The Value of Communities of Practice (CoPs) Within Knowledge Management (KM)

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ABSTRACT

This paper focuses on Communities of Practice (CoPs) as one vehicle for managing knowledge in an international organisation, with core business areas in civil and defence aerospace, as well as industrial and marine power. The study aims to characterise the nature of CoPs in terms of the value they provide. 21 CoPs were sampled using a range of data collection methods, and thematic analysis resulted in the following four categories of value: re-use and transfer of knowledge; connecting and strengthening of networks; motives and rewards for participation; and gaining management support and organisational credibility. It is argued that the multi-dimensional value of CoPs implementations can be conceptualised as reducing costs, and/or adding benefits at various levels. Effective CoPs operate like a lens to draw in disconnected people, practices and knowledge, and then focus on relevant issues at personal, community and organisational levels. CoPs can be a powerful component of a holistic KM strategy, when the strengths of people's tendency to seek social interaction and share informal knowledge are balanced with addressing formal, business needs and demonstrating organisational value.

INTRODUCTION

This paper focuses on Communities of Practice (CoPs) as one vehicle for managing knowledge in the workplace. The research investigates 21 CoPs operating in an international organisation, with core business areas in civil and defence aerospace, as well as industrial and marine power. A review of the relevant literature on CoPs is used to inform the rationale and objectives for the present study. The research context and methods are then described, before presenting and discussing the main findings, and drawing preliminary conclusions.

LITERATURE REVIEW

Despite claims made by theorists and practitioners that Knowledge Management (KM) can be a primary opportunity for improved organisational effectiveness and gains in competitive advantage, the empirical evidence remains sparse (Scarborough, 2003). A consideration of the literature reveals a polarization between what may be classified as technology-based approaches and more social/people orientations to KM (McDermott, 1999; Wenger et al, 2002). Both technological and social solutions should be accommodated if an organisation is to manage knowledge resources effectively (Bhatt, 2001).

Bechy (2003) highlights the transfer of knowledge across boundaries as a major KM challenge, and the potential role of occupational CoPs. Indeed, CoPs have been forwarded as central to many KM strategies, particularly those aimed at facilitating knowledge sharing and exchange between geographically, socially and organisationally distributed workgroups (Brown & Duguid, 1991; Lave & Wenger, 1991; Orr, 1990). Ali (2001) further supports the importance of cultivating CoPs to promote the more creative and implicit features of knowledge activities. There is a significant interest in how to effectively capitalise on the organic, informal and resilient nature of CoPs, in order to cultivate and nurture them as more formal organisational knowledge assets (McDermott, 2000). From this standpoint, CoPs can help span boundaries created by typical hierarchical and bureaucratic organisational structures (Scarbrough, 2003). The emphasis is on encouraging the free and open sharing of experiences among CoP members about work, and facilitating this through trust and reciprocity with little direct management (Swan & Newell, 2000). However, the notion of cultivating CoPs and increasing the level of management and control means that some return on investment becomes a priority.

For CoPs, like many KM activities, this goal of demonstrating value is difficult to meet. Essentially, there is a recognition that it is easier for organisations to adopt, accept and justify technological KM solutions. However, guidance on nurturing these often fragile organisational units has been recently outlined (Gonglo & Rizzuto, 2001; Wenger et al, 2002.). Typically, this advice describes ideal lifecycle models of development, and offers suggestions on how to facilitate the CoPs through various stages to reach maturity and demonstrate value at the organisational level (Skyrme, 2002). Despite these advances, there is scope for empirical work on what the value of CoPs means in organisational reality.

Research Objectives

The reported successes of CoPs are limited to a relatively few number of organisations and small-scale case studies (Breu & Hemingway, 2002). With this in mind, the current study has the following objectives:

- to characterise the nature of the CoPs
- to categorise the value that CoPs can provide

Research Context

The research was carried out in a large global company providing power for land, sea and air, which has core business areas in civil and defence aerospace, as well as industrial and marine power. At this time, CoPs were being promoted and supported as one element of a company-wide KM initiative. Within this investigation, 21 CoPs were sampled using a range of data collection and analysis methods, which served to triangulate the findings and strengthen the overall claims. The CoPs covered a wide range of issues and topics including: parts and components (e.g. bearings, compressors, and control systems); analysis techniques (e.g. automatic and thermo-mechanical); engineering design (e.g. computational fluid dynamics and whole engine modelling); IT (e.g. computer-aided design and intranet development); and organisational strategy (e.g. business intelligence and knowledge management).

METHODOLOGY

The multi-method case study approach provided a comprehensive account of CoPs, and permitted the perspectives of the main stakeholders (i.e. facilitators, members and researcher) to be acknowledged and investigated. Both planned and opportunistic methods of data collection were used, with each technique offering particular insights. A qualitative survey and semi-structured interviews constituted the main methods of data collection, while the researcher also participated in workshops, meetings, and informal discussions. All data were analysed for qualitative themes.

Questionnaire

Initially, a short self-assessment questionnaire was developed collaboratively by the researcher and key contacts within the host organisation. This instrument was designed to elicit the views and opinions members had of their CoP, together with any future aspirations. It can be seen as a health-check mechanism or a method of

taking the temperature of a CoP (Adams & Freeman, 2000). The survey focused attention on CoP issues such as; objectives, activities, problems and successes, and was either administered at meetings or circulated electronically to the appropriate distribution lists. Anonymity was guaranteed and 52 responses were received.

Interviews
Ten interviews with facilitators and members of various CoPs were also conducted in the early stages of the case study. These allowed the researcher to become familiar with the specific groups under investigation, and started the process of gathering data about indicators of value. Subsequently a further 15 interviews were undertaken with facilitators and members. All interviews were audio-recorded and in order to retain a degree of informality and flexibility, a semi-structured interview guide was used to cover a set of issues (e.g. goals and objectives; roles and activities; problems and obstacles; successes and achievements)

Meetings and Workshops
The researcher also participated in meetings and workshops (n=15), which were centred on providing feedback to, and eliciting further views from CoP members. Several of these face-to-face events were used for more specific purposes, such as, gathering and documenting success stories and failures as useful lessons. In conjunction with the more formal methods of collecting data, informal discussions were also held with several of the CoP facilitators (n=5).

Thematic Data Analysis
The recorded interviews were fully transcribed, while detailed field-notes from meetings, workshops and informal discussions were also written up. As the survey responses were also in written format, the analysis was mainly qualitative and focused on developing themes to address each of the research objectives.

RESULTS
Key features of the CoPs are briefly described before outlining the main findings from overall analyses of value (see Table 1 for representative examples of the CoPs investigated).

Nature of CoPs
Although the CoPs initiative formed part of a larger KM programme within the organisation, two clear patterns of emergence can be distinguished. Most of the CoPs were initially informal interest groups, while a minority were set up in the wake of a disbanding project team. Typical objectives for these groups are to facilitate different types of KM processes, namely; solve problems (know-what), share good practices (know-how), and link people (know-who). Face-to-face meetings and workshops were common at start-up and then to review progress and plan next steps at regular intervals. Email, discussion lists and intranet websites allow on-going updates and news provision for members. In terms of organisation, some CoPs have become hierarchical and evolved sub-units with dedicated

functions. There are also examples of CoP roles being distributed by company site location or across key individuals.

Value of CoPs
The study reveals the following four categories of value attributable to the CoPs initiative: re-use and transfer of knowledge; connecting and strengthening of networks; motives and rewards for participation; and gaining management support and organisational credibility. These factors are inter-related and within each there are several sub-components and characteristics of interest.

Re-Use and Transfer of Knowledge
A prominent aspect of this value indicator is re-using up-to-date knowledge to solve similar problems. This process was demonstrated within the Thermo Mechanical Analysis CoP, where a request for information on windage in oil dominated sumps was raised by an analyst based in Canada. Another expert in this type of analysis was able to provide an answer, because a similar problem had been encountered and successfully solved at his own UK site. Specifically, the solution was contained in test rig data, which were located and transferred between these individual members of the CoP. Within the same CoP, a second instance saw an enquiry for carbon seals information posed by a German member. This led to the name of a colleague based in USA being suggested by a UK member of the CoP. Overall, the international links within the CoP facilitated the feedback of advice and test data, about heat generation, and wear and tear on carbon seals, to the original questioner in Germany.

The development of good working practices is assessed as another valuable knowledge transfer contribution made by CoPs. The Facilitators CoP is a key player in co-ordinating efforts to learn lessons from both positive and negative experiences, and to draw upon wider KM resources and experts where appropriate. One tangible outcome is the documentation of this knowledge, which is shared among all the CoPs, through both electronic and face-to-face forums. This collaboratively developed material also serves to promote the CoPs initiative to the rest of the organisation. A member of the Computer Aided Design CoP articulates one part of a vision about how this KM system might function, in which for example, relevant knowledge concerning the rationale for design modifications could be incorporated into a website as an entry on a prompt list, a lesson learnt or a working practice.

Lastly, knowledge transfer can increase efficiency and reduce unnecessary repetition. For instance, the Manufacturing Laboratories Managers CoP conducts up-front work to obtain opinions on any proposed amendments to specifications, so that they are correct when formally issued. Such time and cost savings are also shown within the Computational Fluid Dynamics CoP, where requests from an out-lying group resulted in the retrieval of test data. The general consensus is that without the CoP, this data either would not have been found (i.e. cost of re-doing the test) or would have taken a long time and effort to discover (i.e. cost of individuals time). Subsequently, this episode influenced when and why expensive testing procedures should be conducted in the future.

Table 1. Example communities of practice

Nature of CoP	Core objectives	Main functions	Key activities	Example value
Group of CoP Facilitators	Help members to cultivate their own CoPs	Sharing similar experiences	Meetings aimed at picking up successful lessons	Agreed set of guidelines for setting up a CoP
Topic of Knowledge Management	Sharing latest ideas on KM – strategies, practices and technologies	Linking people with KM interests and pointing to new opportunities for collaboration	Themed/focused meetings rotating around company locations	Shift from focus on technology to holistic view of KM. Assist with internal innovative KM applications
Engineering Analysis Technique	Inter-project sharing	Problem solving across boundaries	Moderated discussion group	Time and money savings
Computer Aided Design Tool	Sharing best practice about this package	Learning	Website with hints, tips and Frequently Asked Questions	Faster lead user group (experts) development

Connecting and Strengthening Networks
CoPs in this study combat the disconnectedness of both geographically remote, and those less experienced members of the company. UK-based members of Whole Engine Modelling CoP admitted a lack of knowledge about what their US counterparts were doing. This has now improved to such an extent that they can locate and identify who, for example, has previous experience with specific measurement techniques and instruments. Likewise, the Combustion Cost Reduction CoP actively encouraged a *'know-who'* functionality by inviting nominations for membership, so providing access to the people who are judged favourably by their peers and managers. Other CoPs, such as the Bearings, also see expert identification and location as a key feature, especially for inexperienced members and those further away from the core activity. To launch the Bearings CoP, all group members provided a mini CV, which was then published as a who's who on their website. As a result, members have direct communication links to experts who are located in different domains, such as in-service and product-support.

The development and enhancement of such networks through boundary spanning also plays a critical role in the formation and development of a CoP identity. Within the Computational Fluid Dynamics CoP for example, membership has widened to include sub-contractors, who had previously reported a sense of isolation. These new members of the CoP now feel part of user group, and are excited at being invited to the quarterly meetings, where problems are addressed and best practice shared. Furthermore, spanning boundaries through sabbatical visits between Canadian and UK members of the Whole Engine Modelling CoP have been used to encourage a two-way exchange of experience between sites with strengths in different modelling methods.

Motives and Rewards for Participation
For many members, participation in a CoP is internally motivated to some degree, as the communal activity was seen as inherently valuable. It is also clear that ensuring participants get positive feedback from their investments of time, effort and knowledge is critical. This form of outcome is encouraged through a feedback cycle of making the experience useful (e.g. learning something new or seeing the outcomes of a contribution), so that members became more likely to participate in the future. Likewise, a more vibrant and active CoP also tends to increase the chances that participants would enjoy a positive and valuable experience. Findings from several CoPs, most notably the KM, indicate the importance of a non-judgmental arena and the development of trust to motivate and encourage involvement.

Gaining Management Support and Organisational Credibility
The final mode of value exhibited in this study concerns the challenge faced by CoPs to acquire a sufficient level of organisational support while retaining a degree of self-ownership and direction. Several of the CoPs were able to help projects and other formal groups accomplish their tasks more efficiently. This greatly enhanced their credibility and focused their efforts on relevant issues for the organisation. Generally, management support and recognition helps to give credibility to the CoP and indicates that it is seen as valuable. A reciprocal relationship, which requires on-going negotiation between CoP members and the organisation as a business, is also regarded as another feature helping survival. In the Web Editors case, retaining sufficient organisational support, while adhering to a self-management philosophy helped to manage the transition from a project team to a CoP. To date, most value for the company has been delivered through knowledge exchange between business units and in cultivating innovative and holistic KM practices and thinking.

DISCUSSION

The foremost value indicator comprises the core elements of knowledge management espoused in much of the literature, namely building on and re-using previous experience, while also generating new systems for creating, sharing and transferring knowledge (Kakabadse et al, 2003). CoPs not only provide contexts for sharing expertise (Breu & Hemingway, 2002), but also help develop expertise quicker by giving members the opportunity to become recognised as experts in a particular topic or domain (Archichvili et al, 2003). The Web Editors CoP is a good example of a "learning CoP", where novices gain knowledge about building and publishing intranet sites from experienced members.

Findings are consistent with Archichvili et al (2003), who report that CoPs can help reduce the duplication of activities, through timeliness and efficiency in acquiring information. In line with the existing investigation, they also found that CoPs could operate as a general encyclopaedic problem-solving tool, as an expertise identifier, and as a way of keeping informed and up-to-date about developments in their profession (Archichvili et al, 2003). Having access to best practices and lessons learnt via the CoPs was key to bringing about this multi-functionality.

The current research supports earlier work by Scarbrough (2003), who concludes that one major benefit of CoPs is integrating previously weakly or non-related individuals and professional groups within any organisation. On a related theme, Boland and Tenkasi (1995) highlight the role played by information and communication technologies in fostering a shared or community identity across dispersed employees. It can be argued that as members become connected to people they would not have had a chance to without the CoP, the social capital of the organisation is strengthened (Archichvili et al, 2003). Furthermore, the capability of the CoPs in this study to moderate the fragmentation of people and knowledge may be very useful in providing continuity during times of change and uncertainty (Breu & Hemingway, 2002).

In terms of encouraging CoP participation, Breu & Hemingway (2002) present a similar "success breeds success" argument, in which members can test out their ideas in a risk-free environment without many negative consequences. Motivating factors highlighted within the current investigation include; the role of relevant professional interests, together with satisfactory prior experiences, the integrity of the organisation, and the competence of members to encourage active engagement in CoPs (also see Archichvili et al, 2003).

Although the shift from informal interest groups to CoPs can be seen as part of the company's wider KM initiative, it also exhibits a sense of legitimisation (Wenger, 1998) and an element of sponsorship (Nickols, 2000). Previous studies tend to position CoPs as pre-cursors to generating value at the organisational level. For instance, the creative and innovative nature of CoPs can be cultivated to focus on formal project work with unambiguous and observable organisational deliverables (Breu & Hemingway, 2002). Similarly, Von Krogh et al (2001) emphasise the role of CoPs in making knowledge explicit, with subsequent strategic application towards business goals, both within the organisation and to external partners. They offer a phased description of how these should be managed and outline a raft of organisational benefits, including better decisions on investments and collaboration across geographical and functional company boundaries. Similar findings are exhibited in the current study, although the Web Editors evolution from a project team to a CoP is an interesting exception to the typical pattern of development.

CONCLUSIONS

This paper has explored Communities of Practice (CoPs) as one form of Knowledge Management (KM) enacted within the engineering context of two aerospace organisations. The current research argues that the value of CoPs implementations are multi-dimensional and can be usefully conceptualised as reducing costs, and/or adding benefits at various levels. CoPs should be inherently rewarding at the personal level in order to capitalise on individual motivations. At the group level, the value is in connecting people and their expertise. The re-use and transfer of both explicit and implicit knowledge through social and technical mechanisms is a defining feature of this form of value. While it is advocated that members should control and negotiate what they do and how they do things in the CoP, there should also be some clarity about the benefits offered to the organisation.

Successful and effective CoPs can best be depicted as operating like a lens to draw in disconnected people, practices and knowledge, and then focussing on problems and issues of relevance at personal, community and organisational levels. Accommodating these multiple requirements pose questions for managers, researchers, and practitioners alike. In terms of recommended ways forward, sub-groups could be used to consolidate the depth of core knowledge within the CoP, while recruiting new members may help to widen its scope. Overall, combining the strengths of people's tendency to seek social interaction and share informal knowledge, with the organisational benefit of addressing more formal, business needs, CoPs can be a powerful component of a holistic KM strategy.

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