



Knowledge creation and management networks: agents and processes*



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| Presented: 10/10/2013 | Accepted: 20/11/2013 | Published: 20/12/2013

Abstract

The purpose of this article is to define the functions and roles of key actors and processes involved in the knowledge creation and management network from a virtual platform. The research process has mainly involved the implementation of 5 KCM networks from a virtual platform focused in the debate; together with a self-diagnostic questionnaire, in-depth interviews, seminars with experts, 1 field journal and the literature review. The results focus on the functions and roles of actors and processes and some proposals are suggested to improve the efficiency.

Key words: knowledge management, networks, agents, processes

Resumen

El propósito de este artículo es delimitar las funciones y roles de los principales agentes y procesos que intervienen en la creación y gestión del conocimiento en red desde una plataforma virtual. El proceso de investigación seguido ha supuesto la puesta en marcha de 5 redes de CGC desde una plataforma virtual sostenida en el debate; también un trabajo de campo con cuestionarios de autodiagnóstico, entrevistas en profundidad, seminarios con expertos, un diario de campo y el análisis bibliográfico. Los resultados llaman la atención sobre las funciones y roles de los agentes y procesos y concretan algunas propuestas para mejorar su eficiencia.

Palabras clave: gestión del conocimiento, redes, agentes, procesos

Resum

El propòsit d'aquest article és delimitar les funcions i rols dels principals agents i processos que intervenen a la creació i gestió del coneixement en xarxa des d'una plataforma virtual. El procés de recerca seguit ha suposat la posada en marxa de 5 xarxes de CGC des d'una plataforma virtual sostinguda en el debat; també un treball de camp amb qüestionaris d'autodiagnòstic, entrevistes en profunditat, seminaris amb experts, un diari de camp i l'anàlisi bibliogràfic. Els resultats criden l'atenció sobre les funcions i rols dels agents i processos i concreten algunes propostes per a millorar la seva eficiència.

Paraules clau: gestió del coneixement, xarxes, agents, processos

* The approach, development and data used here belong to the research *Agents and processes in knowledge management networks*, funded by the Ministry of Education and Science (Spain), DG Research, National R + D + I 2007-2011. Ref SEJ2007-67093/EDUC, whose principal investigator is Professor of Education at the Autonomous University of Barcelona Joaquin Gairín Sallán.



1. Introduction

The knowledge and learning society in which we now find ourselves – which has also been called postmodern, postindustrial, the digital era, liquid modernity and the information society (Drucker, 1993; European Commission, 1995; Dennis, 1996; Castells, 1997; Duch, 1998; OECD, 2000; Simone, 2001; Domínguez, 2001; Mella, 2003; Krüger, 2006; Bauman, 2007; Bernal, 2009) – is characterised by certain manifestations, some of which are linked to globalisation and the internationalisation of political, economic and social systems, the immediacy of constant change and an exponential increase in information and communications. Knowledge, in our reality, has become a valuable asset for individuals, groups, organisations and society as a whole. In this regard, attempts are being made to find ways to create, manage, monitor and distribute knowledge. It is in this spirit that highly reputed international organisations such as the United Nations (UN, 2007) or the Organisation for Economic Cooperation and Development (OECD, 2003), to name two clear examples, are showing an interest in the analysis and study of processes, techniques, tools and outcomes related to knowledge creation and management (hereinafter KCM).

Contributions to the knowledge society and references to KCM have been of special interest to various authors in recent years (Delors, 1996; Brooking, 1997; Nonaka and Takeuchi, 1999; OECD, 2000; Sveiby, 2000; Tiwana, 2002; Rodríguez, 2006; Vahondo, 2010; Yun, 2011; Artiles and Pumar, 2013; Forero, 2013; Franch, Herrera and Losada, 2013). We identify knowledge as a construct shaped by the beliefs, values, concepts, expectations and know-how that are generated, through exposure to information, within the cognitive stock of each person in a given context. From this perspective, the knowledge society, which has already surpassed the information society (European Commission, 1995; Castells, 1999; Domínguez, 2001; Crespi and Cañabate, 2010), requires different organisational structures and permanent learning strategies that will enable better development (professional and organisational) in terms of effectiveness and efficiency, both for individuals and institutions and for the intellectual capital of educational organisations. It is for this reason that appropriate and specific agents and processes are required in order to streamline operations and thus optimise online KCM.

The study (SEJ2007-67093/EDUC) on which this article is based was conducted along these lines. Its objective was to analyse the roles of the agents that make online KCM more efficient and the most appropriate processes for its development. It therefore focused on online KCM processes with intensive use of virtual tools within the framework of lifelong learning in educational organisations (CIEDO, 2012). This article has the following specific objectives: a) identify the main functions and roles of the agents involved in online KCM; b) define the key processes; and c) formulate concrete proposals to improve its efficiency.

The study and analysis of these elements brings to light significant progress in the pedagogical foundations of educational models and in the creation of virtual platforms to support online KCM processes. This article goes beyond the study of functionality and the mere participation of people in forums, chats, wikis or other virtual tools (Marcelo and Perera, 2004; Gairín, 2011). It aims to examine the practical and applied dimension of agents and processes related to KCM online and on virtual platforms.

2. Context and research design

The study, as noted in the introduction, analysed the roles of people and processes in KCM through the collaborative processes that use the Internet regularly to channel interactions. This article looks at some of the most significant results of this study, and defines online KCM agents and processes as well as proposals for improving their efficiency.

The *research process* entailed the design and development of a virtual platform on which to set up five KCM networks. Internal training for the moderators and administrators of these networks was provided (on how to orchestrate and stimulate online KCM) as well as a manual with guidelines on how best to perform their roles. The thematic content of these networks focused on several areas: the institutional image of educational centres, educational management, research, pedagogical studies and the role of management teams. From a technological point of view, the relationships between the members of the e-community (comprising the five KCM networks), were established via an open source LCMS (*Learning Content Management System*), namely Moodle, which allowed the requirements of online KCM to be met.

The research process subsequently focused on the operational identification and characterisation of the main agents and key processes involved in online KCM. Thus, on one hand, the desirable operating modes of the agents were defined, noting the roles, functions and strategies to be used; and on the other hand, the operational processes were described in detail, the importance and necessity of which depended on the circumstances, objectives and topics that were being looked at. For this reason, in the implementation of each of the five networks consideration was given to an online KCM model around whose central axis the discussion revolved. The discussion thus became the strategy from which processes of combination, socialisation, externalisation and internalisation of knowledge were generated. This then produced a record of the discussions (diachronic record), a formal document that reflected what happened in the interactions and discussions that were generated. The discussions were developed through tools such as forums, chats and wikis. To stimulate the discussions, documents of interest, bibliographic and webographic references, examples, best practices, experiences and ideas were provided to make them more dynamic and systematic. These external contributions became supplementary aids and resources and were not only provided by the moderators and knowledge managers, but also by the network participants (users).

The research process was completed by fieldwork, in which various instruments and techniques were applied to collect information. The instruments used, the people involved – directly and indirectly – in the networks, the functionality of these networks, and the factors to consider for better efficiency of online KCM are outlined below.

The *instruments* used in the fieldwork included: a) a self-diagnostic questionnaire aimed at organisational development specialists and managers to identify and locate organisational knowledge; b) in-depth interviews with knowledge managers and moderators on the functioning and development of the KCM networks; c) two discussion seminars with experts, to establish indicators for conditions governing commencement, development and outcomes in online KCM; d) a field journal for the networks and user participation; e) and a literature review. The design and appli-

cation of the instruments were oriented towards gathering information related to the theoretical foundations and pedagogical approach to online KCM (areas such as knowledge, intellectual capital, organisational culture, development and learning, KCM, virtual communities, etc.), the pedagogical features of online KCM (conditions that favour it, requirements, main participants, technologies implemented and their performance, etc.) and the utility, relevance and importance of KCM networks for learning – individual and organisational – and the ongoing training of the professionals involved (García del Dujo, 2009). Of particular interest was the following information about the processes involved in online KCM: the type of communication generated, levels of participation and involvement, cohesion amongst network members and motivation (Fuentes and Muñoz, 2011). In this way, a more in-depth understanding of competing circumstances in improved development of online KCM processes could be attained.

The *sample* of participants was assigned to the five KCM networks, between 25 and 30 to each. The participants were mainly managers and experts in organisational development, KCM network managers (promoters, institutional managers and IT staff), experts in KCM theory and practice and the use of virtual platforms (forums, chats and wikis), university teachers, primary and secondary school teachers and undergraduate and graduate students from degrees in the field of educational sciences. The sample was selected by non-representative, quota, non-probability sampling. For the purposes of the fieldwork, 15 organisational development specialists and managers completed the self-diagnostic questionnaire (three for each of the five networks); 10 knowledge moderators and managers took part in the interviews; and around 20 experts attended each of the two seminars.

With regard to the process of *information gathering and analysis*, it should be noted that the knowledge generated in and from the network participants was organised and structured through the knowledge manager of each of the networks. This knowledge results in most cases in final contributions such as articles, best practices, experiences, tools, references, etc. (Gairín, 2011; Rodríguez-Gómez, Armengol, Fuentes and Muñoz, 2011), which serve to disseminate and share knowledge and lay the groundwork for future networks. The contributions of the network participants were summarised periodically and submitted to the participating groups for approval. The approved summaries would thus be established as benchmarks and final contributions from the work undertaken in the networks. In short, the process followed in each KCM network consisted of: a) defining a concept and its features (e.g. the institutional image of educational centres); b) showing real situations where the problem under analysis is clear or debatable; c) providing tools for diagnosing situations; d) collecting evidence of the practical utility of alternatives; and e) obtaining results and drawing conclusions. There was a further possibility of participants carrying out impact assessments, adding new ways of contributing or defining new problems to be dealt with. With respect to the fieldwork conducted through questionnaires, interviews and seminars, the information was processed through the identification of agreements, divergences, valuations and proposals supplied by the respondents to each of the elements being analysed.

3. The main agents and processes in online KCM

Triangulation of the research and fieldwork results, the general characteristics of which are described in the previous section, point to the efficiency of the process in stimulating and promoting online KCM. However, differing behaviour across the different networks showed that improvement of this efficiency was due primarily to the agents and processes involved in online KCM. For this reason, we have outlined the main agents and processes in online KCM in line with the results of the study.

Firstly, in accordance with Figure 1, the results show a high degree of agreement amongst all the respondents that an optimal functioning of online KCM requires the involvement of at least five key agents (institutional manager, network promoter, IT manager, knowledge manager and participant) with distinct and specific functions, profiles, participation levels and roles. At the same time, there is convergence on the view that online KCM must go through the various processes of planning, development and dissemination. In this regard, the participation of the agents differs when considered in relation to each of the processes for improving the efficiency of online KCM, as summarised below.

Thus we can determine, taking into account the ideogram in Figure 1, the need and importance of integrating all the agents involved in online KCM and throughout all the processes considered, based on an interdisciplinary approach of recognition and complementarity between the different profiles that may be generated within an online KCM network.

3.1. The agents

The work of Liebowitz (1999), Davenport and Prusak (2001), Collison and Parcell (2003), Al-Hawamdeh

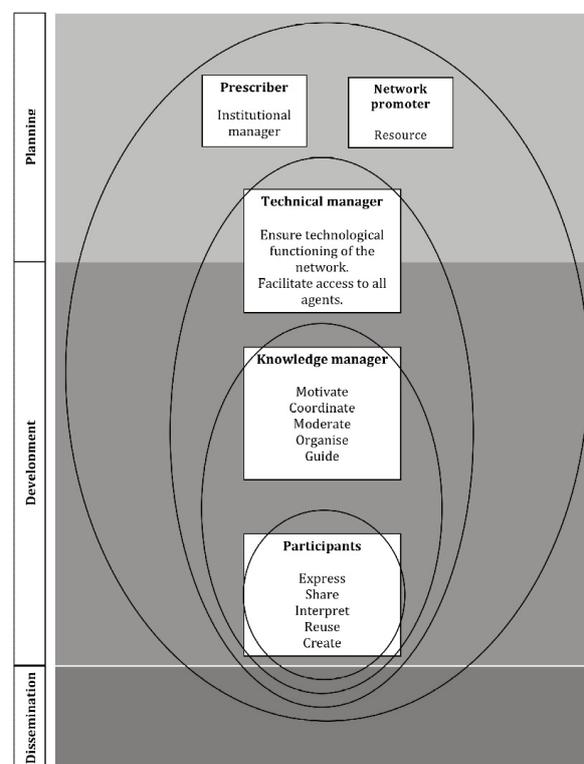


Figure 1. Agents and processes involved in online KCM (based on Rodríguez-Gómez, Armengol, Fuentes and Muñoz, 2011).

Agent	Definition and participation
Participants	Function: to generate knowledge from the online discussion. Profile: constructor. Participation spaces: forum, chat, wiki, etc. Roles: social and intellectual.
Knowledge manager	Function: to promote, manage and organise knowledge. Profile: moderator. Participation spaces: forum, chat, wiki, etc. Roles: organisational, social and intellectual.
IT manager	Function: to organise and manage the technical aspects of the network. Profile: technologist (network administrator and manager). Participation spaces: platform. Roles: organisational and technical.
Network promoter	Function: to meet the demand. Profile: owner of the network and its resources. Participation spaces: outside and inside the network. Roles: organisational, social and intellectual.
Institutional manager	Function: to detect needs and make requests. Profile: prescriber. Participation spaces: outside and, optionally, inside the network. Roles: organisational and intellectual.

Table 1. Characteristics of the main agents involved in online KCM (based on Rodríguez-Gómez, Armengol, Fuentes and Muñoz, 2011).

(2003), CEN (2004), De Tena (2004), Gallego and Ongallo (2004), Gorelick, Milton and April (2004), Wiig (2004), Dalkir (2005), Milton (2005), Frappaolo (2006), Petrides and Nguyen (2006), Firestone (2008), Rodríguez-Gómez (2009) and Cobo (2010), among others, on the agents involved in online KCM, their profiles, roles and functions, determine up to five key agents in online KCM: prescriber, network owner, IT manager, knowledge manager and participant.

The functions performed by these agents may vary according to the profiles assigned and the roles to be acquired, which may, basically, be organisational, technical, intellectual and social, as summarised in Table 1 and looked at in further detail below.

Participants should communicate and establish a rewarding dialogue that promotes the exchange of information based on certain criteria set by the knowledge manager. Their contributions should generate new information relevant to joint and collective knowledge building. Their online interaction should focus on the expression of ideas, the formulation of questions, discussions on different alternative themes, the contribution of pertinent material and documentation, reflections on proposed discussion topics and their practical application. They should share personal or familiar experiences, reviews and criticism of works, doubts, successes and difficulties, etc. The participants, who may be various according to the purpose of the network, should read and share what their colleagues publish and adopt a proactive stance with contributions that lead to the construction of knowledge.

The *knowledge managers* are experts on the subject, as well as designers and moderators (Gairín, Rodríguez and Armengol, 2010), whose functions include planning, guiding, organising, suggesting, encouraging, observing, facilitating, prompting, redirecting, integrating, etc. (Gairín and García, 2006). They play an important role in the motivation of participants (Fuentes and Muñoz, 2011), in promoting socialisation (Revuelta, 2012) and generating a culture that is conducive to autonomy and self-reg-

ulation in the group of participants. In other words, they should encourage improvement in the quality of online KCM and continuity. They should also coordinate and organise interaction between the participants; make suggestions aimed at initiating and linking discussions (e.g. via brief recaps or summaries); guide and enhance discussions (e.g. propose activities, contribute materials, analyse interventions or search for documents); make sure the discussion is productive for the KCM network and its participants; ensure that all members participate with useful, high-quality interven-

tions; redirect the discussion; and conclude, systematise and synthesise the issues addressed.

The *IT managers* participate in the design of virtual navigation tools that enable effective online navigation. They are also involved in the design of user-targeted interaction tools that are simple, easy to use, functional and practical, consistent with standards of usability, accessibility and security. Their purpose is to contribute to the development of fast networks, supervising their image and presentation. Once the design has been completed, they should ensure the network is implemented and administrated through the virtual platform. They should make sure it functions correctly, provide support to the participants, carry out monitoring and maintenance of the network, work closely with the knowledge manager and create technical manuals if necessary. At the same time they should help draw up quality criteria (relevance, focus, accuracy, completeness, reliability, punctuality, detail, format and comprehensibility) for more effective and efficient communication.

The *promoters* are the owners of the network and associated resources. They propose online KCM to institutions as a means to professional and institutional improvement. This requires that they meet specific demands starting from initial diagnoses and culminating in specific proposals for intervention – personalised and well-coordinated – under their leadership.

The *institutional managers* are the network prescribers and should therefore focus on continuous institutional promotion and improvement based on quality criteria. They commission the promoter to execute organisational and cultural diagnoses in order to introduce the necessary modifications that will benefit online KCM in the institution they represent.

In addition to these considerations and requirements, it should be borne in mind that the size of the groups, the number of participants, the forms of participation, and the distribution of the roles and responsibilities of all the agents will directly affect the success of the online KCM. In particular, special attention should be paid to, amongst others: the

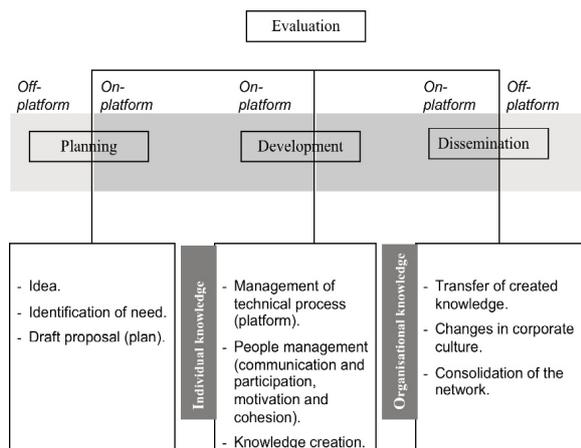


Figure 2. Main phases in online KCM (based on Rodríguez-Gómez, Armengol, Fuentes and Muñoz, 2011).

full range of aptitudes and attitudes that each of the agents possess; the planning, categorisation and distribution of tasks; the monitoring of interactions as the basis of the communication system; the ethics and governance of the network; the type of structures that govern content flow organisation and management.

3.2. The processes involved

The contributions of Polanyi (1967 and 1983), Nonaka and Takeuchi (1999), Sveiby (2000), Hislop (2005), Firestone and McElroy (2003) and Frappaolo (2006) on knowledge building and the pathways, phases, moments and processes involved in the management of shared knowledge, as well as those of North (2001) and Tissen, Andriessen and

Lekanne (2000), are highly relevant in determining the main processes in online KCM.

The approach most widely endorsed by these authors, and one with which we concur in the light of the results, is that which includes social agents, processes and initiatives in online KCM. In this way, the lifecycle of the KCM network may be organised around three broad phases (Figure 2): planning, development and dissemination. Each maintains links and feedback with the others in an inter-phase and intra-phase spiral process. The knowledge production process is thus constantly evaluated and regulated to improve the effectiveness and efficiency of the KCM network.

In the first phase of planning, the agents that intervene are the network promoter and the institutional manager, who identify the need and agree on a proposal for the KCM network. Both interact with the knowledge manager and the IT manager to develop an action plan and to identify the technological resources needed. These four agents thus contribute to the design of the network, virtual platform, training and management of the group and the dissemination of results. The participants are not involved until the second phase, as key agents in the development of the KCM network. The relationship between agents and processes for optimal development of the KCM network, together with the corresponding actions, is illustrated in summary form in Table 2.

3.2.1. Planning

Planning includes organisational and cultural diagnosis and the detection and prioritisation of needs. This first phase originates with an idea to be contrasted with the existing knowledge map in the organisation and which may be complemented by additional contributions from participants in the development phase.

PROCESSES AGENTS	Planning Beginning	Development Execution	Dissemination Close
Participants		Network access and contribution to knowledge creation.	Self- and co-assessment. Day-to-day practical application of the knowledge generated.
Knowledge Manager	Incorporation into the team. Process planning and platform design.	Management of group and knowledge.	Organisation and structuring of knowledge generated. Assessment report. Continuity proposal.
IT manager	Incorporation into the team. Process planning and platform design. Preparation of technological resources selected for the KCM network.	Technical administration of the group.	Report on technical strengths and weaknesses of the network, improvement proposals.
Promoter	Organisational and cultural diagnosis leading to intervention proposal. Team building and assignment of responsibilities. Designation of knowledge manager and technical manager. Approval of design and planning.	Monitoring.	Final evaluation. Dissemination of results. Exploitation of the knowledge generated.
Prescriber	Detection of need. Approval of the proposal. Approval of design and planning.	Monitoring.	Analysis and dissemination of results. Impact assessment. Exploitation of the knowledge generated. Institutionalisation of experience.

Table 2. Processes, agents and actions involved in online KCM (from Rodríguez-Gómez, Armengol, Fuentes and Muñoz: 2011). Legend: Greyscale according to the degree of participation in each of the phases.

Once the organisational structure has been evaluated and the strengths and weaknesses identified, design of the virtual platform for hosting the KCM network begins. The first step is to set up the team – internal and external – to design and develop the online KCM process. Its members, which should include the knowledge manager and the technical manager, have to work as a team and have wide knowledge of different areas (intellectual capital, technological systems, organisational learning, training, cultural change management, group dynamics, etc.). At the same time it is advisable to maintain direct contact with the prescribers and promoters.

The team plans the steps to be followed throughout the entire online KCM process, particularly in the development phase. The objectives of the process are defined at this point, and are aligned with the organisational strategy so that the online KCM system is consistent with the ideology, principles, values and objectives of the institution. The necessary resources (material, functional and human) are determined, the online KCM process is scheduled by establishing periods for the development of each of the stages, and the basic actions and dynamics of the KCM network are designed (e.g. guided discussions, scheduled online conversations, guided activities for the elicitation, socialisation, internalisation and combination of knowledge, guided or autonomous individual and/or group task statements, establishment of criteria for the creation of work teams, selection of models of best practices, proposals for analysis of cases, readings, etc.). Furthermore, the required virtual technologies (groupware, e-learning platforms, databases, blogs, wikis, repositories, messaging, social bookmarking, etc.) should be evaluated and selected, and comprehensive and ongoing evaluation systems should be determined throughout the entire process.

3.2.2. Development

The development phase includes the type of communication (characteristics, contents, processes, etc.), participation (natural or induced), cohesion amongst network members and their motivation. When this phase begins access is given to the network participants so that they may progress from tacit and personal knowledge to explicit and shared knowledge. This marks the beginning of a socialisation process in which participants share individual knowledge (relating to theory and practice, procedure, aptitude, attitude, etc.) in order to collectively contribute to the KCM network.

Through communication and participation in the network, and with the guidance of the manager, the participants will generate knowledge. The knowledge manager guides and stimulates the debate, and aids group cohesion through regular monitoring of the network and organisation of the information and knowledge that are generated by rigorous moderation. Participants contribute by sharing their experience and culture, imparting their personal knowledge, interpreting and reusing the contributions of others, reflecting together on their own beliefs and cultures, developing the information socially and formalising their shared knowledge.

An important aspect of improving the effectiveness of online KCM lies in encouraging participants to engage in a dialogue that grows as they share schemata, formulae, metaphors, analogies, documents, bibliographic references, thoughts, feelings, beliefs, models, etc. which are then

analysed, compared, categorised, interpreted, processed, criticised, reused, systematised, etc. The dialogue acquires meaning when externalisation and individual expression combines with reflection on the network, leading to the creation and internalisation of new knowledge that may be individual and/or collective and that should therefore contribute directly to professional and institutional improvement and development. In any case, the organisational knowledge that may be generated (De Arteche, 2011) should be shared and disseminated to enable, if possible, inter-organisational knowledge.

3.2.3. Dissemination

Dissemination, in the last phase of the process, is essential in organising and exploiting the knowledge generated so as to maintain and/or generate a competitive advantage for participating professionals and organisations. The completion of cycles must be accompanied by assessment reports drawn up from the viewpoint of each of the agents. This enables assessment of, inter alia, the planning (objectives, proposed tasks, timing, etc.), the development and selection of tools and virtual resources, the elicitation and gathering of information, and the agility and effectiveness of the knowledge generated.

Similarly, it is important to evaluate to what extent the benefits of online KCM will last and are likely to become a valuable asset. That is, the impact of the network on the individuals and institutions involved must be assessed, as well as the transferability of the results. The attainment of an improved online KCM model requires a process analysis (before, during and after) that considers aspects such as design, the virtual platform, the agents, communication, participation, motivation and cohesion.

If the online KCM experience is valued positively this should be institutionalised: incorporated into the standard processes of the organisation. In this way it becomes a routine that gives rise to dynamics that may lead to the creation of new KCM networks to tackle other issues, establishing support mechanisms that ensure permanence and motivating participants to explain and share their experiences and knowledge with others.

4. Proposals to improve the efficiency of online KCM

The planning, development and dissemination outlined above require the convergence, collaboration and participation of the various agents being analysed, who have to respond to the requirements that are expected of them in online KCM. This must, evidently, be done from their respective profiles and the functions assigned to them. To improve the efficiency of the agents (participants, knowledge manager, IT manager, network promoter and institutional manager) and the planning, development and dissemination processes, and in view of the triangulation of the results from the study, we have outlined some proposals below (drawing on the work of Rodríguez (2006), Rodríguez-Gómez (2009), Gairín, Rodríguez and Armengol (2010) and Gairín (2011)).

4.1. Proposals for the agents

Proposals to improve the efficiency of the *participants* (creators of knowledge): consistency in the area of intervention and the proposed objectives; participate actively in the online discussion through an exchange of constructive contributions; communicate via interventions that respect the

input of colleagues and add information; arguments for or against; contributions in the form of thoughts, questions, doubts, queries, etc. in order to further the collective construction of knowledge; transmit own knowledge and learning; follow the directions and guidelines of the knowledge manager; provide documents, bibliographic and/or webographic references; and collaborate with the IT manager in solving problems arising from the use of the virtual platform hosting the KCM network.

Proposals to improve the efficiency of the *knowledge manager* (network moderator): have guaranteed experience of the content, organising promotional activities for the KCM network; draw up the proposals resulting from the discussion in line with usability, usefulness and accessibility principles; stimulate and moderate the KCM process; guide and supervise the online discussion; encourage the involvement of the participants and their interaction; suggest activities for the KCM network, taking context into account, monitoring input and evaluating the process; help generate group cohesion; motivate participants; guide participants throughout the KCM process; resolve questions and problems swiftly and appropriately or refer them to the corresponding person; manage documents, records and communications; organise and structure the knowledge generated; make proposals for continuity; and edit the knowledge.

Proposals to improve the efficiency of the *IT manager* (ICT facilitator): keep abreast of technical advances to design the virtual platform and administer the network; develop and manage the network according to purposes and needs; ensure a functioning network and agile and fluid communication; administer the virtual platform as directed by the promoter; develop ideas for improving the virtual environment; provide technological support to participants and the knowledge manager; create guidelines for good practice in online KCM; resolve questions and problems swiftly and appropriately; monitor and maintain the technical aspects of the network; work with the knowledge manager to ensure access to all participants and resolve incidents; support the promoter in improving the image of the KCM networks and their products; suggest various ways of navigating, and organising and managing the knowledge; and update the virtual platform with required resources and contents.

Proposals to improve the efficiency of the *network promoter* (network director): propose solutions that meet the institutional needs of online KCM; maintain a context-appropriate virtual platform; facilitate and implement the online KCM process; recommend and encourage participation in KCM networks; improve the image of the KCM networks and the impact of the products generated; draw attention to the importance of online KCM and point out the advantages and disadvantages for professionals and institutions; represent and administer the KCM networks; coordinate the principal agents; assess the process and provide guidelines for its development and analysis; make concrete proposals for evaluation and improvement; direct administrative and bureaucratic functions (advertise the network, certify participation, select participants, etc.); and report to the institutional managers.

Proposals to improve the efficiency of the *institutional manager* (prescriber): detect and demonstrate the need for online KCM to the institution they represent and its professionals; lead the online KCM project; commit to online KCM

and show support in order to counter resistance to the process; remain attentive to the changing demands of the environment and the internal functioning of the networks; ensure proper incorporation of themes, participants and institutions in the KCM networks; oversee the online KCM development process on an organisational and professional level; and promote a culture of knowledge sharing based on trust, commitment and creativity.

4.2. Proposals for the processes

Proposals to improve efficiency in the *planning* processes: show consistency in the framework of intervention in which the KCM networks operate and the goals they are designed to achieve; adopt a holistic approach in considering the various agents and processes that intervene in online KCM; incorporate organisation, performance, monitoring and dissemination processes into the KCM network; demonstrate flexibility and openness by adopting appropriate changes and improvements in response to the evaluations and monitoring; plan according to context in relation to the online KCM environment (type of organisation, issues under discussion, participants, etc.); develop a comprehensive plan that is useful and adapts accordingly to resources and requirements; be capable of deliberating and innovating in order to find alternatives and make changes that improve the KCM network; plan in a reasoned and systematic manner, including time planning; take a realistic approach, deciding on actions according to the problems that need solving; and incorporate participation channels and collaboration processes that enable the democratisation of planning in the KCM network.

Proposals to improve efficiency in the *development* processes: create effective communication structures and systems for online KCM; determine the role each agent should play in the KCM network and each of the processes; implement appropriate procedures to overcome obstacles and solve problems that may arise; dedicate the necessary attention to each participant or institution so that they may successfully contribute; intervene at opportune moments in the processes for optimal development of the KCM network; integrate, maintain and develop essential resources (material, functional and human); foster and promote online KCM while steering it towards the stated goals; promote a distinctive culture that gives meaning to the KCM network and enables values and objectives to be taken on board by all; adapt the tasks to the actual capacities of the participants; and set common goals based on acceptance, consensus and the involvement of the agents in the KCM network.

Proposals to improve efficiency in the *dissemination* processes: guarantee the confidentiality and integrity of information obtained in online KCM; distribute, via the appropriate means, the created knowledge within a reasonable time limit; contact addresses of promoting institutions must accompany the products generated in the KCM network, as well as references and links corresponding to the implemented actions; provide an institutional statement setting out the criteria under which the network may freely disseminate KCM; include and encourage contact with experts to lend authority to the knowledge disseminated; collaborate with other national and international networks on online KCM issues; submit contributions, communications and presentations resulting from processes generated by the KCM network at academic meetings and events; upgrade the virtual platforms (e.g.

website) and incorporate improvements in content and knowledge dissemination; socialise online KCM by presenting the knowledge in influential journals and through media outreach; and promote interactivity in online KCM to motivate institutions and participants to share, discuss, consult and ultimately continue with online KCM.

5. Conclusion

The most valuable knowledge is not always explicit or available to educational organisations or the professionals that work for them. It must therefore be created and organised within the framework of existing social systems, be they intra-organisational or inter-organisational. A good prescriber, faced with a need for this type of online KCM, should turn to a promoter in order to have a cyber-infrastructure (e.g. virtual platform) that enables existing knowledge to be socialised, internalised, externalised and combined and new knowledge to be created for the benefit of the professionals and organisations. The purpose of the promoter is thus to ensure that online work, interaction and learning, on a virtual platform, promote quality and improvement. For this reason, efforts are made to promote and stimulate effective networks that facilitate and enable relationships between people and that guarantee, through the intervention of knowledge managers, appropriate online KCM processes.

The knowledge managers, in KCM networks of excellence, are usually the experts in online KCM contents and processes. In the planning phase they make a programme proposal from an analysis of the context, the capabilities of the participants and the processes that they consider need to be enhanced in the KCM network; this forms the basis of the conceptual design of the system. In the development phase their task is to moderate and encourage participation, so they focus on the content (linking information, managing the communication process, supervising contributions, providing reading material, summarising, eliciting questions, etc.), while guiding and motivating participants and getting the best out of each of them on behalf of the KCM group. The third phase, dissemination, is useful for extracting knowledge, feeding and enriching online KCM for both participants and organisations.

The IT managers are the experts on the virtual technologies and tools used in online KCM. They participate in the design and planning and subsequently the creation of the interaction highways and must also provide access and technical assistance to the participants, all the while monitoring the functionality of the online KCM process.

The participants are the key players in the development phase. Among their activities and contributions particular value is given to the adoption of attitudes that are positive, constructive, cooperative, helpful, showing empathy, respect, fairness, consistency, transparency and commitment to online KCM.

Educational organisations may foster and promote online KCM, considering the processes that it entails and assigning functions to the key players, in line with the parameters analysed above. Online KCM processes should also involve committed cooperators who are capable together of defining common action criteria that serve the professionals and improve the organisations. By taking into consideration the factors and proposals outlined, the efficiency and success of KCM online and on virtual platforms may be improved; failing to do so may only increase the possibility of encountering difficulties.

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| How to cite this article

Fuentes Agustí, Marta and Muñoz Moreno, José Luís (2013). Knowledge creation and management networks: agents and processes. @tic. revista d'innovació educativa. (n° 11). URL. Accessed, month/day/year.

