

Facilitating Knowledge Sharing Environment within Bureaucracies by Cultivating Communities of Practice: A Case Study

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Abstract: Hierarchical structures and processes in organisations that manage large infrastructure programmes are designed to better control their implementation. Bureaucratic rigidities of the organisations do not allow them to deal with increasing complexity as they lack environments that encourage the knowledge flow, risk taking and flexibility on which adaptation thrives. The centralised power structure generates defensive mechanisms and discourages individuals to learn and to share knowledge. To remain flexible and adaptive the bureaucracies need to sustain their competitive advantage by capitalising on knowledge and experience of their experts. The leadership needs to think holistically about combining conditions of hierarchy and discipline with other forms of cooperation. Communities of practice can become the spaces of explicit and especially tacit knowledge exchange outside the usual organisational constraints and can foster environment of learning and collaboration internally and externally. However, there are many examples of failure to evolve them into a sustainable entity. This paper explores the process of cultivating communities of practice within a hierarchical organisation that manages large infrastructure programmes. It aims at studying how application of problem structuring techniques can assist the organisation under scrutiny in understanding the key sponsors' perceptions regarding communities of practice and how that can contribute to reducing a tension between a need to capitalise on expert knowledge and the individuals who are discouraged to learn by control structure of a hierarchical organisation.

Key words: Knowledge Management, Communities of Practice, Organisational Learning, Hierarchical Organisations, Cognitive Mapping

Introduction

More public companies are discovering the need for effective mechanisms in their organisations to capitalise on expert knowledge. The knowledge based view of the firm suggests that intellectual resources are key organisational assets that sustain competitive advantage (Drucker 1998; Wenger and Snyder 2000). Large infrastructure organisations generate a great deal of tacit knowledge, which is personal and is linked to experience and learning. However, control mechanisms of hierarchical bureaucracies coupled with management by objectives generate defensive mechanisms that discourage individuals' desire to learn (Argyris and Schon 1978; Josserand 2004; Mills and Friesen 1992; Mintzberg 1993; Senge 1990). Organisations are confronted with a tension between their need to learn and share knowledge, and the individualism stimulated by their control structure (Trauth 1999).

It is universally recognised that organisational culture has a big impact on behaviours and can hinder or promote a knowledge sharing environment (De Long and Fahey 2000; Mueller 2012). Some of the components of organisational culture that have been identified as being influential towards promotion of a knowledge sharing environment, for example the general working environment, hierarchical organisational structures and the lack of a social network.

Cultural change is inevitable for organisations planning to have robust knowledge management (KM) systems. They need a paradigm shift from 'knowledge is power' to 'sharing knowledge is more powerful'. However, changing organisational culture in hierarchical bureaucracy can be a long and painful process. It may take more than a decade to create a knowledge sharing culture, which can potentially discourage the management that is already under the strong pressure to deliver short-term results.

Hierarchical organisations need to introduce some forms of cooperation to develop practical knowledge within a bureaucratic structure. They need to integrate vertically organised teams with loosely-knit horizontal communities of practice (CoPs) (McDermott 1999; Smith and McKeen 2004). CoPs can move organisations away from traditional hierarchical structures towards task-force-based structures, resulting in an increased

focus on learning within teams. CoPs do not require painful changes and allow achieving some tangible benefits and quicker wins.

The focus of this article is the role of CoPs in a hierarchy as a vibrant source of organisational knowledge from the perspectives of the senior management, potential CoP sponsors. The authors practically contribute to the field of KM in hierarchical organisations.

Theoretical background

According to Morgan (2006), centralised control is one of the characteristics of the machine organisation. Organisations that operate like machines are usually called bureaucracies. They are characterised by efficiency, quality, and timeliness of production processes and behave in predictable ways. The structure and processes of traditional hierarchies may achieve the best results in day-to-day work; however, they do not have enough flexibility to deal with changes and leverage what they know (Kotter 2012).

Hierarchical form of organisations does not fully benefit from the big knowledge potential at the front-line. The complete opposite: hierarchies distinguish thinkers at the top from doers and strategy from tactics, ignoring that all parts of organisation are involved in creation of know-how (Brown and Duguid 1998). Organisational culture coupled with control mechanisms in hierarchies makes people risk averse and less open to share their mistakes and failures. Professionals end up working in their silos. To survive and continuously develop in dynamic and complex environments, organisations need to engage in learning.

Various studies provide evidence that organisational culture creates norms regarding what is 'right' and 'wrong' in the organisation and influences how people communicate and share knowledge (De Long and Fahey 2000). It is difficult to create an environment that will facilitate the necessary level of cooperation in public hierarchical organisations that focus on rules and procedures over innovative initiatives. There is a need for another strategic operating system that can be used alongside the 'business as usual' one to encourage organisational learning and to boost creativity and innovation. The development of organisational knowledge relies on the capacity of the organisation to develop the horizontal social network through which individuals can share knowledge and experience (Burt, 1982; Hernes 1999).

Large infrastructure organisations generate a great deal of tacit knowledge which is a product of experience, innovative problem solving and insights. That knowledge is stored in the heads of individuals and cannot easily be codified. Many authors argue that the only way to transfer tacit knowledge is through guided joint social interaction (Davison and Blackman 2005; Hayes and Allison 1998; Lave and Wenger 1991).

The concept of CoPs has been widely acknowledged by academia and practice to have high potential in creating and sharing valuable organisational knowledge (Bolisani and Scarso 2014; Jagasia, Baul and Mallik 2015; Josserand 2004; Wenger). CoPs play a big role in creation and exchange of task-based tacit knowledge across the organisation helping experts improve the ways they do business (Davenport and Prusak 1998; Wenger 2010).

There is a shortage of studies regarding CoPs within public hierarchical organisations (Bolisani and Scarso 2014). According to Wenger and Snyder (2000) it is quite challenging to sustain CoPs and incorporate them into the organisation because of their resistance to supervision and control. There is a need for deeper analysis in regards to articulation of CoPs with the organisation they are imbedded in and their sustainability in the control environment (Josserand 2004). The question remains as to how articulate CoPs in an organisation with its rigidities and control mechanisms and ensure their sustainability, especially if they differ from other common organisational forms.

Weick (1976) developed the concepts of tight and loose coupling to describe organisational structure in educational institutions. The concept can be applicable to other industries. In tightly coupled organisations there are accepted rules enforced by an inspection and feedback system. The management coordinates the activities of different departments according to a central organisational strategy. In loosely coupled systems, employees have more autonomy and different parts of organisations may operate without much coordination between each other. Weick (1976) analysed the potential effects of loose couplings that may occur among

individuals, organisational units and between hierarchical levels. Hierarchical bureaucracies with their centralised control structure are tightly coupled systems, which has advantages and disadvantages. In this article we focus on the ways in which loose couplings contribute to handling bureaucratic rigidities of hierarchical structures.

It is highly likely that efficacy in a loosely coupled system with autonomous units is greater than in a tightly coupled system with limited freedom to make decisions (Weick 1976). Loosely coupled systems understand their environments better and have more flexibility to experiment, explore and to adjust to the changing environment without affecting the whole system.

CoPs, as loosely coupled systems, can fill organisational gaps in various contexts due to their elasticity and adaptability to the organisational environment (Josserand 2004). They can adjust to the changing environment much quicker than hierarchical organisations with their rigidities. They allow for a non-threatening change that can reduce bureaucracy and speed up decision-making.

CoPs should not be viewed as a replacement for traditional operational models, they rather add a new dimension. They may not fit the design of organisations that are often focused on accountability for short-term results (Wenger and Snyder 2000). Thus, the role of the leaders in building and facilitating the environment that can encourage knowledge exchange is crucial (Nonaka, Toyama and Konno 2000). That is why it is necessary to understand the senior management mindset around CoPs.

In this research, we deal with multiple perspectives and bounded rationality, so it is very important to have the tools that can support representation of all perspectives and views (Axelrod 1976). Soft systems thinking (or soft OR) has been developed to deal with these kinds of situations. Systems thinking is a theory addressing the interrelationships between variables and their connections to a whole system. The theory can be viewed as a reaction to failure of traditional approaches when confronted with complex problems in social systems (Checkland 1981). The advantage of 'soft' systems thinking is that it "keeps in touch with the human content of problem situations" (Checkland, 1985, p. 765).

Research setting and methods

Yin's (2003) case study method was used for this research, involving 'empirical investigation of a contemporary phenomenon within its real-life context [using] multiple sources of evidence' (p. 23). A case study design was chosen because of the exploratory character of the research (Yin, 1984; Eisenhardt, 1989; Brown and Eisenhardt, 1997). Multiple cases are beneficial, yet there are contexts in which a single case design is preferred and yield rich in-depth data (Dubé and Paré 2003). The information obtained through engaged action research enabled the researchers to look at and examine the findings in real-life environment.

Soft interpretive OR approaches and techniques recognise the importance of human perceptions, interpretations and worldviews while dealing with subjectivity and uncertainty. People with different mental models 'see' the same things differently and organise their knowledge based on their values. Knowledge initiatives that ignore the dynamics of human nature are doomed to fail (Davenport and Prusak, 1998).

For this study, the problem-structuring methods of soft systems thinking, the strategic options development and analysis (SODA) developed in the late 1980s are applied. Cognitive mapping (CM) technique is a fundamental part of SODA approach that has recently been developed further into 'JOURNEY Making', (JOintly Understanding Reflecting and NEgotiating strategy) (Eden and Ackermann, 1998).

CM is a formal modelling technique with clearly defined rules for its development. The technique helps describing people's tacit knowledge about a certain problem, particularly in ill-structured decision problems without reducing the complexity (Ackermann and Eden, 2010). A cognitive map graphically demonstrates a problem situation, gives an indication of why the situation is problematic and what can and cannot be done about it (Eden 1994). The formal basis for cognitive maps derives from Kelly's (1995) personal construct theory which proposes an understanding of how people 'make sense' of their world by seeking to manage and control it (Eden 2004).

A significant strength of CMs is that it supports elicitation of mental models and generation of creative ideas using the participants' language. Decision Explorer software (<http://www.banxia.com>) was used for the analysis of cognitive maps.

This study is a part of a broader research programme of action research aimed at studying the inhibitors to KM in the organisation via a 2-year Knowledge Transfer Partnership, supported through UK government funding via Innovate UK. The firm under the scrutiny is a public organisation that manages large infrastructure programmes and operates in a multi-organisational environment comprising complex overlapping and interlocking projects and operational systems.

Data for this study were collected through semi structured interviews, community documents, and observation. The documentation, observation and informal conversations with the employees in regards to multiple KM initiatives that did not survive provided the authors with a good understanding of organisational context and the reasons for failure of KM initiatives, which allowed for triangulation as a basis for a comprehensive case analysis.

The initial interviews were conducted with the management team of the one multi-billion-euro infrastructure programme (12 participants) and lasted from one to two hours. The interviews were recorded, transcribed and translated into cognitive maps to depict the interviewee's perception of the situation. Content validation of individual cognitive maps was conducted by sharing them with interviewees during follow-up interviews.

The individual maps were merged into a single map reflecting all the individual views. The combined map was presented to the interviewees during a focus group to test whether it correctly interpreted their views and was worked on until everyone found it acceptable. The key options and assumptions were discussed and verified, and the redundancy was eliminated. The focus group allowed participants understand different viewpoints. Of the various analytic tools that were available, the most valuable ones for this case study were head, centrality, domain and cluster analyses (Ackermann and Eden, 2010).

The heads of a map are the concepts represented by the nodes that have only arrows going inside. They are the goals expressed in terms of final ends or effects. Domain and centrality analyses were used to identify the key issues from the perspectives of the interviewees. Decision explorer also allows detecting clusters, where a cluster may be separable from other parts of the map (Eden 2004).

Analysis of the combined cognitive map revealed the key inhibitors to creating a knowledge sharing culture. It allowed deeper understanding of problem situation and served as a basis for interview questions with five potential CoP sponsors using the same methodology.

Findings and discussion

Within the last decade the company under scrutiny pioneered several KM initiatives, which have failed to gain the necessary traction to overhaul its existing processes. These were hierarchical in nature and reliant upon engagement with IT platforms that were perceived as being remote from operations. There are currently several factors that are contributing towards inefficiencies in the company including a systemic failure to re-use knowledge generated across regions, programmes and projects. This project aims at understanding the key challenges regarding implementation of KM.

Preliminary data were collected from the management team of one infrastructure programme around main opportunities and challenges in knowledge creation, application, sharing, and retention.

From the perspectives of the infrastructure programme management team merely having a KM system and providing access to it will not encourage knowledge sharing behaviour. For a KM programme to be successful specific cultural conditions must be present. The key challenges mentioned by the team relate to: a) "silo" mentality, b) "blame" culture, c) lack of trust among the stakeholders, d) lack of proper planning, and e) lack of common language within the supply chain.

The concepts “share knowledge”, “share best practice”, “retain knowledge in the organisation”, “create a learning environment”, “change the organisational culture” and “create the environment of trust” were among the 10 key issues mentioned by the infrastructure programme management team. Interviewees emphasised the importance of cultivating CoPs as tools to “exchange tacit knowledge” and “break silos” internally and across supply chain.

CoPs are vulnerable because they usually lack budget and formal voice in the company, so they need to be integrated into the business and get support from the senior management (Wenger and Snyder 2000). That is why it was crucial to identify potential CoP sponsors who recognise the importance of cultivating professional CoPs to learn about their expectations.

The key results of analysis were presented to potential CoP sponsors (the commercial and development director, heads of commercial, procurement, and cost estimates professions) to get their feedback regarding the challenges mentioned by the team. They appreciated the key issues mentioned by the team and mentioned that CoP cultivation is the most feasible way for expert knowledge retention and exchange. To understand the perspectives of the senior management of infrastructure programmes, potential CoP sponsors, regarding the best ways of sharing expert knowledge in the company the individual interviews were conducted.

The analysis of the detailed data was organised into a cognitive map (Figure 1). The map gives deep insight into problem situations and ways of addressing those problems from the perspectives of senior management (because of the size of the map only high level nodes are demonstrated). Head analysis was conducted to identify goals and their interactions. As the merged map illustrates, the interviewees have high expectations from managing tacit knowledge in their organisation. The concepts ‘58 improve safety and performance’, ‘59 improve reputation of the company across the industry’ and ‘60 be the client of choice for the supply chain’ were defined as the goals (Figure 1) that can be achieved by implementing robust KM strategies.

The results of centrality and domain analyses can give insights into which might be candidate key issues. Concepts with the top 13 highest domain and centrality scores have been reported in the Table 1. The key strategic issues underlined (Figure 1).

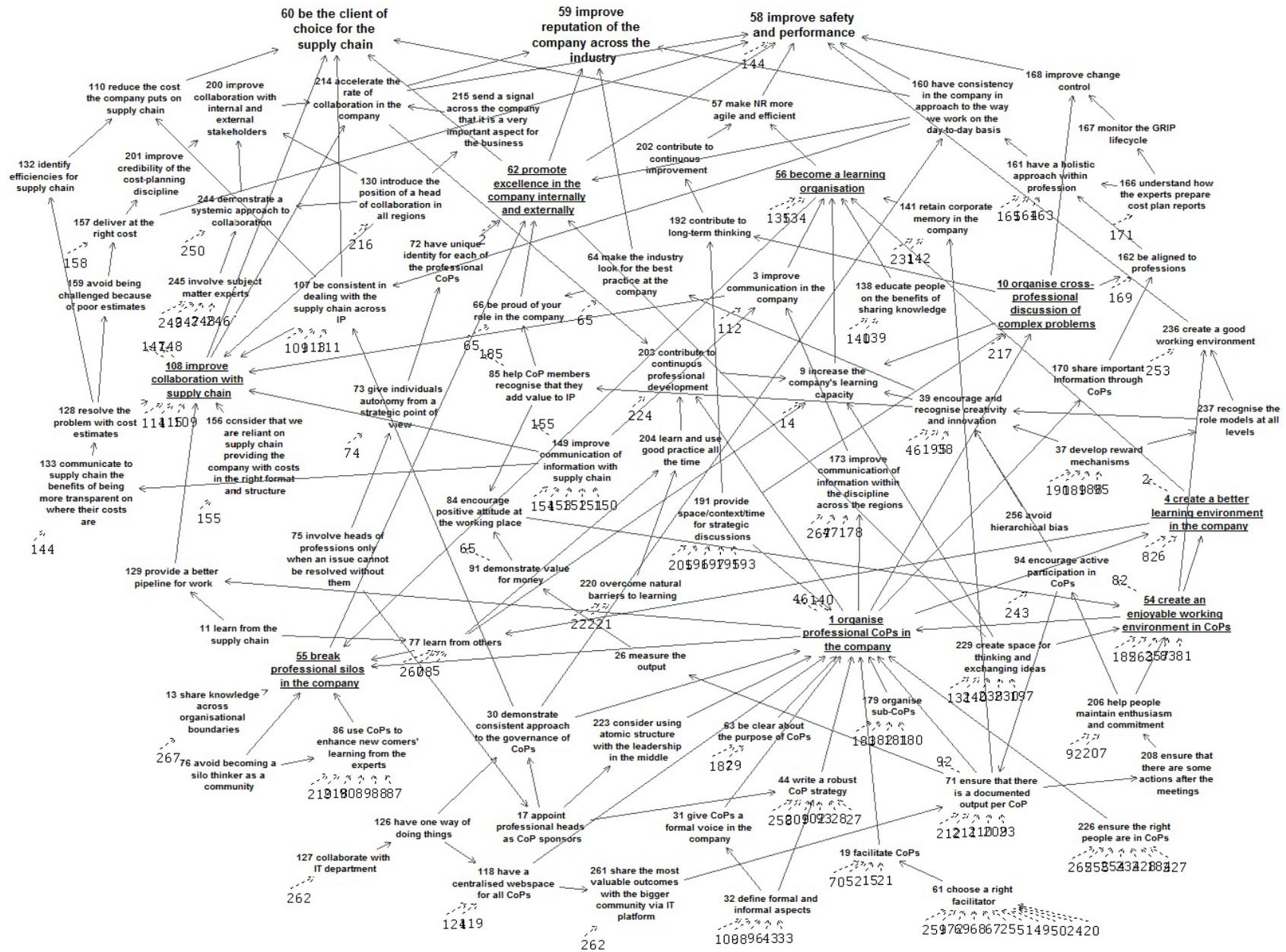
The senior management of infrastructure programs emphasised that addressing the key issues mentioned by the management team i.e. break ‘silos’, create a learning environment, improve knowledge exchange internally and across the supply chain, will increase organisational capacity complex problem solution. They also highlighted the importance of creating an enjoyable working environment to encourage knowledge exchange and innovation within the CoPs, which eventually will contribute to a better learning environment in the company (see the direct inward link to the node 54 from the node 4, Figure 1).

The leadership of the company is actively promoting continuous improvement programs with quite low rates of improvement mainly because continuous improvement requires a commitment to learning and overcoming the cultural issues such as the silo and blame mentalities.

Table 1: The results of Domain and Centrality analyses

The Key Strategic Issues		Centrality score	Domain score
1.	1 organise professional CoPs in the company	93	21
2.	55 break professional silos in the company	59	7
3.	54 create an enjoyable working environment in CoPs	59	10
4.	4 create a better learning environment in the company	57	7
5.	10 organise cross-professional discussion of complex problems	54	7
6.	62 promote excellence in the company internally and externally	50	9
7.	56 become a learning organisation	52	9
8.	108 improve collaboration with supply chain	44	14

Figure 1: The merged Map (dotted lines represent the links to hidden nodes)



There is an understanding in the company about the importance of becoming a learning organisation (node 56) that involves systematic problem solving, experimentation with new approaches, learning from own experience, past history, and best practices of others, and transferring knowledge quickly and efficiently throughout the organisation.

The management team mentioned that the culture of blame in the organisation as one of the inhibitors to learning and innovation. The inability to uncover failures may contribute to already existing rigidities of hierarchical organisations. All interviewees mentioned that CoPs can become a risk-free space where people can build trust and share not only good practices, but also what they have learnt from their failures and mistakes. They realise that CoPs should encourage free knowledge exchange without fear to be blamed for wrong actions. Some of the important points mentioned by the heads of professions were to 'maintain the balance between control and freedom' (node 33, Figure 2) and minimise their involvement in CoP discussions (node 75, Figure 2). They agreed also that CoPs should be given a formal voice in the company (node 31, Figure 2).

Based on Argyris and Schön (1978) organisations operate mainly on single-loop learning principles. However, CoPs can create an environment where people can be open to confrontation and where the subject matter experts can question deeply rooted assumptions, norms, and objectives eventually helping the company develop the capability of double loop learning. Double loop learning can be achieved if 'error is detected and corrected in ways that involve the modification of an organisation's underlying norms, policies and objectives' (Argyris and Schön 1978, p.3).

The analysis illustrates that there is an evidence in the company of professionals of the same discipline working in their silos using different formats and structures (node 55). The interviewees mentioned the need to work collaboratively across different disciplines and functions with the involvement of supply chain experts to co-create value. For CoP members learning is a matter of practice, not a theoretical thing. It is all about becoming a practitioner. One of interviewees mentioned that 'CoP will be able to provide a better pipeline for work because we will be delivering at the right cost'.

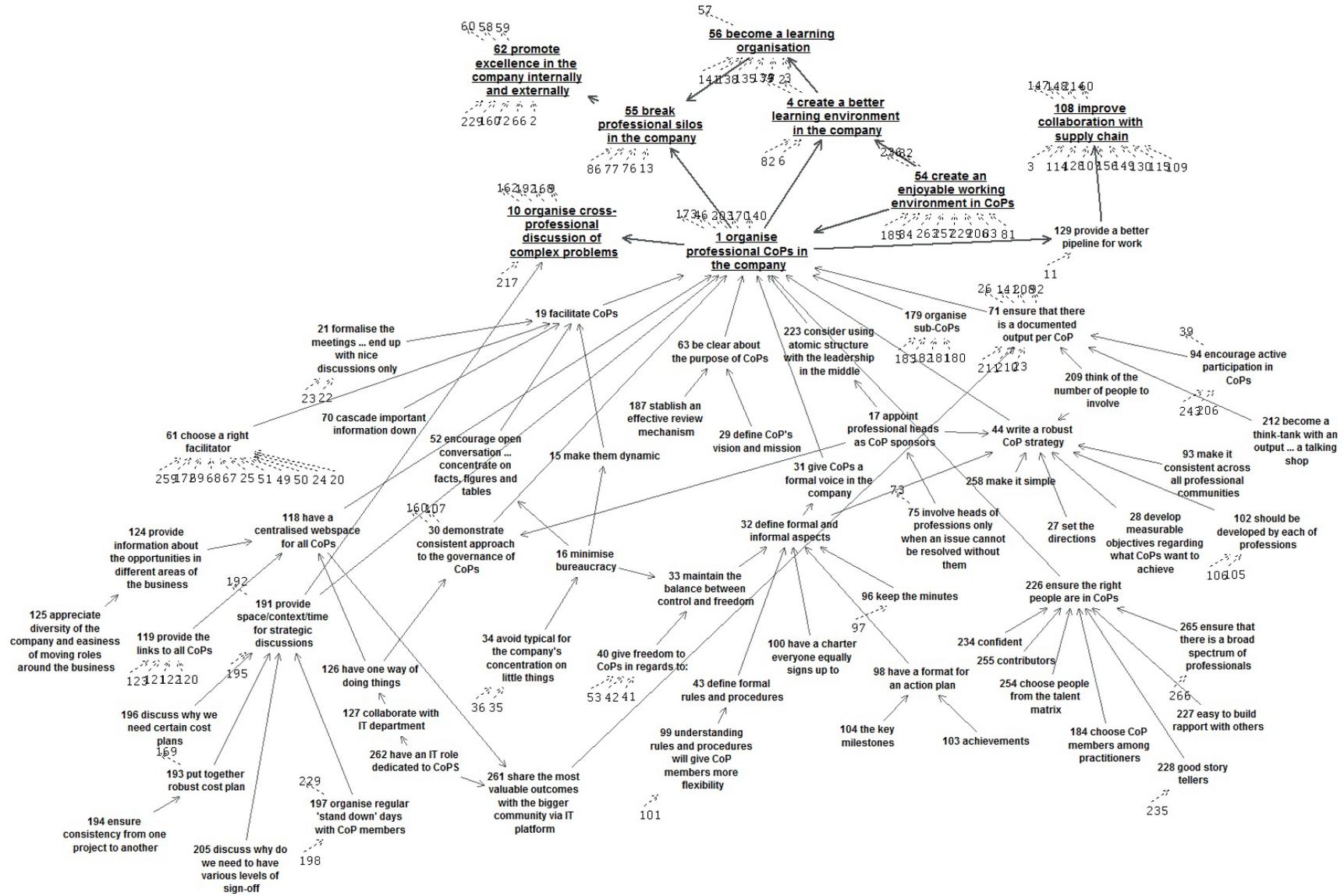
Cluster Analysis was used to identify groups of concepts that are linked together and cover a particular area of the issue. Cluster analysis is a procedure that organizes data entities into relatively homogenous groups. The key strategic issues can be the heads of the clusters that can be analysed individually. The analysis of the cluster that has the node '1 organise professional CoPs' as a head (Figure 2), demonstrated that CoPs have the potential to dramatically change how enterprises operate (see the bold arrows that go out of the node 1). As Figure 2 demonstrates, CoPs directly contributes to the strategic issues described in the nodes 10, 55, 4 and indirectly affects nodes 62, 56 and 108.

The literature on loose coupling suggest that decomposable structures have certain desirable properties, such as the potential for recombination and adaptability (Weick 1976). The map (Figure 1) demonstrates that CoPs cluster is quite loosely coupled with the rest of the map (in terms of inward connections from the other clusters) and at the same time, it significantly contributes to the other key strategic other key strategic issues.

That can be viewed as another indication of feasibility of viewing CoPs as loosely coupled remedy to bureaucratic barriers towards knowledge generation and exchange. As a loosely coupled system, a CoP will be free from the control mechanisms of hierarchical bureaucracies coupled with management by objectives which discourages individuals' desire to learn. From the perspectives of the management CoPs can co-exists with the administrative hierarchy as a loose coupling mechanism to facilitate single and especially double loop learning.

The senior management of infrastructure programmes came to agreement on CoP facilitation (node 19), expected outcomes (node 71), the profile of potential CoP members (node 226), importance of having a robust CoP strategy (node 44), sponsorship (node 17), requirements for centralised IT platform to share the outputs from different CoPs (node 118) and so on. The interviewees agreed that to stimulate the involvement of CoP members their cooperation should be grounded on concrete and practical realisation to partially satisfy the need for reification. There was also consensus in regards to the role of regional directors and line managers. The management can contribute significantly to strengthening the role of communities within an organisation by encouraging participation of their experts.

Figure 2: The CoP cluster (dotted lines represent the links to hidden nodes)



The results of this research demonstrated that managing CoPs is a very demanding task for the sponsors and managers and their commitment to support and promote CoPs is a key to their sustainability, especially considering that hierarchic bureaucracies lack environments that encourage the knowledge flow, risk taking and flexibility.

Conclusion

The hierarchical organisations have challenges in sharing knowledge their design is often focused on accountability for short-term, local, or individual results and is not well suited for communities (Wenger et al. 2002). In those organisations, people associate knowledge with power and promotion opportunities. The analysis of merged cognitive maps illustrates that hierarchical organisations that strive to become learning organisations to remain flexible and adaptive must take holistic approach to combining conditions of hierarchy with other forms of cooperation. Organisations that implement large-scale infrastructure programs can build capability by understanding their cultural environment and perspectives of employees regarding enablers and inhibitors to knowledge transfer (Davies and Brady, 2000).

Using the effect of loose coupling, CoPs can contribute to hierarchical organisations by making them more organic and flexible. They can become a loosely coupled remedy to bureaucratic barriers by serving as a driving force for behavioural change. Based on the analysis of the maps, CoPs are an excellent way of transferring practical tacit knowledge and experience operate outside organisational boundaries and hierarchies. They can be reintroduced into the formal system (become tightly coupled) by integrating with vertically organised teams without compromising the culture of free knowledge exchange. CoPs also need official sponsors at the senior level, who will invest resources to help CoPs develop and sustain. Thus it will be useful for practitioners to start KM implementation by understanding mental models of potential sponsors.

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