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Intentional Development of Communities Of Practice – Improving Knowledge Sharing And Work Guidelines

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Abstract

Healthcare professionals within operations widely use guidelines for sharing knowledge however, guideline effectiveness varies. Communities of practice (CoP) can increase guideline compliance and best practice transfer, however, only few studies focus on intentional CoP development that support guideline effectiveness. We address this gap by proposing and testing a framework for intentional CoP development within operations to study the relationship between organizational knowledge sharing and CoP. A framework for intentional CoP development is synthesised from CoP research. The test setting is a blood analysis unit in a regional hospital where employees apply automatic analysis equipment. Two CoPs are developed and the study finds that manager support, voluntarism and undisturbed meeting space are important elements for CoP development.

Keywords: Communities of Practice, knowledge sharing, guidelines, organizational learning

1. Introduction

Written guidelines are used to distribute knowledge among healthcare professionals within operations however guideline effectiveness is found to vary greatly (Grimshaw et al. 2004). Several factors are related to guideline effectiveness where one factor is a passive dissemination strategy of notifying via email (Grimshaw et al. 2004; Nilsen 2015) and another factor is guideline development independently of practitioners (Orr 1996).

Increased guideline compliance (Fung-Kee-Fung, Boushey, Watters, et al. 2013; Schenkel & Teigland 2008) and increased guideline quality and best practice transfer (Cordery et al. 2015; Barwick et al. 2009) are related to Communities of Practice (CoP). However, there are only few studies (e.g. (Fung-Kee-Fung, Boushey, Watters, et al. 2013; Cordery et al. 2015)) linking intentionally developed CoPs with guideline development. Consequently, knowledge about how to intentionally develop CoP in a regulated operations context is still lacking (Li et al. 2009; Ison et al. 2014). We address this gap by proposing and testing a framework for intentional CoP development within operations to study the relationship between organizational knowledge sharing and CoP.

A framework for intentional CoP development is synthesised from CoP literature and tested in a blood analysis unit.

2. Communities of practice

Communities of Practice (CoP) is defined as a *'Group of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an*

ongoing basis' (Wenger et al. 2002). The term Community of Practice was coined in a descriptive study to highlight the importance of learning and knowledge in the context of doing something together with others (Lave & Wenger 1991). The interest in how work, knowledge and employee relations are connected and their influence on organizational knowledge sharing has yielded numerous studies of CoP in the organizational context, meta studies, and explanatory frameworks (Aljuwaiber 2016; McKellar et al. 2014). From the CoP literature five critical factors for CoP development are identified. The five factors are identified by comparing studies and identifying factors related to CoP development, and subsequently grouping the factors into five categories while adjusting to the operations healthcare context.

2.1 Factor 1: Involving people

CoP theory was developed descriptively and proposed that employees are self-organized and not supported by management (Orr 1996; Gabbay & le May 2004; Lave & Wenger 1991). However pre-existing and "slumbering" CoPs can be leveraged when intentionally developing CoPs by 'manipulating emergence' of new CoPs (Kislov et al. 2012) and relying on the pre-existing network and social capital between employees (Iaquinto et al. 2011; Fung-Kee-Fung, Boushey, Watters, et al. 2013). By making CoP participation voluntary the employees can decide if the CoP is relevant or not for them (Hemmasi & Csanda 2009; Scarso et al. 2009; Fung-Kee-Fung, Boushey & Morash 2013) and consider if the CoP focus is meaningful (Akkerman et al. 2008; Wolf et al. 2011).

2.2 Factor 2: Coordinating activities

Social activities relate people to one another and the practical tasks support the CoP completing tasks and having an effect, and assigning a person an informal authority and responsibility for the well-being and functioning of the CoP is frequently found related to successful CoPs (Li et al. 2009; Aljuwaiber 2016). The role is named differently across studies; coordinator (Wenger et al. 2002; Iaquinto et al. 2011); facilitator (Scarso et al. 2009; Wolf et al. 2011; Schenkel & Teigland 2008; Cordery et al. 2015); knowledge broker (Conklin et al. 2013), and discussant fellow (Rowley et al. 2012). A beneficial definition comes from Conklin et al. (2013) that have described how *knowledge brokers* 'engage in a set of relational, technical, and analytical activities that help communities of practice (CoPs) to develop and operate'. The responsibility of the different roles varies greatly from practical task regarding meetings rooms and other meeting facilities (Iaquinto et al. 2011; Wenger et al. 2002; Akkerman et al. 2008), facilitate inter-CoP relationship (Barwick et al. 2009; Akkerman et al. 2008; Conklin et al. 2013), facilitating inter-CoP discussions (Barwick et al. 2009), encourage participation (Iaquinto et al. 2011) and connecting with stakeholders and collaborators (Wenger et al. 2002; Rowley et al. 2012).

2.3 Factor 3: Time to participate

Within the operational context, employees are often assigned to a shift and in contrast to knowledge works (e.g. engineers) that have some influence over time and tasks, the operational employees are depended on someone to cover their shift. Consequently time to participate in the CoP must be allocated by an operations employee's managers. Still similarities exists across contexts and having the necessary time to participate in the CoP are found important in both healthcare (Fung-Kee-Fung, Boushey, Watters, et al. 2013), construction (Schenkel & Teigland 2008) and automotive engineering (Wolf et al. 2011). Several studies relates successful CoP with a management sponsor, which we consider an important factor for the time available for CoP participation either through direct allocation or indirect support (Probst & Borzillo 2008; McDermott & Archibald 2010; Iaquinto et al. 2011).

2.4 Factor 4: Meeting room

CoP is a social phenomenon and physical interaction between CoP members are found important for successful CoP (Iaquinto et al. 2011; Wenger et al. 2002; Orr 1996; Fung-Kee-Fung, Boushey, Watters, et al. 2013) and reduced physical interaction is found to have a negative effect on CoP performance (Schenkel & Teigland 2008). The meeting between CoP participants must provide a risk free zone that caters for asking questions without risk of sanction (Borzillo 2009), having in-depth and undisturbed discussions (Orr 1996) and enable a collaborative work effort (Fung-Kee-Fung, Boushey & Morash 2013). We propose that the diner from Orr's account is replaced by a meeting room for the CoP participants to assemble in.

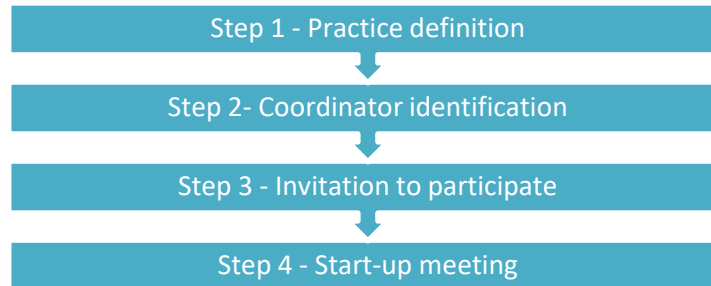
2.5 Factor 5: ICT

Information and Communication Technology (ICT) is an essential component of a knowledge management system (Hislop 2013), and the assigned IT equipment must be aligned with employee IT literacy e.g. choosing email for communication if employees are familiar with this technology (Scarso et al. 2009). Furthermore the CoP must be able to communicate in-between meetings, and by considering the feasibility of the framework the participants are encouraged to use the ICT they feel comfortable with (Fung-Kee-Fung, Boushey & Morash 2013).

3. Proposing the framework

We propose a framework for intentional CoP development within operations that has four steps (See Table 3). In step 1 the practice is defined by management based on the criteria '*relevance for employees*' and '*relevance for management*'. A practice is a limited collection of actions that can be identified as a task to complete e.g. maintenance job X, analysis Y. The purpose is to identify a practice that management will dedicate resources to develop and employees are interested in. Step 1 is mainly informed by factor 1. In step 2 a voluntary coordinator is identified among possible CoP participants (an employee with practice experience) and asked if he/she is interested in being responsible. The tasks are; arranging meetings, updating guideline, and communicate with stakeholders. The coordinator is prepared through a talk with the manager. The purpose of the coordinator is to ensure that the CoP will meet and that documentation is updated. Step 2 is mainly informed by factor 2. In step 3 the voluntary invitation to participate in the CoP is communicated to employees via email and a presentation at a meeting. The employees are told that the purpose is to establish a group for knowledge sharing, practice development and guideline improvement. Participation comes with two explicit requirements: '*an interest in sharing knowledge about the practice*' and '*experience with the practice*' with the purpose of attracting employees that will be active and that can participate in conversations. Anyone interest should email the manager. Step 3 is mainly informed by factor factor 1 and 3. In step 4 a start-up meeting is arranged where those that have expressed an interest in participating meet and discuss the meeting frequency, individual expectations and motivation and their resource requirements. Step 4 is mainly informed by factor 3, 4 and 5.

Table 1 – The four steps for developing the Community of Practice. The framework version 1.0

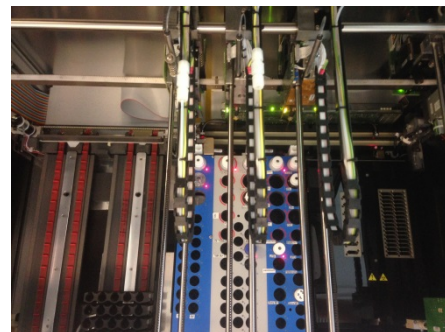


4. Setting

The blood analysis unit collects and analyse samples from patients at the hospital and around Northern Zealand, Denmark. The unit analyses approximately 3.5 million samples yearly and there are 29 employees that work 24/7 in three shifts and one manager. The analyses are mainly done by automated equipment where the employee's tasks are to keep the machine running, and validate answers. There are three categories of employees: 21 'operators' that are responsible for daily operations, 5 'specialists' are operators also with responsibility for training and problem solving, and 3 'subject matter experts' are responsible for updating guidelines and are not part of the daily operations.

Table 2 illustrates the work environment. The work station is called 'STA-R' and is used app. 250.000 times/year to analyse bloods coagulation capability. The 'operator' performs a daily routine and clean the machine, replace needles and refill reactors.

Table 2 – On the picture to the left an operator can be seen during maintenance of the STA-R the interior can be seen on the right



5. Method

The study is a single organization multiple case study. In each case of the two cases, different practices are selected and for case 1) the practice is a maintenance task for the STAR equipment and for case 2) the practice is a start-up procedure for the Centaur equipment. The cases took place in the same organizational unit 10 month apart. In each case an intentional CoP was initiated using the described framework.

The collected data was; the written guideline (in before and after intervention version), semi-structured interview with participants (to evaluate the framework and outcome), semi-structured interview with the coordinator (to inform and confirm findings), and CoP meeting minutes written by the coordinator (to document CoP activity).

6. Findings

6.1 Framework application

The framework application followed the sequence described below:

- Week 0. The researcher met with manager. The CoP was explained. The manager accepted.
- +1 weeks: Practice identification by the manager
- +2 weeks: Coordinator identification and acceptance.
- +2 weeks: Presentation by the manager at the monthly team meeting (app. 33% present due to 24-7 shift). Later the same day an email was sent to all employees. During the meeting the employees could ask questions
- +3 weeks: Deadline for signing up with the manager.
- +5 weeks (case A) / +6 weeks (case B): Start-up workshop
- +5 weeks (case A) / + 6 weeks (Case B): Initial communication between CoP and manager

6.2 CoP activity

In both case A and B the interventions connected employees that met on a number of occasions during a 13 week period (See **Table 3**). In case A 4 employees volunteered and in the course of the 13 weeks 4 meetings took place. In case B 3 employees volunteered and during the 13 weeks they met 5 times and the coordinator was absent for one meeting because of a holiday.

Table 3 – CoP activity for case A and B

Participant	Number of meetings	Seniority
Case A		
A1 (Coordinator) - Tina	3	34 years
A2/B1 - Annette H	3	20 years
A3 - Karin	4	10 years
A4 - Anette	4	15 years
Case B		
B1/A2 (Coordinator) - Annette H	4	20 years
B2 - Solvejg	5	19 years
B3 - Camilla	5	<3 years

In both cases, the CoP coordinator was also a specialist for the equipment at which the practice took place. The specialists considered their participation and being the coordinator as a natural extension of being a specialist. The same was the case with participant B3 that was an inspiring specialist. The other participants had long seniority and were experienced with using the equipment and performing the practice. The employees expressed the following about their motivation for participating:

B3: I wanted to learn more about the Centaur... I did not participate in the Star group (Red.: Case A) since it didn't interest me as much

B2: I think it (Red.: Centuar) is an interesting subject so I would have participated even if I had been assigned to do

6.3 Inter group discussions

In both cases, the CoP participants reported having conversations that explored differences and similarities of the participants' different ways of working. The participants willingly shared their individual knowledge

with each other and furthermore differences in their approach were explored and became opportunities to learn from:

A2: *'During the meetings we discussed our different approaches'*

B: *'..by talking about why we do what we do then we get things talked thoroughly through'*

A1: *'In the group we have shared our experience, what we do and why we do it'*.

The participants in case B made similar statements. The CoP provided the participants with a new way of interacting that were characterized by having more time to talk together about their work within the specific practice:

B3: *'Changes to a procedure are difficult to talk about during the work. The meetings provide the opportunity to sit and talk – this is necessary when changing a procedure'*

B2: *'We've had long talks about what to include and how it ('the text') can be understood'*.

6.4 A new guideline

The guidelines were in both cases significantly changed in terms of different use of illustrations, the use of specific words, and the sequence. Screen dumps from the software and pictures from the equipment have increased. For case A there were 0 pictures and 20 screen dumps in the old guideline and in the new guideline there were 6 pictures and 19 screen dumps. In case B the guideline went from having 0 to 6 pictures, the use of screen dumps did not differ significantly. An example of the pictures used in the new guideline for case A and B can be seen in Table 4.

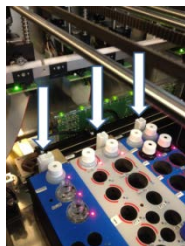


Figure 1 - Picture to the left: Case A: The white arrows show the positions of three wells inside the STA-R. Picture to the right: Case B: The black arrow indicates the maximum refilling level of the white plastic plates. Both pictures were taken and edited by participants

When asked about the use of pictures in the guideline the coordinator replied:

A1: *Pictures make it easier to know what to do. When you haven't done the maintenance for a while then it can be difficult to remember what the "well" is when you have to refill hypochlorit. A picture makes it easier to follow the SOP.*

6.5 Changed task sequence case A

The new guideline for case A has a noticeable change of sequence: the task of 'cleaning needles' is done before 'cleaning wells' where the old SOP described this in the opposite order. When the coordinator was asked to explain the difference she replied:

A1: *Cleaning wells is only done weekly and therefore something you rarely do leaving many insecure about it. Maybe they do it every six months. Cleaning needles is done every day so you know it and feel confident about doing it. So instead of starting with the difficult task we now start with the easy, then you can clean the needles and go for your coffee break and then start the well cleaning.*

The reason for the change in sequence was knowledge about how the task *felt* when doing it and participants identified the task sequence they found confident about. Another explanation of the change in sequence is that the new sequence places the difficult task (Well cleaning) prior to the coffee break and the coordinator further explained that the coffee break offers an opportunity to '*ask for help*' because all the operator assemble for a noon coffee break. The change in sequence was motivated by consideration the fact that operator rarely do the maintenance job.

6.5 Changed task sequence from case B

The old guideline described that two tasks (one automated and one manual) were to be done subsequent to one another and B3 did this, however B1 and B2 did the two tasks parallel which gave the same end result but in a shorter time than the approach of B3. This difference arose because the FK had described the approach by B3 in the guideline because then all the automated controls could be started simultaneous whereas the parallel approach required that the equipment be paused and continued. The FK considered the parallel approach to be too complex for practitioners to do and pose a threat to the quality. B1 and B2 considered the subsequent approach a waste of time, and they ended up stressing over the manual job because they knew the machine was "waiting" for the bioanalyst to finish consequently they adopted the parallel approach. The result was that the new SOP described the parallel approach.

7. Discussion

The purpose of the study was to a test framework for intentional CoP development within operations to study the relationship between organizational knowledge sharing and CoP. The framework test established a CoP in both cases and framework steps are found related to CoP activity.

7.1 Is it a CoP or not?

In both cases a small group of people (3 and 4 for case A and B respectively) held a number of meetings and communicated in between meetings during the study period. To discuss if we can consider them as CoPs we refer to their qualitative characteristics.

According to Wenger et al. (2002) a CoP is; '*Group of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis*'. The study deployed an intervention relying on voluntary participation and the information specified that participation required '*an interest in sharing knowledge about the practice*'. Because participation was fully voluntary and framed by a pre-defined practice we can consider that participants actually shared '*a passion*' in the practice and in sharing knowledge. Furthermore, judging on the CoP activity in the study period (Table 3) members had ongoing interactions, during which they shared knowledge and developed their individual practice as well as the guideline. The conversations between members are particularly relevant when characterizing the CoPs (see section 6.3), and in the investigated cases participants stated that different approaches were shared, discussed and integrated resulting in one common approach. This type of conversation is typical for CoP that facilitates the negotiated development of practice through sharing stories (Wenger et al. 2002; Hislop 2013).

In both cases the CoP was made responsible for updating the guideline to establish a coherent operations knowledge management encompassing both knowledge development and utilization. While the CoP supports knowledge development through '*interpreting*' and '*integrating*' of individual knowledge (Crossan et al. 1999), knowledge utilization requires that knowledge is disseminated to relevant employees and a

guideline is one method for doing this (Cordery et al. 2015; Nilsen 2015). However the guideline responsibility raises the question if the framework test developed a CoP or a temporary team. Based on the differences between a CoP and a team indicated by McDermott & Archibal (2010), we can confirm that this is the first instance. Firstly, in both cases a collaborative effort took place and despite having a coordinator with a supportive responsibility, all participants were equal in terms of contributing in defining the practice, sharing knowledge, and establishing collaboration activities. Secondly, the community was not charged with solving a specific working problem as it was responsible for developing, documenting and disseminating the knowledge to improve tomorrow's work day and reach beyond itself. Thirdly, the guideline changes are the outcome of CoP conversations. Lastly, the time span was not specified in advance since participants were charged with developing knowledge with the requirement of updating the guideline. It is certain however that the level of activity was reduced after the 13 week period due; anyway the CoP continues to exist, at least in an informal (latent) way, since members continue to interact and share knowledge embedded in their daily work.

7.2 The effect of the steps

The framework deployed a number of steps that are related to the intentional development of the CoPs and elements were identified as influential for CoP activity by the CoP participants; voluntary participation, the meeting room, and the coordinator.

7.2.1 Voluntary participation

Experience and an interest in sharing knowledge were requirements for participating and these requirements were chosen because the participants should be able to participate in a conversation about the practice and be interested in exploring different approaches. For each case a group of app. 3-4 employees were connected and held a number of meetings, with a stable show of participation, and had in-depth conversations consequently the framework successfully connected employees. The approach taken for connecting employees was successful and is feasible for an organization where operations employees share a physical workplace with scarce resources, and where CoPs must adjust activity level according to the organizational need. Since participation was voluntary the pre-existing relationships and individual interest is leveraged which reduces the instrumentality of the framework. The recruitment rests on communicating the opportunity to participate in the CoP to all employees. Within an operational unit with a 24-7 shift-plan there are very limited opportunities to gather employees and few resources to manage a communication framework that targets operations must consider these characteristics. We deployed two interventions; a presentation by the manager during a team meeting (app. 33% present) and an e-mail to all employees. Further studies should explore how to communicate a recruitment campaign that is feasible to manage and has a high reach.

7.2.2 The meeting room as an undisturbed space

Organizations must support CoP with the necessary equipment (Scarso et al. 2009; Iaquinto et al. 2011; Fung-Kee-Fung, Boushey, Watters, et al. 2013) which we translated into providing a meeting room for the participants and having the manager support that the meeting took place in a meeting room. The CoP mainly interacted in meeting rooms close to the practice which could be considered bringing a distance between the participants and the practice however we argue that the meeting room is necessary to have in-depth talks. One understanding of interactions is that they are embedded in the actual work (Lave & Wenger 1991) and another understanding is that interactions take place within a safe environment where

ideas can be freely exchanged (Orr 1996). Our results support the understanding brought forward by Orr because the work environment is busy and a quiet room is needed to have in-depth conversations where ideas can be exchanged freely.

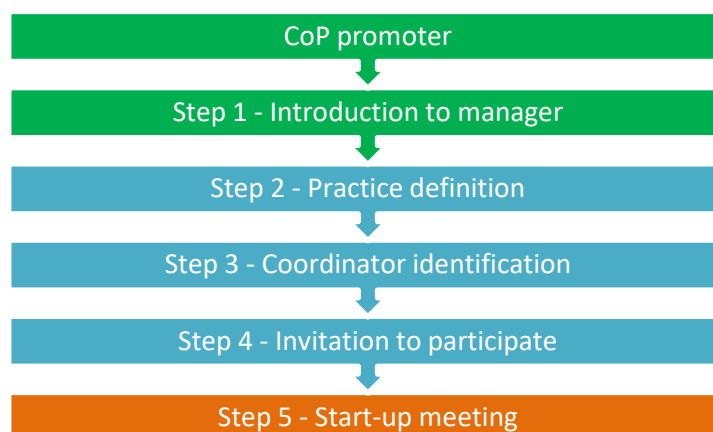
7.2.3 The coordinator

The coordinator was introduced in two steps: first the manager was presented with a description of the coordinator role and second the manager asked a suited candidate if she was interested. The choice was later confirmed by the CoP participants at the initial CoP meeting. This approach was adopted from Wolf et al. (Wolf et al. 2011) and similar to their conclusions the approach functioned well. The risk is that the manager chooses a favourite however the benefit is that the manager knows the employees and can approach a well-suited candidate. During the intervention period the coordinator was in-charge of implementing the guideline changes that the Cop agreed on. Furthermore, the coordinator was important for staying in touch with SME and acting as a knowledge broker that spanned the border between the practice founded knowledge of operation employees and the theoretical founded knowledge of the SME (Wenger 2000). We did not find that the coordinator made a difference for the inter-CoP relationship which could be attributed to the CoPs consisting of a small group of people with a pre-existing relationship. Future studies should investigate how the role of a coordinator changes from different contexts and the personal characteristics associated with being a coordinator.

7.3 The updated framework

Besides the framework steps identified by the participants we also found support for adding 'CoP introduction to Manager' as step 1. If CoP is new to an organization the manager must be introduced to the subject and subsequently to the framework and its application, which was also done in week 0 during this study (See 6.1). The 'Start-up meeting' was not identified as very influential by the employees and this raises questions of its purpose and content. Lastly, a CoP promoter is added as supportive resources that can bring CoP knowledge into the organization.

Table 4 – The framework version 2.0. A new step 1 is added and the step 5 'Start-up meeting' requires further studies.



8. Conclusion

The framework test resulted in the development of two CoPs. The development was mainly facilitated by voluntary participation, assigning a coordinator, resource allocation including time to meet and a meeting room.

The study confirms that managers play a vital role in CoP development through the allocation of resources. However future studies are needed to better understand the start-up meeting, the CoP promoter, how to recruit members and the relationship between the CoP and stakeholders that influence the organizational knowledge sharing. The study offers business managers a useful tool for CoP development and direct managers towards the critical elements (e.g. voluntarism, a meeting room).

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