Towards a Knowledge Sharing Mechanism via Digital Networks guided by Communities of Practice and Knowledge Mapping: case of ATM Mobilis

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Abstract—with the advent of an economy knowledge-based, the communities of practice (CoPs) constitute for companies interesting structures order to achieve and share their knowledge. Moreover, knowledge / skills mapping (KMap) is seen as a way to improve the sharing and the use of intangible capital, represented especially by the knowledge (tacit and / or explicit), as well as a how to capture best practices in order to foster innovation and help decision making. This paper attempts to understand the knowledge / skills mapping (KMap) which is concretized by an approach to collaboration with the devolvement of communities of practice (CoPs) and devices for knowledge sharing via digital networks, in order to show the actors trades / strategic of organization the interest and importance of this discipline and to describe its possible links to knowledge management. The objective is to trace the best practices and identify devices for sharing knowledge through the digital networks more particularly which are put in place by the operator of the phone mobile ATM Mobilis (Algeria Telecom Mobile Mobilis).

Keywords—knowledge management; knowledge mapping; knowledge sharing; digital networks; collaborative networking; system decision support.

I. INTRODUCTION

In an economy increasingly based on knowledge, the importance of the production factor "knowledge" increases compared with traditional production factors, we have witnessed the emergence of numerous concepts in order to better manage knowledge (as a central resource) existing at the enterprise level. This knowledge is mainly owned by the actors of the organization and it is necessary to ensure its conservation or at least of prevent errors. Currently, we are strongly interested in the concept of communities of practice because, by definition, they constitute a place to exchange and knowledge sharing more and more useful or even indispensable for companies. Lave and Wenger [13] have defined the CoP as a group of people who come together to share common interests and goals, with the aim of sharing information, developing knowledge and developing themselves both personally and professionally. Furthermore, a CoP is not just a network of connections between people, e.g., a group of people who work in the same building. CoP membership is based on a commitment to the domain of interest and also a shared expertise in that domain.

However, our bibliographic research showed that there are very few works which are dedicated explicitly to the process of knowledge creation within the communities of practice. Communities of Practice (CoPs) [13]; [5]; [6]; [7] are an area of constant study and analysis. Such interest concerns the methods of creation, functioning and management of knowledge in social communities [5]. According to Etty [31], the community of practice is a learning space where both the tacit and explicit dimensions of knowledge are intertwined and developed further. Indeed, Nonaka [12] has developed a framework for knowledge sharing and knowledge creation. New knowledge is created through different modes of knowledge conversion. These modes of conversion are socialization, externalization, combination and internalization and they take place in different forms of interaction across either knowledge management or knowledge mapping.

Proceeding from this observation, we were interested in this paper to bring lighting through of questioning on this emerging concept "community of practice" which constitutes a subject relatively related to knowledge management, which is currently experiencing a resurgence of interest. To this effect, a series of interrogations guided us to lead off our research work: What communities of practice mean? How is realized the process of knowledge sharing in a community of practice? What is meant by knowledge? What does knowledge management and knowledge mapping? What are mechanisms for knowledge sharing via digital networks? Why the communities of practice to ATM Mobilis? With what tools and what methods the company (ATM Mobilis) assures the sharing of practices and knowledge?

Our study wishes to bring answer elements to the overall of these questions within the development of collective model knowledge sharing. This analytical model has indeed guided by a grid used during our investigation:

- Studying and show importance and interest of knowledge / skills mapping (kmap) for trades of actors;

- Detect the practices of informative watch and identify devices of knowledge sharing via digital networks and expressed needs;

- Check if the notions of Communities of Practice (CoPs), Knowledge Mapping (kmap) and Knowledge Sharing are genuinely a current preoccupation and well anchored in the professional practices and daily to the ATM Mobilis;

- Studying through a survey carried practices and mechanisms of knowledge sharing via digital networks guided by CoPs and kmap to service of ATM Mobilis.

The overall of study articulates on a willingness for understanding of this new thematic of knowledge sharing guided by communities of practice and by knowledge mapping projected by the revolution in technology of information and communication (ICT) our aim is to improve operational level who these techniques can help for innovation in company. Finally, we conclude summarizing our work and indicating the limits of our approach as well as research prospects.

II. TEORETICAL FRAMING

This section deals with the main concepts that are employed in this article regarding to context and elements.

A. Context and Elements of the management and mapping of knowledge (kmap)

In the literature, knowledge management is becoming a prime necessity for firms to be competitive in knowledge driven markets. According to Handzic and Durmic [24], Knowledge management (KM) involves collecting, organizing, and distributing knowledge that is accumulated over a period of time for the purposes of improving and increasing a company's competitive edge. On the other side, Knowledge Management (KM) is a cyclic process with a set of activities, techniques and practices that will simplify the process of capturing, creating, storing, distributing and sharing tacit and explicit knowledge [2]. Indeed, tacit/explicit knowledge management is extremely rich and dynamic: It has become necessary to model them. This modeling is to transform large amounts of data, from interviews with experts and searching documents in multiple repositories related to business activities [14], [15]. To this end, a multitude of tools and methods exist for knowledge discovery in data, expert interviews and/or reference materials. These methods are classified into two categories: explicit methods (capitalization) and methods for automatically extracting knowledge [213] (Fig 1)
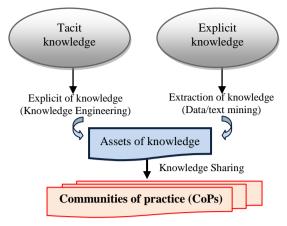

Fig. 1.   Explicit and Sharing knowledge

Moreover, knowledge mapping, which is considered as a method of knowledge elicitation, aims to showcase of the trade's critical knowledge of the company [22]. Similarly, it allows for the indication of the importance of knowledge that is at risk of being lost and that must be preserved [23]. Among the problems open from the knowledge mapping, include notably research dynamic of knowledge domains decisional in a knowledge map that is becoming increasingly complex, due to several parameters (number of domains, criteria and degrees of criticality) thereby the evolution of knowledge maps exploiting other sources of enterprise data. Then, it does not allow formalize the data and information in real time. For this, the generalization of the extraction process of knowledge on all available knowledge in the organization (Database, reference documents, enterprise portal) is desirable and possible by the use the data mining techniques [21;22;23].

B. Definition and Common Characteristics of Communities of Practice(CoPs)

Lave and Wenger [13] have defined the CoP as a group of people who come together to share common interests and goals, with the aim of sharing information, developing knowledge and developing themselves both personally and professionally. In addition, Wenger [5] confirmed that community of practice (CoP) defines itself along three dimensions – what it is about, how it functions and what capability it has produced (see table 1).

TABLE I.   THREE DIMENSIONS OF A COMMUNITY OF PRACTICE (WENGER 1998)

Dimension	Description
What it is about	*Joint enterprise* as understood and continually renegotiated by its members
How it functions	*Mutual engagement* that binds members together into a social entity
What capability it has produced	The *shared repertoire* of communal resources (routines, sensibilities, artefacts, vocabulary, styles etc) that members have developed over time

The joint enterprise, mutual engagement and shared repertoire that Wenger [5] identifies are common across all Communities of Practice. These indicators provide coherent criteria for evaluating communities of practice studies and detecting lack of rigor about a CoP. Furthermore, Preece [16]

have described online communities as consisting of people, shared purpose, policies, and computer systems which diminish members' concerns of location and time. CoPs are self-organizing systems whose methods of interaction, rules, issues and lifespan are determined by members, based on the intrinsic value that membership brings [26]. They pursue a shared learning agenda and they create value for their members and stakeholders through developing and spreading new knowledge, practices, capabilities and organizational capacity. They create knowledge networks across professional and hierarchical boundaries, and access the intelligence that is everywhere in the system [10]. Although knowledge within CoPs has gained increasing popularity in managerial literature, the management side of knowledge has been less discussed [7]. According to Joanne [31], the role of communities in the process of learning and knowledge generation has attracted much attention in the context of intra and inter organizational knowledge transfer. Moreover, Communities of practice have become increasingly utilized by organizations as a means of improving performance [8; 36]. In closing, communities of practice can be defined by Al-ghamdia and Al-ghamdib [9] as: "Groups of professionals brought together by shared goals and common concerns regarding participation, exchange, trading, organizing and management of their tacit and explicit knowledge in order to improve their professional performance, as well as the performance of their organizations as a whole. Joshi and Bhardwaj [17] have studied of women involvement in the water and forest management in lesser Himalayan region of Nainital District, India and provides insights into the characteristics of Communities of Practice (CoPs) prevailing in the hill women community for water and forest management of the region.

C. Knowledge sharing and knowledge transfer

In order for that knowledge to create value, it must be shared. The companies may play an important role in process of knowledge generation and transfer, dissemination by establishing necessary collaborative infrastructure to support production development, and collaboration between actors of trades and managers of companies. We have seen in the related work of Knowledge Management that Information and knowledge are critical components of company decision-making, strategic management, regulation, training, innovation and risk management in general. In the early days, knowledge sharing and knowledge transfer were done through passing on of a family secret formula from one generation to another to make unique product. Thus, knowledge can be seen as a source of competitive advantage for many years. For Langley [19], knowledge transfer is embedded in the culture of the effective organizations because they are significantly more likely to value the knowledge transfer processes that are in place.

The author adds that the steps of the Knowledge Transfer Life Cycle [19]:

- Identifying: Determine what knowledge needs to be transferred;
- Capturing: Accumulate the essential knowledge that needs to be transferred ;

- Sharing: Establish methods for transferring the knowledge;
- Applying: Use the knowledge that is transferred;
- Assessing: Evaluate the benefits of the knowledge that is transferred.

According to Järvis and Tint [25], Knowledge transfer focuses on structural capital and the transformation of individual knowledge to group or organizational knowledge, which becomes built into processes, products, and services. Knowledge sharing focuses on human capital and the interaction of individuals. Knowledge transfer includes transfer knowledge at higher level in organization, for instance, group, units, and departments [18].

According to Ryu, Ho and Han [37], knowledge sharing is a people-to people process to exchange knowledge. For an organization, it is very important to have employees, who are willing to share knowledge and are motivated to do this. Christensen [28] determines knowledge sharing as a process of identifying existing knowledge in order to transfer and apply this knowledge to solve common problems in an organization; or a process of creating new knowledge by combining existing knowledge. Cambrera and Cambrera [3] argue that knowledge sharing is a main element in an organization, without it a company could not reach their goals and competitiveness. Likewise, the cost of sharing knowledge is based on a cost of realizing the sharing process (for instance, providing tools, documentation, group meetings etc.).

To summarize, knowledge sharing could be viewed from different perspective, which gives wide understanding of this process. To do an effective knowledge sharing, several factors should be viewed. Likewise, to facilitate knowledge sharing, KM must understand the requirements of the users, as well as the complexities and potential problems with managing knowledge and knowledge sources. Very broadly speaking, the companies must foster a knowledge sharing culture that ensures that these investments are fully utilized.

D. Digital Networks

In the broad sense, a social network refers a set of actors and relationships that they maintain among themselves. Indeed, social networks are playing since long an important role in research on the organizations, especially in the study of professional careers (job search, career, and mobility) [39], of organizational learning [40], of innovation and the access to knowledge or information strategic. According to the great terminological dictionary defines the digital network as a "network in which information, analog or digital, are transmitted by digital links". For the International Telecommunication Union (ITU) has defined ISDN (Integrated Services Digital Network) technology as a network providing digital connectivity from end to end with a wide variety of services.

Furthermore, Reagans and McEvily [33], network structure can affect knowledge transfer independent of the effects of common knowledge and tie strength. Network-based models of social capital emphasize the importance of cohesion

and range. The authors have cited that Ingram and Roberts [30] have described how dense friendship networks affected the performance of Sydney hotels. Hotel managers embedded in friendship networks (i.e., managers connected to each other through a dense web of third-party friendship ties) shared customers and best practices, which increased the profitability of their hotels. Reagans and Zuckerman [34] also inferred knowledge transfer from the association between network structure and organizational performance. In their analysis of corporate research and development teams, the authors described how interactions among scientists with non-overlapping networks outside of their team improved productivity. In contrast, Harrison and Hu [1] have cited a approach named Social network analysis of Wasserman and Faust [35] useful for describing the mechanisms through which knowledge is transferred between individuals. A key advantage of using this approach is the ability to examine relationships between individual actors and clusters of actors within a predefined group, like an organization. Bebensee et. Al, [39] argues that online social networks are changing the way individuals share knowledge. These networks, by means of Web 2.0 features, are relevant to processes of knowledge management such as the acquisition, creation and transfer of knowledge [4]. Likewise, digital social networks have the potential to affect significantly the innovative capacity of organizations. Information, knowledge and sources of knowledge troll these networks potentially generating new understanding [4].

En closing, the transfer of knowledge within a network is dependent upon the characteristics of a series of dyadic relationships [1].

III. Research Methodology

A. The method: A case study

In the framework of the research wearing on a knowledge sharing mechanism via digital networks guided by communities of practice (CoP) and knowledge capitalization, we base our choice on two working methods: the *content analysis* and *the inquiry* with an *analysis grid*.

In the content analysis, it's about of a bibliographical study constituted an analytical or critical reading of the reference documents, strategy, quality or the documents on the referential of competences of the ATM Mobilis available in order to identify elements that could help us better understand the problematic and the fundamental concepts of our research work. Moreover, we have completed our methodological approach by researching the web (Intranet and Company Portal) grace to which we have able to structure the literature review in order to draw the history of best practices and lessons learned. This task requires an important analytical capacity. Likewise, the other Information sources include documentation on the organization of its communities of practice that we have collected on the Intranet network (Company Portal, Forum, etc...).

The field survey method has been chosen in order to meet the interlocutors, such as unit managers or the members of the executive committee, faced with the problems the

communities of practice and mechanisms of knowledge sharing from day to day; understand the way of which they apprehend and consider the tools and the resources implemented. This survey was consolidated with a few actors of strategy of the ATM Mobilis. It consisted before any into the presentation of knowledge mapping and the communities of practice; are coming afterwards the description of the practice and knowledge networks implemented and finally the analysis of the organization the communities of practice to ATM Mobilis.

It seemed to us useful later to engage in an analysis to the Appendix of the ATM Mobilis of the Oran city through a field survey on the knowledge sharing diagnosis; the needs and practices of the actors of trades and the existing potential in terms of communities of practice and the level of use of computer tools. This has necessitated the preparation of a questionnaire and an analysis structure. The results of this survey are rendered in graphic form, especially in the form a radar diagram (Diagram of Kiviat). A balance sheet of the conclusions concerning on the syntheses carried assorted of the proposals completes the second part of the relative study on the practical application of the capitalization of knowledge to the ATM Mobilis.

In this context, we have proposed a know-how map representation (inspired by Mind map in a process driven logic) and a data collection technique adapted to the interviewees' profile. The data collection was carried out on a period of 5 months from January 2015 to May 2015, based on a series of semi-directive interviews with a number of senior executives of the ATM Mobilis and the Regulatory Authority for Post and Telecommunications, complemented by a thorough exploitation of reference documents which was provided to us.

The data gathered on the ground guided us in the construction of our knowledge mapping, which we briefly describe in two major steps; 1) Building the process Know-how map using the principal of BKMDM (Boolean Knowledge Mapping guided by Data Mining) method and 2) Assessing the process know-how map by interviewing the trade's actors according to the criticality grid defined by the Knowledge Management Club.
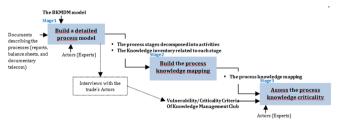

Fig. 2. *The major stages of the critical knowledge modelling approach guided by BKMDM Method*

For this, each criterion is evaluated on a level scale from 1 to 4. The levels of each criterion are carefully described and presented to the interviewee. This systematic approach is certainly useful in facilitating the evaluation exercise. Nevertheless, it requires a high level of professionalization

and abstraction on the part of the interviewees, which is a not so obvious condition to satisfy for our case study. For instance, knowledge with high criticality according to the criterion "Difficulty in identifying sources" and "Difficulty using knowledge" advocates expertise localization through the identification of the experts holding this critical knowledge and use of this knowledge at the company level.

Finally, this building of knowledge mapping (See figure 2) helps us to start the second phase of our project which is the diagnosis of information and knowledge sharing, the attitudes to teamwork, and the participation in communities of practice.
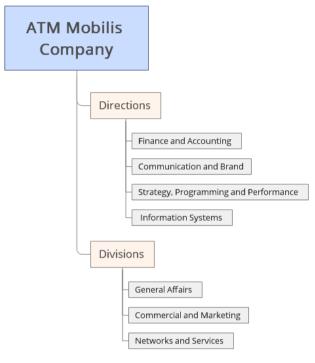

Fig. 3. *The knowledge mapping of the principal divisions and directions to the ATM Mobilis*

We have defined a research protocol approach combining to both qualitative and quantitative [20]. Remember that at this step several tools collection of data has been used.

In qualitative terms, a sample was organized aimed about thirty experts (actors of trades and strategies) of the ATM Mobilis on an effective of the quarantine, is a participation rate of 86.6%. Note that our survey, an analysis grid listing the principal themes to be addressed especially the diagnosis of knowledge sharing, the needs and practices in information of the actors of trades, the existing potential in terms of virtual community and the use of computer tools has been developed in order to able to direct the interviews with respondents.

In quantitative terms, research was based on a grid of 20 surveys of which 10 relate to the diagnosis of the knowledge sharing, 4 on the needs and practices information of the actors of trades and 6 on the existing potential in terms of virtual communities and the level of utilization of the computer tools.

Finally, we found it useful to note that in all of the field survey carried out, the chosen approach is an approach more of the qualitative type than quantitative which aims to draw some findings which will serve to illustrate a certain number of working hypotheses compared to the understanding of the knowledge capitalization and the knowledge transfer mechanisms.

The communities of practice of the ATM Mobilis it possible to ensure the development increased of all thematics responsibilities and operational of the organization and aimed at ensuring that actors of trades be able to build on the capabilities and expertise available within the organization a view to exchanging, sharing of knowledge and experiences, identify practical solutions agreeing to the different situations of the directions.late as follows. The compilation and use of collective experience in terms practices constitute an important part of the implementation of a culture of practice within the ATM Mobilis and the construction of organization based on the knowledge. This process allows the actors of trades to use so as more effectively the knowledge of the organization through access to a knowledge document center at the national scale (in all city of Algeria).

The knowledge / skills map in terms of practice and information sources to this end a tool which has been designed to transfer some attributes of tacit or explicit knowledge in graphic form readily understandable by end users (managers, experts, engineers, etc.). The data collection, the construction of the map and evaluating different knowledge domains (know-how trades) are based on a work of extraction of expert knowledge. At this level, the focus is now placed on substantive capabilities or of the information. This knowledge / skills mapping based on the creation and development of communities of practice to the ATM Mobilis in order to be able to search and identify experts, developers and practitioners possessing internal information sources of being used for different initiatives and also to identify the domains in which the ATM Mobilis intends to strengthen its capabilities. The expected benefits may be, for example, the encouragement of each actors of trades at obtain an appropriate level of information, the knowledge and the experience on the practical and the knowledge share with persons are located on the inside and outside of the ATM Mobilis.

Finally, we present the results of the survey conducted among of the actors of trades of the ATM Mobilis. In the three themes of the survey conducted on field, namely the diagnosis of the knowledge sharing mapped, needs and practices in information of the actors and the existing potential in terms for virtual communities and the level of use of computer tools:

- Develop a pedagogy of digital uses in confidence around a public awareness program to the stakes Faced with the collaboration and exchange of information, we notice through the field survey that over half of the respondents in the directions in the proportion of 66.23% (12 on 20) make appeal more to their immediate colleagues to solve a problem professional in their daily activities being based on the knowledge / skills mapped. In addition, we also find that 61.53% of respondents (10 on 20) believe that they have quite often or always of the time for exchanging information

with colleagues. What appears a fact positive 30.76% say they have sometimes or enough often of the time to spend with their colleagues against 7.69% only who declare that they had never or have rarely;

- Faced with the participation in communities of practice, we find that the data related to the knowledge of participants on the existence of communities of practice to the ATM Mobilis show that the set of respondents are aware of their existence either 20 on 20 (100%) but paradoxically little have adhered to at least one of the networks of practice and knowledge either 15 on 20 (42.30%). Note that the evaluation of communities of practice by the participants in these activities was measured by a question very global on the degree of satisfaction related to their participation;

- Faced with the use of permanent manner of computer tools which is one of the highlights of the ATM Mobilis. This is felt to through the results on the question pertaining to the permanent access to a computer and to the Internet. To this effect, we find that all respondents, either 100%, have access to a computer, to the Internet and to the Intranet: This facilitates things for information exchange and knowledge sharing. The respondents have also to pronounce on the tools used to share and exchange information with colleagues. In fact, we remark that a large majority considers the phone, the email, the discussion forums, the company portal and the intranet as the most prized tools successively in the proportion of 96.15% (19 on 20) while the internal information bulletin and video conferencing come in 2nd positions. Consequentially upon our previous objective, we have also wanted to know whether respondents had an adequate training level for the use of computer tools advanced; we find that 92% of respondents (18 on 20) assert to have followed an internal and external training on the use of these tools. Indeed, The ATM Mobilis has organized online training courses for intended all its actors of trades for an upgrade of advanced computer (Soft and Hard) and ICT (see figure 3).
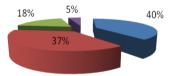

Fig. 4.   Attitudes about the cooperation and information exchange

Finally, the risk management of a project requires to capitalize the know-how and the experience gained and to establish rigorous documentation about risks associated with the project (see figure 4).
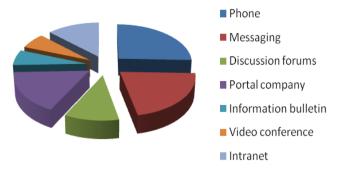

Fig. 5. *Tools used for knowledge sharing*

IV. Conclusion

This paper is an attempt to comprehension of a new thematic into emerging: knowledge Mapping (kmap) which is concretized in its approach to Collaboration by the establishment the communities of practice (CoPs) and the knowledge sharing devices via digital networks, in order to show to the actors trades of the ATM Mobilis telephony operator in Algeria, interest and importance of this discipline and describes its potential links with knowledge management. Our study has demonstrated clearly that communities of practice (CoPs) and knowledge mapping (kmap) are a veritable environment of sharing and exchange between professionals of a given domain via digital networks. More precise manner, they present the advantage to take over a large share of fixed costs inevitably associated with the need to build and exchange knowledge in conditions of often more effective and less costly than the classic institutional mechanisms.

Finally, our study opens the way on future research such as the creation of an information watch cell, the conception and the organization of a knowledge base across the communities of practice guided by the extraction of new knowledge from data and / or text (data mining & text mining) and the creation of a virtual information center for ATM Mobilis.

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