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A study on the implementation of communities of practice in an institutional portal

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Abstract

Knowledge is among one of modern world's most precious assets, with Knowledge Management attaining a prominent level in organizations. One of the forms of Knowledge Management application lies through the Communities of Practice, which bring together individuals who share a concern, a set of problems or a passion for a subject, and who deepen their knowledge on the relevant issue through interactions. In the communities of learning realm, Virtual Learning Environments represent another option for practice in knowledge management application. However, they focus on the processes and management of teaching or content, disregarding the potential of knowledge present throughout the institution. The present work depicts a hybrid structure between the Virtual Learning Environments (VLE's) and the Virtual Communities to provide support to the use of Communities of Practice in Institutional Portals. This work is based on exploratory studies on the domains of the Communities of Practice and the Virtual Learning Environments, thereby resulting in a "conceptual framework" of the existing relations between the VLE's and the interactions between the CoP members.

Keywords: Communities of Practice; Portais Institucionais; Knowledge Management; Communities of Learning; informação em saúde.

Introduction

Currently the differential factor among organizations is not found among its equity assets, but rather in its intellectual assets, as the latter allow them to become ever more competitive and efficient (Klein, 1998). Companies compete in a knowledge environment, with the "skills" of

the "knowledge workers", that is, creative workers with "knowhow" on the matters at issue being need.

According to Druker (2001), organizations have been searching for a structure bearing a more horizontal format, relying on highly-specialized workers at its base, devoid of intermediate subordination, similar structures to symphonic orchestras, where a conductor coordinates several musicians, with specific knowledge of their field of work. Thus, information and knowledge may "flow" more freely, without hierarchic restrictions.

Nonaka (2001) in the "knowledge spiral" defines knowledge in two discrete types: explicit and tacit, the former being all knowledge which may be easily formalized or synthesized, whereas the latter is present in the individual and blends into his/her way of acting and being, as one's experiences are so ingrained. Thus, Nonaka defines the need to transform tacit knowledge through four manners of conversion: **socializing** (tacit into tacit); **externalizing** (tacit into explicit); **combining** (explicit into explicit); e, **internalizing** (explicit into tact).

Knowledge socializing may occur in several manners and by several means, among which the Communities of Practice (CoP). The term CoP was initially used by organizational theoretician Etienne Wenger, by defining a community of practice as a group of people sharing a same interest regarding a subject or problem and who learn from regular interactions (WENGER, 2008).

This contact among community members may occur in person or virtually, but should allow for exchange of information and knowledge which, upon being placed in practice by other members, help in the search for solutions and best practices, by promoting group learning. José Terra (2005) highlights that the CoP deal with the way people naturally associate , by increasing their creativity, their problem-solving resources and skills to create solutions to challenges. Communities of Practice remain together by a common feeling and by the need to "know": the members wish to know what the other members know.

One of the limitations in the use of CoP lies on the support that information and communication technologies are able to provide to community management keeping the CoP feature and promoting knowledge exchange. Requirements such as creativity autonomy, critical ability and collaboration, although offered by the majority of Information and Communication Technology (ICT) do not provide great organizational functionalities which promote collective knowledge.

This work proposes a structure to render support to CoP creation in the OTICS Observatory Portal, leading to a "conceptual framework" which sets forth the main functionalities and necessary relationships among the Virtual Learning Environment (VLE) and CoP tools, as well as the interactions among the users of both. The next section presents a brief contextualization of CoP's regarding the functionalities needed. Section 3 defines the basic project features and the specification of CoP requirements applied to the proposed context. Section 4 illustrates a case study of framework application to the OTICS Observatory portal context. Finally, section 5 presents the final considerations.

Information and communication technology in Communities of Practice

The organizations started to acknowledge CoP's contribution in knowledge creation and divulgation by connecting people through social networks, identifying competences and serving as a model for learning. Within the realm of teaching institutions, teachers' communities display great variety of knowledge which may be grouped in areas of competence and interests (either collective or individual), and still follow a thematic organization ruled by the administrative and curricular structure of the courses. This scenario then comprises a great opportunity and laboratory for CoP use.

Major corporations have perceived the importance and the value provided by the CoP's (KANTER, 2001; XEROX, 2005; WORDBANK, 2008; IBM, 2008; GONGLA; RIZZUTO, 2001), although several still question CoP efficiency. However, Terra (2005) and Albagli (2007) list some of their advantages for the organizations and their participants; among the several identified, we point out: expediting market trend perception; enlarge relationship networks; enhance best practice sharing; increase participation, group sense and collaborator value; facilitate discovery of new knowledge; improve the organizational learning process; preserve organizational knowledge, among others. Rogério Pereira (2006), in his study on how the CoP's help in cutting through administration red tape, highlights advantages of knowledge conveyed by the CoP's, as this knowledge matures and enriches itself during the exchanges carried out by members.

Figure 1 illustrates how the interfaces required by the CoP's are identified by Wenger et al (2005) through *tensions* found in the exchange relations between members and the community, generating three types of needs which define technical possibilities aiming to meet th needs of a community's members: Interaction (*synchronous and asynchronous*), Publication and Tendency (*individual participation and community cultivation*).
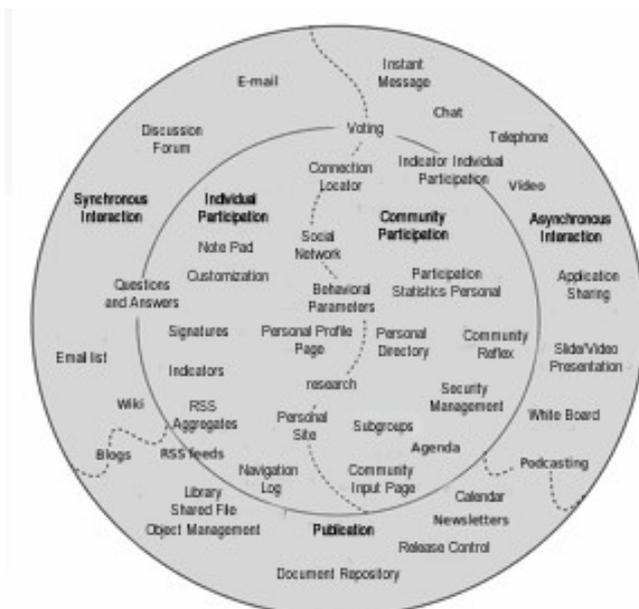

Figure 1: Activity synoptic chart relating technological tools to the tensions found in the communities according to Wenger et al. (2005)

To Albagli (2007), the TIC use facilitates circulation of information and knowledge; however, cognitive capacity and capacity of innovation are not affected by technology. Thus, the CoP's use traditional technological tools, used with personal, corporate, or relationship sites, only changing its objectives and forms of usage. Albagli and Wenger have studied and suggested several computational tools for CoP instrumentalization from traditional communication tools such as chats, discussion forums, faqs, e-mail, instant messages, or more enhanced communications tools such as white boards, podcasting, video-conferencing (see Figure 1). Management and publication tools are also needed. In this context, innovation does not lie on the tools but rather on the focus toward their use, which enables CoP members to spread knowledge.

Interconnection between the tools and the CoP's comprise the core of this work. The communities possess a domain, which emerges in the dialogs and in Community Management itself; then the inference of individual interests to associate them to communities displaying the same interests becomes possible in case contextual search methodologies are applied to the discussion forums, chats, faqs, and other communications tools.

There are many relations existing among tools, personal experiences and interests, which renders it difficult to exhaust them, but the aim is favoring dissemination of knowledge, enlarge the scope of practices and increase relations by suggesting new ones and strengthening the existing ones.

Requirements for Communities of Practice in the OTICS Observatory

The Virtual Learning Environments (VLE) comprise a set of ICT tools providing support to learning. This support may follow a traditional, in-person, teaching style, or emulate an entire distance mode through internet communication and interaction tools. According to Casa and Ribeiro (2005), the traditional teacher and student roles are redefined in these environments, turning students into more active agents in the learning process, where they produce knowledge, establish relationships and collaborates with colleagues, thereby socializing ideas.

To Dillenbourg (2000), intensive interaction among a group of people through some means constitutes a community. Although a feeling of community may not emerge per se, only due to electronic communication, the felling is built up through a great number of interactions and to the time required by shared objectives and experiences. Thus, to Dillenbourg then, the success of as VLE or of a virtual community depends on how the technological medium fosters cultural process learning and development among different individuals. A premise would be the correct connection of students with professionals within and without the institutions, developing an exchange of experiences through the interaction between heterogeneous knowledge holders and an objective (learning) in common. The same applies to participants in virtual communities who keep heterogeneous relationships with other communities and social tools.

In this work, we have drawn up a basic hypothesis that a CoP-based approach may serve as support and encouragement to collaborative work in knowledge sharing with virtual communities. This hypothesis suggests that collaborative tools, which amalgamate interpersonal and content relationships, may expand the pedagogical and collaborative dimension of those involved in the environment. As a proposal for methodology application to knowledge management, we have envisaged the possibility of adapting a tool for the

amalgamation of traditional communities around the formal CoP concept, taking as usage case the OTICS Observatory.

The OTICS Observatory comprises a national project (CNPq Process no 409433/2006-3), developed to operationalize the creation of an Observatory capable of integrating and articulating the National Health Information Systems from the Ministry of Health and the National Data Bases stemming from the inquiries and census surveys performed by the IBGE, but has enhanced these proposals by associating to them the challenge of knowledge spreading and production, thereby contributing to the enlargement of collective intelligence on health and the health system.

OTICS is comprised of a set of technological and operational solutions which encompass technological and political-organizational aspects, aiming at qualifying the monitoring and evaluation of health indicators, by establishing a permanent and continuous management and teaching process in the health system. The "Observatory" concept encompasses a set of solutions able to capture, treat and spread information and knowledge to support decision-making to a network of defined players, involved in the management and learning processes in the health system.

Among the solutions made available one finds VLE's and Virtual Community Management through a set of tools, as follows: murals, blogs, document repositories, participants' lists (with the possibility of sending Instant Messages), discussion forums, chat rooms, and webfolios (a tool for delivery and evaluation of works and documents).

In this proposal, we search for a formalization of the relationships existing between the collaboration tools, found in the OTICS Portal, with the individuals who make use of them. The portal collaboration tools are the links among the individuals, they bear a similar role to the CoP tools, being differentiated by the fact that the individuals do not belong to formal CoP's, but present features like knowledge sharing from a common domain.

Requirements for Communities of Practice in Framework Structuring

The CoP's have a well-defined lifecycle regarding their stages, although no limits exist in the time scope for the definition of each one of the stages, defined by Wenger (1998) as creation, expansion, maturing, activity and dispersion.

The **creation** of the CoP is the result of interpersonal relationships, which have been solidified by common interests. The framework should indicate the existence of these relations by using the information on portal users, complementing with the data pertinent to the interactions occurring with these individuals, dialogues, file, documents and common interest exchange, among others.

The CoP's have, among their tenets, the concern with knowledge so that it may be shared and that the best practices concerning the domain dealt with, emerge from the relationships. The CoP practice itself is revealed during the individuals' interactions.

After being "formally constituted", the CoP bears the need to define one or more members as moderators, who shall be references during CoP lifetime. The moderator's figure may be defined according to some criteria such as: time of participation, number of contributions, specialization in the domain, among others.

The next stage in the CoP's lifecycle is **expansion**, in which more individuals are invited to participate in the community , bringing with themselves new practices, new knowledge and experiences. It is important, in this stage of the lifecycles to discover individuals with common interests and individuals who use the collaboration tools for contributions on the CoP domain.

The **maturing** phase is a natural consequence of CoP activity; the more interactions exist and the more knowledge on the domain is generated, the greater shall be the possibilities that this CoP be a model over this domain. Usage indexes of the research collaboration tools for this domain increase, thus also increasing the contributions. These new experiences and shared knowledge is what matures the CoP and its domain.

When the CoP is in the **activity** phase, the activity indexes shall keep a standard indicating a constant cycle of events and knowledge sharing. At this stage in its lifecycle, the community becomes a reference over the domain, as it already bears a regular rhythm, which conveys trust to all, and a set of good practices under the domain.

The loss of active and participating members may occur during any phase of the CoP's lifecycle. However, the **dispersion** phase is marked by a high loss rate. Members may step away for several reasons, as when the CoP domain is not of interest to the member, or because it is a domain in disuse. With the absence of participants, the events in the community start to produce less effect, thereby dispersing the participants and mainly the observes.

Initial architecture of the set of specifications

The present proposal is based on the CoP's lifecycle for the definition of its management and for the definition of the relationships involving the tools. A detailed view of the conceptual framework is then proposed, depicting the main components to be taken into account in using the CoP in the context discussed (as per Figure 2).

This diagram of Figure 2 comprised the conceptual map of the elements involved in the framework, symbolizing the concepts and their interrelations involving the CoP.
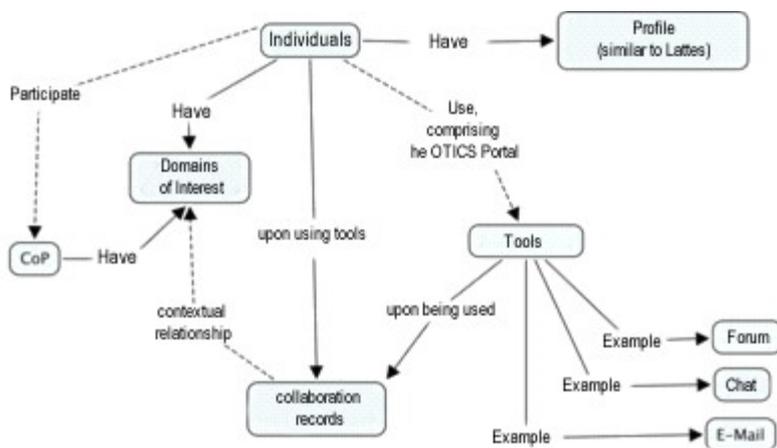

Figure 2: Diagram structure of a COP framework proposal. The solid lines represent the hierarchic relations between classes. The dotted lines define the contextual relations inferred by the framework.

The Virtual Community resources (both VLE's and CoP) in the OTICS Portal are comprised by a set of **Tools** used by the players (participants, students, teachers and external community) of the observatory. For it to be possible to identify the existing relationships among individuals or among individuals and the CoP, it is necessary that these interactions be stored and available for analysis and research.

In addition to the tools, the portal bears a set of users, students, teachers, and external community, which ensure the operation and the dynamics of this tool, as, without the participants, knowledge would not be shared. It role is basic as knowledge concentrators. These **Individuals** people the portal and are potential candidates to form a CoP, as per their **Domains of Interest**.

The **Domains of Interest**, in turn, describe the participants regarding their aspirations, curiosities and needs. However, this does not represent an entire individual's profile, which also entails the texts and materials submitted to the portal, their interaction in the discussion forums, chats, and collaborative participations in addition to the static description, which presents a series of complementary information, such as training, professional experiences, titles and awards, areas and research projects, thereby comprising a detailed **Profile** of each participant.

The **CoP** class contains knowledge emerging from informal relationships among individuals, detected with the help of the **Collaboration Records**, which comprise historical records of the use of collaborative tools.

The CoP's are made up by the elements: **Domain, Community** and **Practice. Domain** should be explicit and present both in the CoP and to individuals, which establishes a strong link between individuals and the communities. The **Communities** are made up of a set of persons who will be brought together with concern for learning and sharing knowledge on the proposed domain. **Practice** is present in the interactions, in knowledge exchanges held upon using collaboration tools.

Management Components of the Communities of Practice

As CoP's are new elements to portal structure, there arise some concerns on their management. Some basic requirements are observed as follows, for community management, by using as a basis the life cycle and some of the principles of CoP formation according to Wenger *et al*. (2002) and Terra (2005):

• List of Participants: it should be possible to locate all CoP members, thus observing their Profile and Domains of Interest. Therefore a form of mutual knowledge among members is provided, which then increases their confidence;

• Activity Level: it is possible to determine, by observing the collaboration frequency of each member and the performing of specific events or activities, the levels of activity to identify the CoP's lifecycle stage, as well as define the current CoP rhythm;

• Profile: it is necessary that CoP participants visualize the profiles of the other members, as it is possible then to determine which experiences and knowledge underlie the CoP, allowing for specialization and common competence maps to be drawn up;

• Historical Backgrounds: there should be a way to carry out research on the interactions occurring in the past, even linking facts to individuals;

• Invitation and recommendation: for the CoP to grow, continue adding knowledge and renewing ideas, it is necessary that dialog be constant. In this case, a tool is mandatory which allows for inviting people to participate in the CoP or, in the discussions promoted. In addition to an active invitation, it is necessary to define a mechanism for search and recommendation of the interests involved in the community or set of communities in which the individual participates. This ensures participation at different levels and keeps the dialog channel open;

• Events: in events shall be held the search for keeping CoP activities (lectures, workshops, round tables, debates) both virtual and in - person. These events value communication, the participants, disclose results and familiarize members, thereby increasing their confidence and bringing the CoP together;

• CoP Profile: the CoP must possess certain structuring elements such as a moderator, rules, domain of interests and objectives. This profile needs to be defined by the moderator, who shall have access to the other items in a differentiated manner than the observing participants.

Case Study of OTICS Observatory Framework

Initially, the existing interpersonal relations do not necessarily form a CoP in the portal/community scope, but as favorable conditions present themselves, in terms of tools and structure, there arises a great possibility that Communities of Practices may emerge from these relations, with the most varied domains. These CoP can become a facilitating instrument for user integration around the Observatory.

The following tools have been defined among the portal tools as main sources of information and knowledge to use in the present proposal: Discussion Forum, Document Library, Calendar, Mural, RSS , Profile and WebFolio.

These tools are highlighted only the points which need adaptations, as the current functionality of tools does not present problems or shortcomings, are needed only for adjustments for integration with a CoP as from the set of specifications to be proposed within the framework:

• Calendar: the type of event should be added to the calendar, defining the event as private or public, allowing the Collaboration Records to keep a search context for public events and indicate them to potential interested Individuals;

• Mural/Publications: this tool can offer the Individuals (participants in the same domain) suggestions on the orientations published by other individuals. To allow for this relationship, one should define a success indicator in the *Collaboration Records*, that is, the success of the orientation proposed by the participant for that publication;

• Discussion Forum: this tool operates in a traditional manner, keeping the communication among the participants. Its dialogues can be stored and indexed so as to facilitate search in the *Collaboration Records*;

• Document Library: this functionality is dispersed through several tools, especially with the handling of files and archives serving as supporting element to the community. An adaptation

should be promoted for controlled access by certain members and, equally, certain CoP's, to establish relationships between *Domain of Interest*, *Individuals*, and other components;

• Profile: this tool should receive special treatment, as knowledge is present in people. Profiles are based on the Lattes model, and can be constantly updated. Although quite detailed, the Lattes model can be added to descriptive information which narrate experiences on the profile items. It can also serve as basis for the putting in place a "Yellow Pages" system, listing *Domains of Interest*, *Profile*, and *Collaboration Records*;

• RSS: the RSS technology allows participants to enroll in communities supplying RSS feeds, regularly making available updates on their contents. in the framework context, automatic dissemination of participants' contents of interest directly influences the adopted practices of collaboration and learning, relating *Collaboration Records*, *Individuals* and *Domains of Interest*;

• Webfolio: equally used as reference for information search, also relate *Collaboration Records*, *Individuals* and the CoP themselves.

Other tools are available at the portal such as Chat and Instant Messaging, albeit not defined as priority for drawing up this proposal, for presenting the following features: the Chat encourages communication among portal members, but the dialog presents itself normally fragmented and distributed among members, in addition to allowing for constant variations of subject, without connections with the conversation context. A brief deviation from a subject may be interpreted as a new discussion domain, confusing a possible search for relationships; the Instant Messages has not been related because it is of a personal nature.

Both tools may be used without restrictions, but shall not be construed as pertinent repositories for use in framework evaluation scenarios. This does not prevent that future versions or implementations use such tools, as we know that the latter also carry a great background of knowledge.

Results Achieved

Our experiment comprises a scenario as CoP use contextualization through a discussion forum tools. This scenario constitutes only an example of operation which, in general, shall display the same behavior for all other framework tools.

A discussion forum is a tool in which the participation individuals write their doubts, needs and observations so that others may answer them, thereby sharing knowledge and experiences. In this example, Figure 3 illustrates the utilization of a traditional forum, in which an individual writes questions and another answers them. This communication shares and generates specific knowledge on the domain at issue.
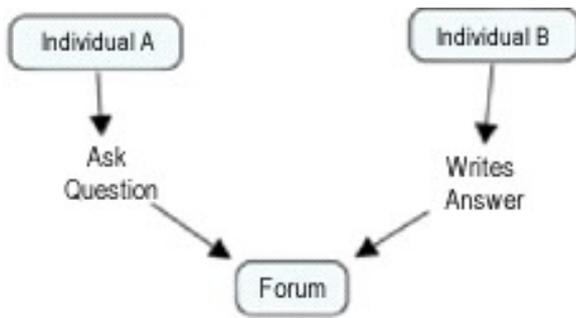
Figure 3: Traditional forum example of usage

The discussion forum behavior having as basis the proposed framework, allows for relating individuals, domains and communities enabling discovery of relationships among possible new participants for the CoP which deals with domain approached in communication among the individuals of a same community and new relationships among other communities (Figure 4).
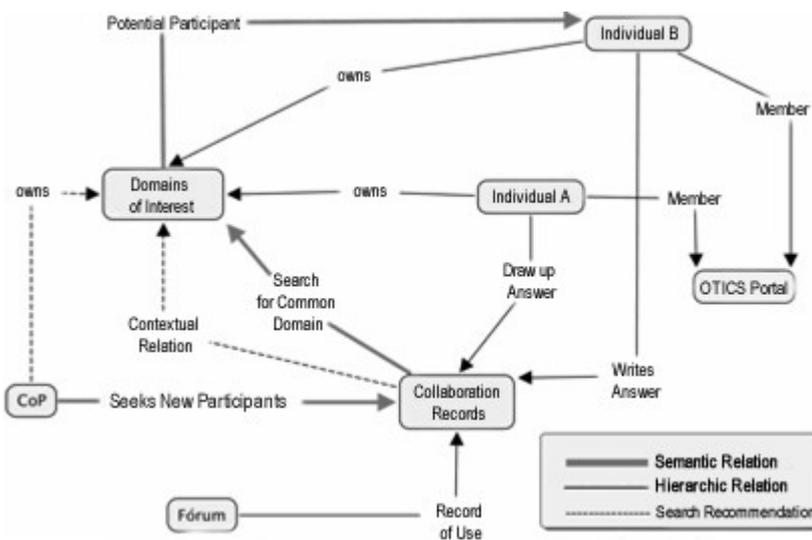
Figure 4: Example of a forum with support from the proposed framework

In Figure 4, individual A, portal member, her a doubt about a domain which is not of his interest; thus, he sends his doubt to the forum, which is promptly answered by individual B. Individual B has the communication domain in this profile of interest, but does not know the CoP which deals with domain.

When the moderator uses the CoP management tools, he may carry out a search for possible new participants for the CoP. This search is represented (on Figure 4) by the relationships highlighted by the dotted lines.

The relationship between the use of the Collaborative Tool, the Domain of Interest, and the Individuals participating in the portal indicates the potential of the new participant (or new communities) of the CoP's set.

Conclusions

We presented, in this work, a study of the needs and specification of requirements which involve CoP implementation in the OTICS Portal. This first study was generically carried out as a proposal for the drawing up of a conceptual framework for CoP construction.

The portal serving as case study, the OTICS Observatory, contemplates a set of collaborative tools providing support to the relationship among users. This relationship extends itself beyond information and knowledge exchanges carried out at the portal, by reproducing the CoP lifecycle stages. We understand that the interactions among users define the CoP lifecycle, and the cycle in turn creates different needs for collaboration tools and CoP management tools. These needs and relations are studied and contemplated by the proposed *conceptual framework*.

A number of essential elements to the correct operation were proposed, as from this study, for effective CoP management. These elements add new information on the current community structure at the portal, thereby allowing "coupling" of new specific functionalities for the CoP's without the structural changes to the standing portal.

Within a possible scenario we add the elements proposed for control and management, which potentialized the capacity of knowledge spreading and the possibility of tracking and search for "qualified" individuals in any domain. A traditional discussion forum is a repository of questions and answers registered by users, this same forum when put in place under the framework optics which allows for associations between the domain of interest of an individual related to the forum, with a CoP which broaches the same domain, being even able to encounter individuals who do not belong to the CoP, but answer to the forum and display personal interest in the domain. It is important to point out that the searches carried out by the system only display statistical content with the purpose of ensuring portal users' privacy.

Finally, the framework present provides a set of structures and functionalities which ensure that this CoP, after being duly registered, may be able to self-manage (through moderators) and share knowledge with new participants, indifferently from participation in one or another communities. In addition to the management functionalities, the framework also defines the identification of CoP activity frequency, observing whether the activities proposed are carried out by portal participants or users. It is possible to carry out checks such as the following: what are the CoP's of interest on a specific subject or what are the users who like this subject. Knowledge is being shared, through the CoP's, among the persons , even if these bear interest on the subject at different moments.

As from this framework, it shall be possible, in future works, to model and build CoP's encompassing the CoP management functionalities and their evolution through the lifecycle. It is aimed, through project extension, include the utilization of Onthologies for the definition of the Domains of Interest in order to define a widely-reliable basis in the identification of the domains, and the adding up of text Mining Mechanisms in searches to improve the performance and reliability of the results presented.

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Notes

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