine new, intrateam concepts with other, explicit knowledge in the organization. The fourth flow of knowledge (vector 4) is theorized to occur through a process termed internalization. Internalization denotes diverse members in the organization applying the combined knowledge from above-often through trial and error-and in turn translating such knowledge into tacit form at the organization level.

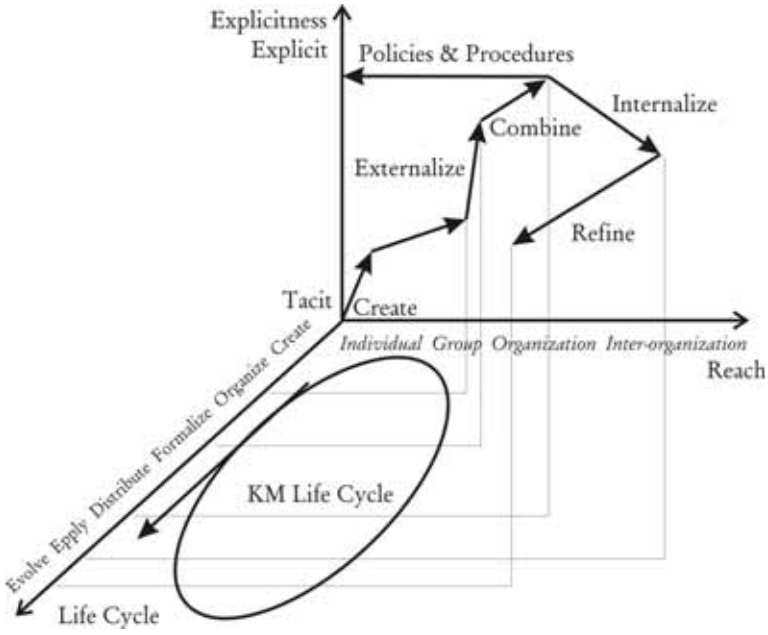
3.1 Knowledge-flow dynamics

Design new knowledge process require understanding flow of knowledge. This section build up that understanding upon Nonaka's and Nissan models of knowledge-flow dynamics. This may help to describe better and explain how knowledge flows through the enterprise.

The first step toward building on current knowledge-flow theory is to augment Nonaka's two-dimensional framework by incorporating a third dimension, the KM life cycle. Nissen operationalizes the construct using the lifecycle stages from the Amalgamated Model (Nissen 2002). Further, because the concept of flow is inherently dynamic, Nissan extend this framework by incorporating time as a key, fourth dimension. Such augmented dimensionality preserves-and indeed subsumes-Nonaka's two-dimensional framework and provides the basis for a richer model. This richer model may enhance our descriptive and explanatory power in terms of understanding the knowledge-flow phenomenon.

In Figure 3, we note a few, notional, knowledge-flow vectors for illustrating and classifying various dynamic patterns of knowledge as it flows through the enterprise. For example, the simple, linear flow labeled "Policies and Procedures" depicts the manner in which most enterprises inform and train employees through the use of policies and procedures: explicit documents and guidelines that individuals in the organization are expected to memorize, refer to and observe. As another example, the cyclical flow of knowledge described by the amalgamated KM life cycle model, shown in the figure, reflects a morecomplex dynamic than its simple, linear counterpart. This flow describes a cycle of knowledge creation, distribution and evolution within a workgroup, for example. Further, Nonaka's dynamic theory of knowledge flow can also be described in this space by the curvilinear vector sequence corresponding to the processes labeled "create," "socialize," "externalize," "combine" and "internalize," respectively. Thus, this model subsumes the one proposed by Nonaka and shows a somewhatcomplex dynamic as knowledge flows along the life cycle. Moreover, examination of this space suggests also including the refine vector, which is not part of Nonaka's theory but represents a key element of the empiricallyderived, Amalgamated Model (e.g., the key to knowledge evolution). Clearly, a great many other flows and patterns can be shown in this manner. Nissen incorporates the *time* dimension into the model. Because static displays such as the graph presented in Figure 2 are difficult to visualize in more than three dimensions (Nissen substitute terms *epistemological* and *ontological*, substitute the term *explicitness* for *epistemological* and *reach* for *ontological* in Figure 3).

Figure 3. Extended Model with Knowledge Flows



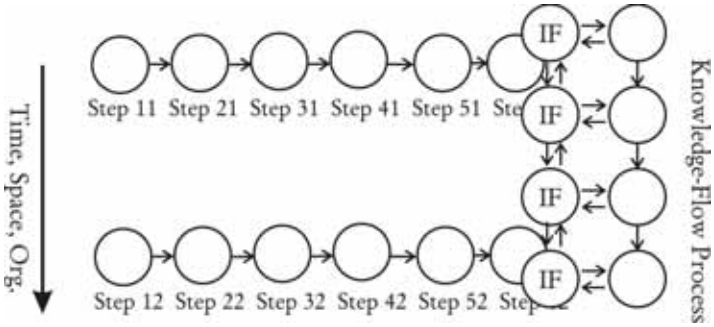
(*Source*: Nissen 2002)

4. Knowledge process innovations

Knowledge processes should have interaction with physical processes and informational processes. IT infrastructure can support that interaction. Knowledge processes have to be optimized and designed to maintain dynamic in whole enterprise. Companies should recognize importunacy of interaction dynamic. They have to imbed the mechanism to make it possible. The whole process of creating and recreating know-ledge should be divided into more narrow processes. Design of every of theme must be aimed to position knowledge as the most important assets of an enterprise.

Substantial integration of knowledge management with process innovation is observed in current practice, as companies realize the direct connection between KM and knowledgework process innovation (Davenport et al. 1998). In their study of more than thirty KM efforts in industry, Davenport et al. (1996) note the practice is "fundamentally change management projects." Emerging theory of knowledge creation and management has a dynamic, distinctly processoriented flavor (see esp. Nonaka 1994). Ruggles (1998) goes so far as to suggest a primary objective of practice is to assess the impact of KM as a process, fundamentally a proposition of inovation. However, as learned through the painful, expensive and failureprone "first wave" of inovation (Cypress 1994), simply inserting IT into a process in no way guarantees performance improvement. Indeed, many otherwise successful and effective firms experience process *degradation* as the result of process inovation (Caron et al. 1994; Hammer and Champy 1993). This point is underscored by Hammer (1990), whom colorfully refers to such practice as "automating the mess" (e.g., making a broken process simply operate-broken-faster). Drawing on Leavitt (1965) and others (cf. Davenport 1993; Nissen 1998), new IT needs to be integrated with the design of the process it supports. That is, the organization, people, procedures, culture and other key factors need to be considered in addition to technology. Given that many KM projects now revolve around IT implementation (e.g., intranets/extranets, Web portals, groupware; (Nissen et al. 2000), process innovation and knowledge management even appear to be sharing some of the same mistakes. Building upon this research, we begin to characterize a powerful interaction between the flow of work (i.e., workflow; (Georgakopoulos et al. 1995) and the flow of knowledge (i.e., knowledge flow) in an enterprise. Following Oxendine and Nissen (2001), we refer to these flows as *horizontal processes* and *vertical processes*, as conceptualized in Figure 4. Briefly, the two horizontal directed graphs in the figure delineate separate examples of a work process (e.g., steps 1 – 6 as performed at different points in time, space, organization). The graph at the top of Figure 4 represents one particular example (e.g., performed at a specific point in time, location, organization) of this notional process, and the graph at the bottom represents a different example (e.g., performed at a separate point in time, location, organization).

Figure 4. Horizontal and Vertical Processes



(*Source*: Adapted from Nonaka 1994, Nissen 2002)

Both horizontal graphs represent the flow of *work* through the enterprise. According us, besides representation flow of work, it is necessary to represent flow of information as conceptualization of work processes, and flow of knowledge (Nissen 2002). The vertical graph represents a complementary set of processes responsible for the flow of information and flow of knowledge. As noted in

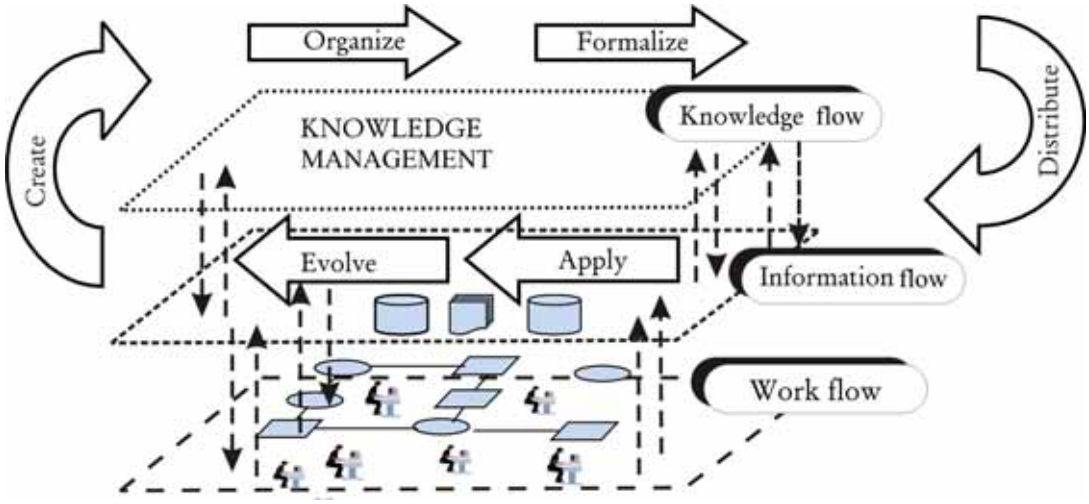
Section I, knowledge is not evenly distributed through the enterprise, yet enterprise performance is dependent upon consistency and effectiveness *across* various workflows. The associated knowledge (e.g., process procedures, best practices, tool selection, and usage) flow across time, space and organizations. Such crossprocess activities are seen as driving the flow of knowledge-as opposed to the flow of work-through the enterprise. Indeed, Nissen and Espino (2000) identify seven vertical processes (e.g., training, personnel assignment, IT support) that interact in a complex manner that is not reflected by the simple, linear flow depicted in the figure. It is upon these vertical process flows that we concentrate in this research.

5. Key fundamentals of knowledge based enterprise

Knowledge comprises expertise, experince, knowhow, skills and competences. Knowledge processes are synergetic symbiosis between management, organization, business processes and information technologies (see figure 5).

Traditional organizations have neglected knowledge processes. Many organizations are faced with old inefficient way of creating and recreating of knowledge. They have been trying to redesign business processes and knowledge processes as their main processes. The fact is that successful stories are not so many.

Figure 5. Key fundamentals of knowledge based enterprise



(*Source*: Autors)

We suggest methodology with next steps:

- Analysis existing knowledge process,
- Defining strategy of innovation,
- Mapping individual and organizational knowledge,
- Redesign knowledge processes, and other processes,
- Implementing new knowledge processes.

According our view, improvement knowledge management is holistic approach and it is complex endeavour for every organization, both big or small. Knowledge is intangible asset which can be transferred and disseminated trough organization. For the best it's using, our work suggests the methodology which emphasizes dynamic. Dynamic is the main characteristics all knowledge processes, especially these which create new knowledge and innovation (cognitive thought). Design of knowledge processes and its interaction have to be fundamentally based on dynamic.

6. Conclusion

The modern enterprise depends upon timely and effective flows of knowledge through its organizations for success. But knowledge is not evenly distributed through the enterprise, and a dearth of information systems is available to enable timely and effective flows. Further, the few theoretical knowledge-flow models available have been supported knowledge process innovation. A survey of current practice shows that such system and process design is accomplished principally by trial and error, one of the least effective approaches known. The research

described in this article builds upon and extends current theory pertaining to knowledge flow. It focuses in particular on investigating its integration in coherent processes. Leveraging the good understanding of flows in other domains, we extend the theory that can lead to "devices" of considerable utility in the enterprise knowledge domain. The result is a approach that can be used to improve existing practice of knowledge process innovation. The patterns can, in turn, be analyzed to inform the design of useful information systems and business processes. This paper makes a theoretical contribution by enriching our understanding knowledge flow, and its integrating in a coherent process which can be innovate by using some methodology, associated with the flow of knowledge. Differentiating between flows of knowledge, flow of information, and their complementary flows of work through the enterprise, we identify an important dynamic in terms of organizational capability, and framework for better knowledge manaement.

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INOVACIJA PROCESA ZNANJA – DINAMIČKI PRILAZ PROMJENAMA U PREDUZEĆU U EKONOMIJI ZNANJA

Zaključak: *Uspjeh savremenog preduzeća zavisi od blagovemenog efektivnog toka znanja kroz organizaciju. Znanje nije jednako raspoređeno u preduzeću, pa je potrebno uspostaviti blagovremen i efektivan tok znanja implemantacijom novih procesa. Nekoliko teorijski raspoloživih modela znanja podržava inovaciju procesa znanja. Istraživanje prakse pokazuje da se inovacija procesa znanja ostvaruje kroz pokušaje i greške, što se pokazuje kao njefektivnijie. Istraživanje opisano u ovom radu se nadgrađuje na postojeću teoriju i praksu o menadžmentu znanja i u određenom dijelu proširuje te teorije. Posebno u dijelu integracije tokova znanja u koherentne procese. Podržavajući shvatenje tokova znanja šire, mi smo željeli da kreiramo "instumenat" koji bi se koristio u domenu inovacije procesa znanja u preduzeću. Rezultat je prilaz koji može da se koristi za poboljšanje postojeće prakse inovacije procesa. Model se može koristiti, i obrnuto, to jest može da se posmatra kao podloga za oblikovanje informacionih sistema i poslovnih procesa. Ovaj rad daje teorijski doprinos razumijevanju tokova znanja, kao i integraciji znanja u koherentene procese koji mogu da se inoviraju korišćenjem nekih metodologija, vezanih s tokom znanja. Diferenciranjem tokova znanja, tokova informacija i njima komplementarnog toka rada kroz preduzeće, identifikujemo važnu dinamiku koja treba da odlikuje metodlogiju za kvalitetniji menadžment znanja.*