Knowledge as a CSF in project management

The Project Management Lab®
Tiziano Villa, PMP® CMC®

PAPER CATEGORY : Tacit
PAPER SUB-CATEGORY: HR Applications

- Concepts: what is common and what is different between "project knowledge" and "project management knowledge"? A short description of your view of this would be useful.

Summary

Projects are unquestionably a powerful source of knowledge. Every project offers several learning opportunities to generate knowledge and increase both individual competencies and organizational assets. However knowledge is not yet formally considered and well-managed like other project management main themes, such as scope, time, cost, risk. Both dimensions of knowledge are usually "missing in action": explicit knowledge, formal and gained through codified frameworks, but mainly tacit knowledge, informal and gained through joint activities among individuals. Another key issue to be taken into consideration is the organization's maturity in managing knowledge within the project environment: usually maturity level is very low and there aren't specific models in place to understand, measure, and enhance the maturity of project-based organizations for creating and managing project knowledge. This presentation aims to discuss effective ways of managing tacit knowledge and knowledge maturity models within the project environment.

1. Tacit knowledge in projects

Polanyi stated that "w*e can know more than we can tell"* (Polanyi, 1966, p. 4). This simple statement implies that what we normally call "knowledge" can and should be divided into different categories. One of the ways to categorize knowledge is to divide it into explicit and tacit knowledge. Explicit knowledge can be articulated in formal language, while tacit knowledge is based on the experience of individuals. Explicit and tacit Knowledge are the "*basic building blocks of a complementary relationship*" (Nonaka – Takeuchi, 1995, p. ix), both are essential to creating and fostering knowledge within any organization. In particular tacit knowledge can be defined as: subjective and based on experience; simultaneous and context sensitive; analogical and not easily transferred.

The experimental dimension of tacit knowledge as described above is strongly related to the project environment, and it is typical of any innovative enterprise and project. Indeed the PMBOK® Guide defines knowledge as *"knowing something with familiarity gained through experience, education, observation or investigation".* (PMBOK® Guide, 2004, p. 363). This definition may appear tautological but it's effec-

tive for pointing out the deep meaning of knowledge in projects. is Although the PMBOK® Guide concentrates on explicit knowledge and makes only a few direct references to tacit knowledge, there are various pointers to that dimension: expert judgement, training, group meetings, different communication methods and, last but not least, lessons learned sessions are among the tools and techniques suggested for several processes.

Because of this tacit knowledge is an intrinsic element of project management and its best practices. Uncovering tacit knowledge may prove practicable and most of all useful to project managers. By uncovering the tacit knowledge hidden in their projects, project managers will be able to use that knowledge to improve the performance of their project, as well as to develop new knowledge to be reused for similar projects and within the performing organization. Moreover, project managers will enrich their personal expertise and competences and develop the openness of mind, the capability to "*expect the unexpected*" which is a fundamental trait for any individual working in a project environment.

2. Tacit knowledge enablers

A knowledge enabler may be defined as a set of specific conditions that, if correctly defined and managed, can effectively promote knowledge creation. There are specific knowledge enablers that are relevant for enabling tacit knowledge processes in the project environment. We focus on some of these:

- Catalyst of knowledge creation: Knowledge activists are major players in establishing the essential space and relationships that allow tacit knowledge to be unleashed (Von Krogh – Ichijo – Nonaka, 2000, p.148). Catalyst of knowledge creation is one of the roles of the knowledge activist. A catalyst acts as a facilitator of knowledge sharing, particularly when the individuals that must create knowledge together are many, physically distributed and differ in culture and organizational placement. A catalyst collects insights, experiences, issues, ideas, problems and opportunities to be used as inputs to foster knowledge creation. Catalyst also helps individuals and teams to launch and maintain effective relationships focused on knowledge creation.

- Redundancy is a wilful overlapping of information that exceeds for amount and variety the immediate needs referred to a specific operational situation. Redundancy may have a negative connotation, it could recall repetition, disorder, overload. From a knowledge creation perspective the opposite is true: sharing redundant information fosters the sharing of tacit knowledge. An intentional redundancy enables individuals to better understand the "big picture" and consequently to be more proactive in developing informal non-hierarchical communication channels where tacit knowledge can move around easily.

- Autonomy refers to the level of self-organization, individually allowed according to the circumstances. Autonomy increases the possibility that individuals will motivate themselves to create new knowledge and will produce unexpected insights by acting in a self-adjusting way. The individual capability to effectively manage one's own autonomy is the basis for a wider effective self-organizing group. Autonomy stresses the holographic model: the whole (organization) and its parts (individuals, teams) share the same knowledge.

- Manage Conversations: through conversations groups exchange first of all viewpoints, ideas, beliefs and insights. Therefore conversations enhance a day-by-day tacit knowledge creation. In order to create knowledge, conversations should be focused on the future and uncover what is mainly hidden, implied and tacit. Conversations for knowledge creation prove to be effective only if well-managed.

3. Enabling tacit knowledge in the project environment

Figure 1 summarizes the application of tacit knowledge enablers within the project environment. The four tacit knowledge enablers, previously discussed are linked to five project management process groups, as described by PMI® PMBOK® :

	Catalyst of knowledge creation	Redundancy	Autonomy	Manage conversations
Initiating	♦♦	♦♦	♦	♦
Planning	♦♦♦	♦♦♦	♦♦	♦♦♦
Executing	♦♦	♦	♦♦♦	♦♦♦
Monitoring & Controlling	♦	♦♦♦	♦♦	♦♦♦
Closing	♦♦♦	♦♦	♦	♦♦

♦♦♦ High Relevance
♦♦ Medium Relevance
♦ Low Relevance

Figure 1: Tacit knowledge enablers vs projedt management process groups

Catalyst of knowledge creation

Cooperation is the hallmark of both the project environment and the knowledge creation context. This similarity should be used to take advantage of tacit knowledge and the project manager should encourage team members and/or other stakeholders to become catalysts of knowledge creation, pursuing to uncover and use whatever tacit knowledge is available within the project environment, actively counteracting the common tendency to consider one's project experience as unique and not replicable. Although separating differences from similarities may be difficult, this enabler helps to integrate tacit knowledge into the heart of every project management process. This is particularly true for large and complex projects, where the lessons learned process will record the lessons already learned so that they may be disseminated but may not be sufficient to create new insight into the working of the project. Particularly planning and closing activities could be strongly improved if individuals act as knowledge catalysts.

Redundancy

Within the project environment knowledge creation is strongly related to the socialization process, in particular for the PMBOK® Guide Planning and Monitoring and Controlling process groups. This shouldn't come as surprise, since the activities included in these groups require the active involvement of the PMT - Project Management Team members and various stakeholders. Such involvement should be directed also towards the socialization of tacit knowledge. For example, when creating the WBS enough time should be spent in order to launch and manage effective knowledge relationships, riding over physical, cultural and organizational barriers. In particular, sources of tacit knowledge should be identified and involved in the project from an early stage and brought together: the choice of a specific physical location as well as the absence of judgement will also foster the opportunity to obtain a deeper interchange of experiences, mindsets, emotions. Icebreakers, simulations, creating metaphors, sharing "project tales", are all means of applying redundancy to group activities. Particularly planning and monitoring & closing activities will be more effective due to an intentional application of redundancy.

Autonomy

The autonomy enabler acts on an individual level as a strong motivating factor, increasing the possibility that individuals (i.e. team members) will create new knowledge, either researching on their own or sharing their tacit knowledge. It also refers to self directed groups, that "*integrate the knowledge and wisdom of ordinary people instead of relying on a few heroes*." (Nonaka – Takeuchi, 1995, p. 77). Furthermore the knowledge acquired by any individual within the project should be made available also by taking the responsibility to help others*: "Expertise should be equated with social responsibility*" (Von Krogh – Ichijo – Nonaka, 2000, p. 52). In the project environment, experts and members of PMT should be helped to increase their awareness and reach a good level of personal mastery in explicit and tacit knowledge and then encouraged or given the opportunity to become mentors and tutors. Autonomy can make the real difference during the project execution, where individual coping with challenges, insights, changes of perspective, personal responsibilities, can and must develop tacit knowledge through the internalization p process.

Managing conversations

Project manager could greatly benefit from managing conversation to encourage and support him/her during the challenging task of embodying and putting in action new knowledge, for instance during the risk identification process, when sharing knowledge "*allows distinction–making in observation made of events and situations that are both internal and external to the project*" (K.U. Kolskinen, 2004 p. 16). "*Approches like visualizing, brainstilling and gestalting help unleash tacit knowledge*", while "project tales" are natural and attractive ways of bypassing normal defence mechanisms and hierarchical barriers and of engaging our feeling. "*Storytelling is natural and easy and entertaining and energizing. Stories help us to understand complexity. Stories can enhance or change perceptions*." (Denning, 2001, p.xv). Stories are easy to remember and help the re-enacting process that characterizes the Internalization. Managing conversations, for example through storytelling, is mainly suggested during planning, executing and monitoring & controlling activities, because these types of activities socialize tacit knowledge among individuals through peer-to-peer and/or group relationships.

4. Knowledge as a Critical Success Factor for project value

Doubtless knowledge is a Critical Success Factor (CSF) –for project value. A planned management of knowledge, along the project life cycle, strongly improves the project performance. For example, knowledge produced at time-now is a precious resource for the progressive elaboration of the remaining part of the project (WBS updates; cost and time estimates; analysis of performance measurements and forecasts, assessment of change requests; responses to priority risks, issues resolution). In addition, the knowledge dimension of the project offers daily opportunities to project team members, such as sharing points of view, acquiring a wider understanding of the project, "learning by intrusion", testing and improving personal competencies. Knowledge is also a key driver for business results: the knowledge developed accomplishing the project is the basis for settling and implementing an effective change business process. Knowledge acts like a bridge from project deliverables to business benefits. Finally project knowledge, if well managed, feeds the organizational knowledge base. Starting from positive and negative project events, lessons learned are documented. In turn, lessons learned from single projects supply helpful insights for developing company best practices.

Thereby the challenge is *"how to make knowledge an essential driver for project success?".* A maturity model, expressly knowledge-focused, is crucial for taking up this challenge.

5. PKMM at a glance

A PKMMM - Project Knowledge Management Maturity Model is a framework focused on the ability of a project-based organization to create and manage knowledge inside and among its projects. PKMMM aims at defining, assessing and improving the project knowledge management practices of an organization. PKMMM is based on a logical configuration, divided in 5 maturity levels, 6 knowledge domains and 20 knowledge components (T. Villa, 2010 p. 3).

Maturity levels depict the evolutionary stages a project-based organization may reach during its knowledge journey. Each stage provides a high-level description of the overall project KM – Knowledge Management maturity. Knowledge domains focus on topics considered essential for enhancing the project knowledge dimension. Knowledge components are the places where the current maturity level is measured and where improvement actions towards the target level are implemented.

5.1 PKMMM maturity levels

Level 1 – Unknown

At this stage knowledge is an unknown dimension of projects. Knowledge is individual and tacit. Project teams are usually unaware of the meaning and the importance of knowledge for project success. Sharing knowledge within projects is an unexpected event. There are no formal processes for managing project issues from a

knowledge perspective. At this stage project knowledge is present occasionally at the individual level, and project KM has no direction.

Level 2 – Emergent
At this stage a few projects show awareness towards the relevance of knowledge for project value. Some knowledge experiences emerge from isolated projects, but are not necessarily exploited at an organizational level. If successful, these experiences capture the attention of the project sponsor and senior management, and arouse the curiosity of other project teams. At this stage knowledge is present at the group level, and project KM has an accidental bottom-up direction.

Level 3 – Intended
At this stage senior and middle management recognize knowledge as essential for project delivery, business results, and the development of project management best practices. The organization issues a deliberate strategy regarding project KM. Knowledge roles regularly operate in central functions and knowledge responsibilities are assigned to project managers and project team members. The project mandate formalizes specific knowledge goals. Formal processes are in place for enhancing knowledge within projects. At this stage knowledge is present at the organizational level, and project KM has a regular top-down direction.

Level 4 – Shared
At this stage knowledge is fully recognized by the entire organization as a CSF for business results. The value of project KM is declared at strategic level and is communicated at every organizational level through multiple and repeated formats. Project sponsors are directly involved in supporting KM activities. Project stakeholders are supportive towards knowledge issues during project execution. Project KM is regularly performed on most projects. Knowledge technologies are pervasively used and knowledge databases are constantly updated with project lessons learned. At this stage knowledge is present at the inter-organizational level, and project KM has a "compressive" direction (both top-down and bottom-up).

Level 5 – Endless
At this stage the continuous improvement of project KM is a strategic goal for the organization. Doubtless, project KM is recognized as a key driver for business results. Organizational project management standards encompass a specific KM subset, effectively and regularly performed. Specific initiatives are launched for disseminating project KM principles and practices across organizations: upwards to customer organizations and downwards to supplier organizations. At this stage knowledge is present at every ontological level (individual, group, organizational, inter-organizational), and project KM has a pervasive direction.

5.2 PKMMM domains and components

Project knowledge strategy
The project knowledge strategy is aimed at fostering individuals' commitment to create and share knowledge within and among projects. This knowledge domain may be broken down into three components: a) Project knowledge strategy definition: the process of conceptualizing a picture of the future (vision), formulating goals and guidelines (strategy) concerning knowledge in projects, realigning the project knowl-

edge strategy, in response to feedbacks emerging from single projects. b) Project knowledge strategy communication: the process of presenting, deploying and supporting the organizational knowledge intention towards project stakeholders. c) Project knowledge strategy evaluation: the process of monitoring and controlling the impacts on project value due to the application of KM in projects, and rewarding project KM best practices.

Project knowledge roles

To be effective, project KM entails the engagement of many individuals, qualified under the general term ”knowledge-creating crew” and some specific knowledge roles, otherwise named “knowledge activists”. This knowledge domain may be broken down into three components: a) Project knowledge catalyst: it is a temporary role, responsible for creating an effective project knowledge context and for facilitating the regular execution of KM. b) Project knowledge engineer: it is a permanent role, responsible for developing the organizational project management framework (model and techniques), spreading its application in projects, verifying the real uses, updating the framework (continuous improvement or redesign) based on feedbacks from projects, strategy changes and new trends in KM. c) Project knowledge officer: it is a permanent role, responsible for optimizing the overall value of project KM for the organization or part of it.

Project knowledge processes

This domain is the engine of project KM. Knowledge processes are the places where *“human knowledge is created and expanded through social interaction between tacit knowledge and explicit knowledge”* (Nonaka I., & Takeuchi H., 1995, p. 151). This knowledge domain consists of four components: a) Socialization: the process of sharing tacit knowledge among individuals. It happens through face-to face interactions. b) Externalization: the process of translating tacit knowledge into explicit knowledge. It happens through dialogue and collective reflection. c) Combination: the process of merging different explicit objects into a more complex explicit knowledge system. d) Internalization: the process of transforming explicit knowledge into tacit knowledge. It happens through personal learning by doing.

Project knowledge technologies

Specific technologies must be active to support the spiral of knowledge creation, especially the externalization and combination processes. This knowledge domain consists of three components: a) Project Management Information System: *“an information system consisting of the tools and techniques used to gather, integrate, and disseminate the output of project management processes”* (PMI, 2008a, p. 435). b) Organizational knowledge database: a company repository for archiving and retrieving lessons learned from completed and underway projects, and project KM best practices. c) Knowledge social media: different types of internet-based applications (web 2.0) that allow information sharing, interactive collaboration and professional networking, beyond the formal project boundaries.

Project knowledge attitudes

Individuals are the foundation of knowledge. Therefore project stakeholders must be fostered in practicing KM, starting from their own attitudes. This knowledge domain may be broken down into four components: a) Project knowledge training: the process of developing and running educational initiatives for different types of stake-

holders, focused on project KM skills. b) Knowledge communities of practice: the process of launching, managing and evaluating organizational communities focused on the application and the improvement of KM in projects. c) Project intellectual capital: the process of defining rules and managing, protecting and rewarding individuals' intellectual capital in projects. d) Knowledge stakeholders engagement: the process of managing relationships with project stakeholders to capture their attitudes towards knowledge and foster supportive behaviours.

Project knowledge enablers

Project KM might be more effective if it can rely on specific organizational enablers. This knowledge domain may be broken down into three components: a) Management oversight: direct involvement of managerial roles of the organization in sponsoring knowledge activities in projects. b) Autonomy: self-organization, individually allowed within the project environment regarding knowledge issues. Autonomy fosters the holographic model: the whole (organization) and its parts (individuals, teams) share the same knowledge. c) Redundancy: a wilful overlapping of information that exceeds for amount and variety the immediate needs referred to a specific operational situation. Redundant information fosters the sharing of tacit knowledge. *"an intentional redundancy enables individuals to better understand the "big picture" and consequently to be more proactive in developing informal non-hierarchical communication channels where tacit knowledge can move around easily"* (Meloni, G & Villa, T. , 2007, p. 4).

6. Conclusions

Knowledge is a CSF for project value. Project knowledge is both tacit and explicit, and is embedded in every ontological level. KM is a very complex matter, especially in projects. The lessons learned represent only the tip of the iceberg. The iceberg of knowledge is looking for its own project maturity model. The model presented in this paper could represent an initial step towards the definition of a PKMMM.

Bibliography

Denning S. (2001) *The Springboard: How Storytelling Ignites Action in Knowledge-era Organizations*, Boston: B.H

Koskinen K.U. (2004) *Knowledge Management to Improve Project Communication and Implementation*, *Project Management Journal- June 2004,* Newtown Square, PA: Project Management Institute.

Nonaka I., Takeuchi H. (1995) *The Knowledge Creating Company: How Japanese Companies Create the Dynamics of Innovation*, New York: Oxford University Press.

Polanyi M. (1966) *The Tacit Dimension*, London: Routledge & Kegan Paul.

Project Management Institute (2004) *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)*, Newtown Square, PA: Project Management Institute.

Von Krogh G., Ichijo K., Nonaka I. (2000) *Enabling Knowledge Creation: how to Unlock the Mystery of Tacit Knowledge and Release the Power of Innovation*, New York: Oxford University Press.

Meloni G., Villa, T. (2007, May) *Uncovering Tacit Knowledge in Projects.* PMI Global Congress 2007, Europe, Budapest, Hungary
Project Management Institute. (2008a) *A Guide to the Project Management Body of Knowledge (PMBOK® Guide) Fourth Edition.* Newtown Square, PA: Project Management Institute.