Community of Practice Software Management Tools: A UK Construction Company Case Study

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ABSTRACT:
This chapter provides insights from a large UK construction organisation case study where communities of practice have been supported through use of a software tool and management approach that encourages their spread across the organisation. We provide a descriptive characterisation of what the community of practice (COP) software tool does, how it evolved, and anecdotal evidence from interviews with its users of its value to the UK case study organisation. We recognise the need to investigate COP value generation more formally and we have developed a research proposal to undertake further work in a collaborative study with industry to provide useful COP performance measures to be undertaken. This chapter provides valuable insights from several years’ reflection upon the tool’s use and application and we highlight both drivers and barriers to its deployment. The objective was to provide a practical example of what COP management tools could and should address.

Keywords: Knowledge Management, Organizational Knowledge, Communities of Practice, Virtual Web Organization

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INTRODUCTION

In a separate chapter in this book an argument was made that a community of practice (COP) generates knowledge networks that enhance and sustain competitive advantage and that it is also used to help COP members actually use ICT tools. In that chapter a number of lessons learned from the way in which COPs operated in three Australian construction contracting organisation case studies were discussed.

In this chapter, we provide further practical insights into COPs using a large UK construction organisation as a case study. COPs in this example were supported through a software tool and management approach that encourages the spread of COP beyond the institutional, technical support and collegial support COPs highlighted in the three Australian case studies reported upon in an earlier chapter.

We provide a descriptive characterisation of what the COP ICT software tool does, how it evolved, and anecdotal evidence from interviews with its users of its value to the UK case study organisation. The research required to investigate this dimension more formally is recognised and is subject to further work in developing an argument for a collaborative industry-academic study that is anticipated and currently undergoing refinement. Thus, for this chapter, the approach is anecdotal but nevertheless based upon several years’ reflection upon the tool’s use and application and drivers and barriers to its deployment.

We have structured the chapter as follows. First we provide some background on COPs and follow this with discussion of several important theoretical knowledge management concepts. This provides a useful framework for us to describe the COP management tool SIGMA CONNECT followed by how this tool was used by Carillion plc in the UK. We then offer our conclusions on COPs and how the software tool was used to affectively encourage, enable and support these COPs. Finally we offer some practical tips and lessons learned.

LEARNING OBJECTIVES:

- Readers should advance their understanding of how construction organisations using COPs can enhance their knowledge creation and sharing including understanding the meaning of terms such as tacit knowledge, sticky knowledge and absorptive capacity.
- This chapter also details how one of a number of ICT tools may be used to more effectively create and share knowledge within organisations—this will deepen the reader’s understanding of how to realise the potential power of COPs. It provides details of what such software tools can offer in managing and facilitating COPs. This is important because readers will be better positioned to make an informed decision on what features a COP ICT tool should provide to meet their needs.
- This is a fresh and new area of knowledge for the construction industry in particular and so this provides a rare opportunity for readers to become better acquainted with a powerful and useful tool available to them.
BACKGROUND

In an earlier chapter the evolution and development of the concept of COPs was outlined. Etienne Wenger defines a community of practice (COP) as “groups of people informally bound together by shared expertise and passion for a joint enterprise” (Wenger and Snyder 2000, p139). Wenger and others have also described how organisations can encourage and support a COP. Several theoretical aspects of the management of knowledge and knowledge transfer are an appropriate topic to introduce in this chapter because it relates to the impact of developing COPs within organisations. COPs are an effective tool that beneficially impact upon the capacity of engaged individuals to supporting an organisation’s increased learning capacity and innovation deployment. COPs are highly intensive incubators of knowledge creation and transfer. Their ethos is one of sharing knowledge, of voluntary joint-problem solving activities and building a capacity for learning (Wenger 1999; Wenger et al. 2002). Understanding underpinning mechanisms of how they do this is vital to their effective deployment.

An important feature of COPs is their capacity for people to share tacit knowledge as well explicit knowledge because this forms a channel for the socialisation of knowledge exchange and its creation. People share not only knowledge but also perceptions of the context that surrounds the knowledge being shared. Tacit knowledge delivered by people provides an added richness to the nature of the knowledge compared to recorded explicit knowledge (shared for example via manuals, help screens, on-line tutorials etc.) because tacit knowledge is embedded with deep personal insights and potentially helpful advice. COPs therefore constitute a very rich and bountiful channel of knowledge exchange. Any tools or mechanisms that can assist and aid a COP’s effectiveness are such tools facilitate a productive and valuable competitive advantage. Because tacit knowledge is notoriously sticky and difficult to replicate, it also adds further potential for competitive advantage.

We have introduced and briefly explain below, knowledge management terms that may be unfamiliar to readers in the context of COPs and knowledge transfer.

KNOWLEDGE MANAGEMENT TERMS EXPLAINED

Tacit Knowledge

Polanyi explored the concept of tacit knowledge, how we can know more than we can tell, through citing an example—face recognition. We can recognise a particular person’s face, even someone from the past or someone who we have never met, from the thousands and indeed millions of faces we could have presented to us yet we cannot explain how we know that particular face (Polanyi 1997, p136).

Tacit, according to the dictionary, means silent, not openly expressed but implied, understood or inferred—from the Latin taceo I am silent (Macquarie 1987, p1727). Tacit knowledge is more difficult than explicit knowledge to create, capture, codify, communicate and transfer because these processes are intellectually very highly energy-intensive. It requires deep consideration and thought about how to manage this knowledge to benefit individuals and organisations. This is because it involves dealing with people and their motivational drives and inhibitors. It can be argued that people have more complex and unpredictable (and hence unmanageable) characteristics than programmable machines that characterise technology. COPs are ideal for facilitating the exchange of tacit knowledge between individuals. COPs
encourage people to talk, exchange insights and jointly work on problem solving so that the rich context of their knowledge is explicated and tested during their social intercourse.

**Sticky Knowledge**

Burton-Jones (1999) describes some kinds of tacit knowledge as ‘sticky’ that is difficult to codify or explain so that it tends to stick to the person with that knowledge and is only transferred with a fair bit of consideration and effort. Knowledge is sticky and both expensive (in terms of transaction costs) and difficult to transfer because it is more than just facts and information. Knowledge is about context, the history and hidden myriad of inferences and cause and effect loops that explain why something did or did not happen in a particular way. Documented manuals and procedures fail to cover all eventualities and are time consuming to access and absorb.

Gabriel Suzulanski conducted a series of studies into the transfer (and often failure to fully transfer) of best practice within organisations. He concluded that the three major sources of knowledge stickiness (barriers to transfer of knowledge) are *absorptive capacity*, *causal ambiguity* and the *quality of the relationship between source and recipient of knowledge* (Szulanski 2003). These are briefly explained below.

The most significant source of stickiness is *absorptive capacity*. Cohen and Levinthal (1990, p128) define absorptive capacity as the ability of a firm to recognise the value of new external information, assimilate it and use it for commercial ends. It is a measure of an ability to absorb ideas, information and knowledge and applies to both external and internal sources of information and knowledge. Their paper is one of the most influential on this aspect of knowledge management. They detail how firms gain this absorptive capacity and much of it entails both hard work and thoughtful management support of growing its development of a knowledge culture. Building absorptive capacity requires long exposure to experimentation, trial and error and reflecting deeply on lessons learned through this process. It also requires its people to seek out information and knowledge both from within the organisation as well as outside it. This research activity need not be ‘academic’ in a bookish sense but is more often a practical outcome of people trying their best to make sense out of complex situations when solving problems. The more practice they are in tackling problems as learning exercises and taking the effort and time to reflect upon what they have learned—and transferring this knowledge to others—the greater is their absorptive capacity. When this does not happen it makes it harder for knowledge to be effectively transferred because these particular strengths are poorly developed. Thus, the wheel gets constantly reinvented and best practice seem impossible to be transferred. Absorptive capacity is a crucial factor in knowledge being transferred either from tacit to tacit or tacit to explicit—the recipient is bounded by his/her absorptive capacity to understand the shared knowledge content and context.

A consequence of poor *absorptive capacity* is often an inability to understand cause and effect loops that envelop any opportunity to learn from experience. *Causal ambiguity* is the condition where people have an inability to be able to confidently make a cause and effect link. Naturally, if you cannot make this connection then mistakes are repeated, an inability to replicate best practice is evident and the management of valuable knowledge becomes extremely difficult. To be able to effectively diagnose situations and be able to confidently read the cause and effect
linkages requires not only deep knowledge about the context of the situation under study, but also an ability to capitalise upon a strong absorptive capacity. Access to ICT tools such as knowledge repositories have potentially great value, but the skills to fully use this valuable asset are essential to be able to make best use of such knowledge. Unfortunately, electronic knowledge repositories have a limited capacity to store contextual knowledge that can be quickly and easily accessed and understood.

The third major influence on knowledge stickiness is the relationship between the source and recipient of knowledge. In terms of electronic sources, they are notoriously cumbersome to engage with—not user friendly. Search engines often either provide too few ‘hits’ or provide an overwhelming number of them that swamps the user’s capacity to deal with the information provided. In terms of people-2-people interactions the issue of culture and communication plays a major and often subliminal role. An organisational culture can encourage or inhibit knowledge sharing. Personal traits also can influence relationships. Further, organisational leadership style and structure all influence relationships between colleagues and their motivational drivers.

Finally, it should also be understood that when transferring knowledge through a process such as best practice dissemination, there are four recognised stages of this process (Szulanski 2003): initiation (when the idea/innovation or best practice is being recognised); implementation (when planning the dissemination and introduction of the innovation takes place); ramp-up (when the innovation is rolled out or a cut-over of the new and existing situations takes place); and integration (when the innovation becomes routine and embedded). The three major factors indicated, plus other minor causes of knowledge stickiness, impacts upon knowledge transfer in varying intensity and impact at different stages of the knowledge transfer stages.

At the initiation stage, for example, absorptive capacity is highly important because it helps people recognise a best practice and how it may be applied. At the implementation stage a best practice is planned and introduced and this poses communication and relevance challenges. The ramp-up stage can be highly affected by causal ambiguity if any cause and effect loops for the way in which the best practice is being ‘tweaked’ in its new setting are not well understood. Finally at the integration stage, backsliding needs to be deterred and any tendency for this lack of integration to be understood so that it can become avoided to allow best practice to be embedded and routinised.

Stickiness of knowledge poses considerable problems for organisations wishing to maximise the conversion of tacit knowledge in people’s heads into explicit knowledge that has been codified. However, sustaining competitive advantage relies upon an organisation’s competencies being difficult to copy or replicate so having a knowledge advantage relies upon both codifying knowledge as well as embedding it in difficult to copy repositories such as people’s heads and organisational routines, procedures and culture.

COPs have several roles in relieving the stickiness of knowledge. They increase the absorptive capacity of individuals and groups through joint exploration of issues, generating and sharing ideas insights on issues/problems and other project related topics of joint interest. They may also encompass involvement in seminars, training
and development as well as research of varying topics. COPs also help link cause and effect loops through discussion and sharing insights. Finally, they generally involve improved relationships between participants, especially when membership is voluntary (Wenger 1999; Wenger and Snyder 2000; Wenger et al. 2002).

The following section now presents a discussion of a UK construction company’s experience in using a particular software tool to manage COPs. It provides a relevant and tangible example of what can be achieved and provides some guidance on how to experiment and pilot the development of COP. The tool is Sigma Connect and it provides a rare example of the construction industry using such tools. Numerous first tier (major construction contractors) use ICT groupware for team communication but we have found little evidence of the use of COP tools that can manage the nature of the interaction that characterises COPs in the construction industry. Thus, this case study provides a unique or near-unique opportunity for an individual case study and justifies our focus on one company and its experience with one tool (Yin 1994).

**CHARACTERISTICS OF THE SIGMA CONNECT™ TOOL**

In this section we briefly discuss how the tool evolved and describe some of the more important features of the tool. Many of the features discussed share a common heritage with other web-based applications, intranets and extranets. This tool helps to administer and manage COPs concerned with ICT applications and can also embed and integrate this with a wide array of company specific or general software applications. Such tools evolve and develop over time through feedback and experience gained by users. Sigma Connect has an interesting pedigree.

**The Origins of the Sigma Connect COP Management Tool**

It is interesting to reflect upon its origins because this will help readers understand how such tools can mature and develop with constant improvement and experimentation. The original features are relatively easy to embrace, however as the tool evolved and matured, more tacit knowledge became embedded in its development and this is why we believe it is a good example to use in this chapter—it represents the ‘state of the art’ or ‘bleeding edge’ of COP management tools.

Sigma Connect was conceived in late 1996 within the Shared Petro-technical Resource of British Petroleum (BP), where it was known as ‘Connect’. The original desire was to create an expertise-based directory to promote closer working relationships between some 500 exploration consultants and their clients in the business units. The initiative sought to move away from the classical texturally oriented approach, and build a more informal solution in the form of an Intranet based web site. On completion of an initial pilot phase, ‘Connect’ was taken under the stewardship of the knowledge management community within BP enabling its use to be extended throughout BP with Addept Computer Services responsible for the on-going development of the system which evolved throughout 1997 and 1998 as participation increased. In mid 1998 ‘Connect’ was adopted as a strategic tool for the merger between BP and the American Oil Company (Amoco). It proved invaluable in assisting the integration of people from the two corporate backgrounds. In addition to the proven support as an expertise system, functionality was added to support the management of COPs within the organisation. By early 1999 ‘Connect’ had become a mature application within the BP Amoco group and in June 1999 the intellectual
property rights were transferred to Addept Computer Services, enabling the application to be offered on a commercial basis as Sigma Connect. Currently Sigma Connect has been used with COP interests ranging from construction to banking and from retail to climate change.

Sigma Connect began life as an expertise finding or “yellow pages” system, enabling people to volunteer information about their knowledge and experience, which they were comfortable sharing. Such systems have been gaining acceptance in major global organisations such as HP’s use of ‘Connex’ (Rollo and Clarke 2001, p49), Xerox’s ‘Eureka’ (Kikawada and Holtshouse 2001, p305) and IBM’s ‘Community Knowledge Portal’ (Rollo and Clarke 2001, p56). The voluntary nature of the system was deemed to be very important with the emphasis on the quality of the information being captured rather than the quantity. The experience of other these systems where a mandatory approach has been taken to the gathering and inclusion of data shows that people are far less likely to respond positively to a request for help originating from a search of such a system. While Sigma Connect provides a sophisticated array of search mechanisms for retrieving information from the system the real challenge has been on how to encourage and reward users for contributing information. Providing support for COP within Sigma Connect is just one way in which usage of the system can be encouraged and benefits delivered directly to the users. Thus this experience accords with general motivation of COP interactions from the 3 Australian case studies reported upon in another chapter in this book.

Maturity Level Development and Features of Useful COP Management Tools
Managing COPs with software provides some challenges that need to be overcome for the tool to be effective. Sigma Connect provides a useful model because its development trajectory has triggered a number of useful features to be incorporated. These are briefly described so that readers can discern between this tool’s maturity level and other similar tools that are at their nascent stage of evolution.

- **User authentication**: Sigma Connect supports the Windows NT challenge and response mechanism and/or portal referral authentications models in addition to its own username and password access. This minimises the number of user logins to gain access to the information contained in or linked to Sigma Connect.
- **Integration**: Sigma Connect can be integrated with other systems with in the organisation. Upstream integration enables new members to be automatically added when they join the organisation and enables contact information to be kept in-sync with core data repositories. Downstream integration enables other intranet web sites and applications to make direct use of the information captured by Sigma Connect.
- **Taxonomy**: A taxonomy enables structured searches of the system. This taxonomy is allowed to grow and change to reflect the ongoing business goals. The provision of statistical analysis for the taxonomy usage, provides a better understanding of its use.
- **Usability**: The overall look and feel of the portal is one of informal encouragement, rather than dictatorial enforcement. This helps to make people comfortable with using the system and leads people to contribute information and promotes the on-going usage of the system. The terminology that the system uses is very flexible ensuring it is in-line with that already in common use within the organisation rather than forcing people to adopt unfamiliar phraseology.
Structured/Unstructured fields - A mix of both structured and unstructured fields provides users with the most productive environment for capturing and searching for expertise. A moderated interface for expanding and managing the content of structured fields enables the systems to grow with the business.

Information delivery - Using a browser-based interface enables the widest possible access to the system from practically anywhere. There is no reliance on client side software and the system can be accessed both from within an intranet or across the public internet using a low bandwidth connection, a pre-requisite for many remotely operating construction workers.

Encourage usage - Any system which fails to remain up to date will rapidly become discredited and rapidly fall out of use. For this reason it is fundamentally important to encourage individuals to use the system and provide incentives for keeping the information up to date. This is achieved by providing more than just an expertise finder as part of the system. Providing support for communities of practice, with document sharing and discussion forums or providing personalized contact management functionality are both good ways of supplementing the basic functionality to encourage usage of the overall system.

Dynamic Profiling - Rather than just being a re-active system, which is driven by user searches, Sigma Connect provides pro-active support through the use of dynamic profiling to highlight other people in the system who have similar interests and areas of expertise. This dynamic profiling is also applied to COPs, highlighting COPs that have a high level of membership overlap.

Physical resources - In addition to addressing the issues of capturing and searching for people's skills and experience and managing COPs, Sigma Connect also address the management of the attributes of the organization's physical resources—meeting rooms, training facilities, application systems etc.

The way that the software tool is used also provides interesting insights. Sigma Connect actively nurtures the growth and development of communities with the objectives of:

1. Helping the organization understand what communities exist and how they operate;
2. Stimulating communities to operate globally throughout the organization;
3. Facilitating the re-alignment of communities with the needs of the organization; and
4. More fully encouraging engagement of people in a pro-active manner through the dynamic profiling features—it helps to direct and link people to the range of COP interest groups, thus it potentially expands and enhances COP activities.

Using much the same philosophy as for individuals, Sigma Connect also provides a global platform for Communities. It builds on the existing momentum, structures and facilities rather than seeking to replace them, stimulating existing initiatives and encouraging new. Through Sigma Connect, an organization can become aware of all its communities, which in turn benefit from that awareness. With Sigma Connect Communities you can:

1. Distinguish Communities by type;
2. Create Sub-communities (to any level);
3. Search by name or topic;
• Distinguish between different Members and Visitor roles;
• Add links, documents and images; and
• Manage Community Membership.

These features help communities flourish and provide a supportive environment for controlled innovation. The visibility of these communities means that management can ensure that they are aligned with the needs of the business and that task outcomes are more readily available. These features and the experience of its development allow Sigma Connect to be a useful model for aligning support for and development of COPs within organisations.

USE OF SIGMA CONNECT™ BY CARILLION PLC - THE UK CASE STUDY

We now discuss how a well-established COP management software tool has been used at a major UK construction organisation. We also provide background detail about the UK construction organisation Carillion’s experience of using Sigma Connect provided through a semi-structured interview with Mr Gerwyn Jones of Web Development Innovations at Carillion PLC undertaken by an Addept director who was intimately involved with and engaged upon supporting Carillion’s use of the tool.

Sigma Connect was introduced into the UK construction contractor Carillion plc as part of its knowledge management strategy. Carillion was formed in 1999 through the de-merger of the Tarmac group of companies. Tarmac was a household name in the UK with over 100 years experience in the construction industry. Carillion is now focussed on the business and construction services industry with a turnover of £2billion and over 20,000 employees. The construction industry is rapidly changing, driven by both commercial and public demands for sustainability, safety and quality. In line with these changes, Carillion’s business is also changing, moving away from straight development projects lasting 2 to 3 years to longer service based projects which not only include the initial construction but the on-going facilities management, maintenance and servicing, which can last for 20 to 30 years or longer.

Sigma Connect was first piloted within Schal a subsidiary of Carillion, which provides fee based construction management and consultancy services. A key factor in this business was getting the right people with the right experience involved in each project; process innovation often being the differentiator between competing project bid proposals. The Pilot was used to help understand the potential barriers and develop buy-in from the stakeholders of each subsidiary for promoting Sigma Connect’s use across Carillion. Cultural barriers were remarkably rare and isolated to very limited number of individuals: most employees wanted to promote what they knew and find others that could help them deliver better outcomes for their projects. Eighty percent of Schal’s employees were using Sigma Connect within weeks of its launch.

Although Schal could be considered as being experienced construction information technology users, a technical barrier that would affect the sharing culture was identified. Schal’s Knowledge Management strategy noted ‘equity’ as a key success factor: Every employee had to feel that their knowledge and experience was equally important to the organisation. Sigma Connect suited the equity premise perfectly but of Schal’s 200 employees, not everyone had easy access to a computer that was
connected to Schal’s Intranet, particularly Schal’s hands-on site supervisors. The solution employed was to install an additional desktop computer to each project site for use by the hands-on employees. The computer was branded a “Knowledge Centre” and looked physically different to all other desktops (the Monitors and desktop cases were black, not beige). This solution was embraced by most of the hands-on site supervisors. Shortly after this successful pilot the Web Development Innovations team was formed in Carillion with the remit of investigating Knowledge Management strategies and tools. Gerwyn Jones was impressed by the success of Sigma Connect with in Schal and it was decided it should be rolled out across the whole group.

Carillion views Sigma Connect as an essential part of the knowledge management jigsaw puzzle. It is not a solution in its own right but plays an important role along with their what they term their ‘Knowledge Forum’, the ‘Knowledge and Innovation network’ and ‘Best Practice Programmes’ many of which are substantiated by a COP within Sigma Connect. Carillion have created a number of different COPs within Sigma Connect. These range from the purely social groupings like a five- a-side football tournament, through the typical expertise based COPs focussed on the use of other ICT products, to a highly structured COP to support the implementation of their internal Fast Track Management Programme.

The main business driver for implementing Sigma Connect and introducing Knowledge Management into Carillion is the very nature of the modern construction industry—being highly competitive, high risk, with low margins. To succeed in this environment a business has to be sharper, more efficient and consistently using its knowledge assets to ‘get it right first time’ and avoiding repeat mistakes. The Business Services side to the business is highly customer focussed in an equally competitive, but growth market.

Carillion’s Knowledge Management initiatives are aiming to avoid people making costly mistakes, but if they do to learn from it so that no one in the organisation makes the same mistake again. In the UK PFI (Private Finance Initiative) and PPP (Public Private partnership) tenders are very hotly contested (Akintoye et al. 2003). A significant amount of money and resources can be spent tendering for one of these bids, so successful knowledge management is relevant not just to the end project but in tendering for the business in the first place. Gerwyn Jones from Carillion stated that “It is essential that we have the right people, the right lessons learnt, the right knowledge and all the information at our disposal so we can tailor a bid quicker and better then ever before”. Before Sigma Connect was implemented people relied on talking to people they knew, which was limited by the size of their own informal networks. Sigma Connect opened up those networks, breaking down the natural boundaries of location, functional structure and cultural background to create an environment that welcomes sharing and fosters innovation. This was particularly important to Carillion as it is split into 8 major functional divisions but where any particular project may involve people from 3 or more of these divisions. Gerwyn also confirmed that Sigma Connect has been instrumental in breaking down barriers to knowledge flow within Carillion.

Awareness of the importance of knowledge management in the construction industry has now reach the level where it is not unusual for prospective suppliers of major
PFI/PPP projects to be asked what their knowledge management strategy is, within a Invitation to Tender document. As such Sigma Connect is regularly demonstrated to potential clients in bid presentations. This has not only impressed clients but also generated an additional incentive for staff to ensure their information is current with in the system.

Providing a quantitative figure for the return on investment in Sigma Connect is very difficult, particularly as the central support team do not always hear the success stories. But Gerwyn believes: “Sigma Connect has contributed to the overall success of our knowledge management strategy—expanding the informal networks people used to rely on and improving the quality of our bids. It helps to promulgate a sharing culture within the organisation, one where we capitalise on the lessons we learn.”

Three examples cited by Gerwyn Jones of how Sigma Connect has helped are:
- With a reduction in new infrastructure in the UK, Carillion Rail decided it should explore the business potential of expanding into Norway and Scandinavia. Sigma Connect was used to find people within the organisation who spoke Norwegian and had the appropriate experience in the railways business. One of the people found subsequently gained a “Value Award” for her performance in achieving business objectives, that were above and beyond expectations;
- In the IT department, two engineers were faced with fixing a component in a printer without having any instructions in English. A quick search on Sigma Connect promptly found someone locally who could understand the instructions and the printer was soon back in action; and
- A project was initiated to investigate the creation of a Call Centre. It was only through Sigma Connect that one of the managers discovered that one of his colleagues, who he had known for over a year, had 5 years experience in managing a Call Centre prior to joining Carillion.

The taxonomy structure in Sigma Connect reflects the areas of knowledge and expertise that are relevant to Carillion’s business. One enterprising business development manager responsible for consultancy to property owning and occupying clients, has added areas of expertise to the taxonomies, so that the expertise relevant to his consultancy packages are available. This allows him to immediately identify any new people joining Sigma Connect who have expertise in his areas and at the same time promotes his part of the business.

Carillion have defined a number of different types and styles of COP within Sigma Connect. Some examples include:
- Fast Track Management Programme;
- Data Protection Group;
- Project Eagle - Gaining a better understanding of the business processes;
- Hyperion Pillar Users - A software users’ COP;
- Movement for Innovation - Best Practices Groups;
- Electronic Data Management - Primarily interested in collaboration tools; and
- A five-a-side football tournament
The entire active user population of Sigma Connect is in many respects a COP that facilitates the diffusion of ICT and more importantly of industry knowledge and experience throughout the organisation.

The main benefits of defining a COP within Sigma Connect are:

- Clearly identifies the existence of the COP and its members;
- Promotes membership of the COP to people with appropriate expertise profiles;
- Contact details and automatic email links are provided for every member;
- Group emailing of all the members can be accomplished in a single click;
- Allows for the management of the membership of each COP in line with organisational objectives;
- Provides a central point for storing or linking to documents, files and web pages;
- Ability to provide an Internet Forum linked to the COP;
- Dynamic membership profiling highlights potential overlaps between communities;
- Information displayed can be different for members and non-members;
- Membership can be used to control access to documents and files; and
- Provides search engine for retrieval of information across multiple COPs.

All of these benefits are in addition to the implicit benefits provided by a COP as highlighted elsewhere in this chapter. In rolling out Sigma Connect within Carillion, Gerwyn has utilised the Implementer style of COP described earlier in this chapter. Following the initial launch of Sigma Connect, which was supported by a poster campaign, articles in the company newsletter and e-marketing campaigns, Gerwyn and his team are still championing the system as part of their more general knowledge management initiatives. As such Sigma Connect is part of a larger culture change programme in Carillion.

Gerwyn believes there are four critical factors for the successful implementation of Sigma Connect:

1. Senior Management Support;
2. Having a dedicated team of people who believe in it to implement and support it;
3. On going promotion and coaching; and
4. Introduction to new employees at induction stage.

These four aspects combined, constantly revitalise the system and ensure its widespread uptake and ongoing use. To date, approximately one third of the employees with access to the internal network are now active users of Sigma Connect. Initially Sigma Connect was seen as a stand-alone solution, now Carillion are integrating Sigma Connect with other systems. For example on the website promoting “sustainability within construction”, a link to Sigma Connect could highlight the people within the organisation who are experts in sustainability.

Typically, the COPs in Sigma Connect direct people to other sections of the intranet where information relevant to the COP is stored. Carillion are planning to implement access control security for these areas of the intranet via Sigma Connect. This means
that some documentation will only be available to members of a COP, but more importantly, the list of people that have access is visible not only to the members of the group, but also to the visitors who do not have access – further encouraging transparency and an open culture.

CONCLUSIONS

We started this chapter with a discussion of three important knowledge management concepts—COP, tacit knowledge and sticky knowledge. These are linked because they relate to the need for tacit knowledge in particular to be shared by people through the channel of human interaction. We stressed that tacit knowledge is generally very sticky and context bound and therefore rich channels of communication are necessary to adequately convey meaning—hence knowledge. Further, we stressed that COPs play an important role in facilitating an increase in the absorptive capacity of individuals and groups, of helping to provide the contextual tacit knowledge that helps explain cause and effect links and so reduce causal ambiguity in understanding how innovation or change impacts upon performance. We also indicated that COPs can facilitate the enhancement of the quality of relationships between COP participants. All these factors help to break down barriers that make tacit knowledge sticky. Thus, COPs can be valuable knowledge management aids. With the advent of tools that help build, manage and maintain electronic interaction of COPs, the scope and scale of COPs can be enhanced and expanded.

We saw in our other chapter in this book relating to COPs that COPs are already ‘out there’ and they already impinge upon organisations and so it behoves construction organisation leaders to grasp a potentially fruitful opportunity to leverage this highly valuable knowledge asset. The tool illustrated in this chapter provides more concrete guidance for the reader. It shows how COPs that may be currently restricted to user access by phone, email, fax and person-2-person contact can be facilitated through a web portal approach that is effectively managed. Features and characteristics illustrated by the Sigma Connect system provided a useful benchmark of system maturity in terms of features offered and issues of security, access and linkage to other organisational ICT systems.

We also provided a concrete example of how Sigma Connect, can be applied in practice so that this chapter provides both theoretical results from a case study as well as practical information on how COP can be facilitated in the construction industry. Sigma Connect provides an example of a proven, web based environment for people to collaborate, sharing their knowledge and experience. Connecting people to people and people to information thereby reinforcing and expanding the scope of their Communities of Practice and unlocking the implicit knowledge held within the organisation. COP management tools like Sigma Connect also recognise that dialogue is one of the most effective ways of transferring knowledge. Only through dialogue can one ensure that the context of the knowledge flow is in line with the recipients’ needs. For this reason, the most effective knowledge channels in an organisation tend to be the personal networks, which form the basis of many COPs. One key to successful knowledge management can therefore be defined in terms of understanding, supporting, expanding and influencing these networks through the definition and management of COPs and the implementation of appropriate technology to support such COPs.
It is also interesting to reflect that interest in effective ICT and knowledge sharing is also emerging as a competitive advantage in project alliancing. For example Bovis Lend Lease was part of a winning consortium in Australia that won the right to construct the National Museum of Australia as a result of its information management strategy response to the client requirement for ICT innovation that better facilitates knowledge sharing as well as electronic document transfer (Duyshart et al. 2003; Walker and Hampson 2003).

This paper is limited by its scope and a number of interesting issues remained to be explored, such as the degree of ease or difficulty with which tools can be used for these COPs to be developed; the nature and degree of COP connectivity using ICT tools, access to knowledge through use of ICT COP tools, and recruiting the right people with required knowledge and the learning culture environment. However, the paper’s relevance and contribution lies with its connection to the concepts of a COP and the exploration of the nature of the social networks as well as the case study of Carillion’s use of Sigma Connect as an effective tool for managing COP.

PRACITICAL TIPS AND LESSONS LEARNED

- Sticky knowledge is a feature of tacit knowledge but it can be made less sticky through effective COP actions.
- COPs are already ‘out there’, organisations should recognise their usefulness and power for knowledge creation and sharing and capitalise on thier capacity to expand their scope and scale through the ubiquity of the web.
- The Carrillion plc case study indicated how a range of COPs types can be effectively managed using web portal technologies—the software needs to be well established to service different needs of people at various levels within organisations and so considerable ‘back-of-house’ features do need to be incorporated. The Sigma Connect tool provides a useful benchmark of functionality.
- The dynamic profiling and other smart features of these tools enable people to be more effectively connected through their expressed interests that are tracked by the COPs management tool.

REFERENCES


