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### Organizing professional communities of practice

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### 3 Design and instrumentation<sup>4</sup>

The previous chapter presented the theoretical design of a system for organizing effective CoPs. This I call the CoPOS (Community of Practice Organizing System). In this chapter the research model used to test the design is developed. The model on which the system is based shows that in order for CoPs to be effectively organized, cognitive, social, motivational and coordinative factors need to be considered. According to the theoretical evaluation, the design satisfies these requirements. The next step in the research is to test to see if the system actually works. This is done by testing the outcomes of the system in regards to individual and group learning outcomes.

This study is about how CoPs can be organized in order to stimulate organizational learning (OL). In order to judge the effectiveness of the system in doing this, a number of variables are defined and tested for. The discussion begins with a look at OL and how it is conceptualized in regards to CoPs, the point being to make a clear link between learning outcomes and OL. Then other outcomes of CoPs are discussed and finally the methodology and instrumentation are discussed.

#### 3.1 OL and Knowledge Building: the role of CoPs

Original OL theorists maintained that for OL to have occurred, there must be an improvement or change in one or more aspects of organizational performance. However, more recent literature looks at organizational learning from a process viewpoint. For example, Fiol and Lyles (1985) define OL as "...the process of improving actions through better knowledge and understanding." Argyris and

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<sup>4</sup> This chapter is based on:

Ropes (In press) 'Measuring the Impact of Communities of Practice.' *International Journal of Learning and Intellectual Capital*.

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Schön (1996) consider OL to have occurred when a problematic situation is experienced by organizational members and attempts to solve it on the organization's behalf is made. Mulholland, et al (2001) describe OL as an interactive process between workers who "...among other things, share stories, offer advice, adapt to new tools, and copy the behavior of respected colleagues" (p. 337). Huber (1991) on the other hand, argues that not all learning leads to a change in behavior, but that sometimes there is merely a change in the cognitive map or understanding of the individual, which increases the range of an entity's potential behavior and thus the potential effectiveness. According to Huber (1991), OL occurs if "... any of its units acquires knowledge that it recognizes as potentially useful to the organization. A corollary assumption is that an organization learns something even if not all of its components learn that something" (p.89). Berends, Boersma, and Weggeman (2003) add that OL processes must also have an element of new knowledge transfer for them to be effective.

Another important notion of OL is that a corporate body of knowledge exists and if attempts are purposefully made to add to it, then one can say that OL has occurred (Confessor & Kops, 1998). This is what organizational knowledge building is about: intentionally trying to add to the organizational body of knowledge in order to attempt to improve its effectiveness. This might occur at the individual or group level, for example within CoPs.

Most of the literature considers OL to be a cyclical, iterative process linking individual, group and organizational levels (Bapuji & Crossan, 2004; Nonaka & Takeuchi, 1995; Stahl, 2000). CoPs play a dual role in OL from a cyclical perspective; first, they can be a source of new learning on their own. Secondly, before new knowledge is integrated into the organization, it must first be validated by a collective – such as a CoP - before it can become part of the corporate body of knowledge (Stahl, 2000). Thus, OL and the role of CoPs therein can be conceptualized in two general ways. First, OL can be linked to learning processes of groups or individuals (Driver, 2002), such as what happens in CoPs. Secondly, CoPs produce and verify new knowledge that leads to a change in the corporate body of knowledge. The conceptual research model shown in Figure 3.1 illustrates the link between CoPs and OL.



Figure 3.1. Conceptual research model

### 3.2 CoPs and learning: perspectives, processes and outcomes

In this section I elaborate on how learning forms the link between CoPs and OL by reviewing four of the most cited works on CoPs (Cox, 2005), starting with Lave and Wenger (1991).

Jean Lave and Etienne Wenger first used the term “Community of Practice” in their book entitled *Situated Learning: legitimate peripheral participation*, in which they studied the learning behaviors of five natural groups (Lave & Wenger, 1991). What they observed was that people learn in a social context through on-going interaction. They found that learning was not a dyadic function between teacher and pupil far removed from practice, but rather an experience, or process, wherein many different actors play a role and where knowledge is situated in a specific context. The resulting theory, which portrayed novices as learning while participating in a community of practice, they called Legitimate Peripheral Participation (LLP). LLP considers that learning is situated in practice and takes place in a mixed social configuration of experts, less experienced practitioners and novices. Through observation and social interaction, new members of the community of practice learn and progress toward expert level. In Lave and Wenger’s book, the CoP is understood to be the environment in which one learned; there was no explicit goal related to the CoP itself (such as innovation or knowledge building). The result of participating in a CoP was that one became an expert in the domain of the CoP by becoming more competent in it. Since Lave and Wenger’s original work, there has been three other major pieces that have influenced the theory and practice surrounding CoPs. The first one is a study of copy machine repair technicians done by Brown and Deguid (1991); the second is a phenomenological study of an emergent CoP done by Wenger in 1998 and the third is a prescriptive book on organizing CoPs in the service of OL, written by Wenger, McDermott and Snyder in 2002.

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### *3.2.1 Brown & Duguid (1991)*

In their study on organizational learning and CoPs, Brown and Duguid looked at how a group of copy-machine technicians learn while working together. Using a social-cognitive theoretical perspective, the authors describe how the technicians solve complex problems together by avoiding the use of the organization's 'canonical' knowledge and relying on their community of practice. Through shared stories about their practice, the technicians are able to expand and develop new knowledge about the machines they repair – knowledge that is missing from the service manuals distributed by the main organization. In this way, learning, work, innovation and performance are intertwined in the daily activities of the technicians. Shared understandings about their work are developed through participation in the CoP. New knowledge - embedded in practices, procedures and insights - is saved, distributed and used by the whole community of technicians themselves. Participation in the CoP increased the technician's capabilities as well as contributed to the effectiveness of the organization. In a later work, Brown and Duguid (2001) argue that individual learning and collective knowledge building are in fact indications that organizational learning has taken place.

The description of CoPs Brown and Duguid give differs from the original conception of CoPs in the sense that Lave and Wenger described a learning environment where novice participants became more competent in the context of a socially constructed group, through participating either actively or passively in the activity system. Brown and Duguid describe CoPs as learning environments made up of more or less equals who build knowledge together in a social situation. Knowledge building is different from traditional ideas of learning in two ways; first it is a social collaborative process and second it focuses on explicitly improving ideas or situations (Scardmalia & Bereiter, 2006).

Furthermore, Lave and Wenger's original work focused mostly on how individuals learned. While social-cognitive learning theory such as Brown and Duguid describe includes individual learning, the group, or CoP, is the focus because it forms the direct environment for learning. Group learning is "... an ongoing process of reflection and action, characterized by asking questions, seeking feedback, experimenting, reflecting on results, and discussing errors" (Edmondson, 1999, p.353). Learning processes in a CoP are no different than in other groups, but the goal for a CoP as a group is to build knowledge around a specific domain;

learning takes place while doing this. CoPs situated in an organizational context thus build knowledge in the service of the organization and the outcomes of this learning are new knowledge products (Brooks, 1994) or what Wenger (1998) called ‘boundary objects’. These can take the form of research reports, memos, et cetera and form connections between the CoP and the wider organization. Boundary objects may lead to innovations such as a solution to an organizational problem, the development of a new product or a new process design. Thus, according to Brown and Duguid, an outcome of group learning in a CoP is innovation.

Innovation can be divided into two main categories, namely incremental innovations and radical innovations (Stam, 2007). For example, the solution to an organizational problem falls in the category of an incremental innovation, while the development of a complete new product or process is a radical innovation. In a cyclical perspective of OL, the CoP verifies the importance of the innovation in regards to the greater collective and subsequently passed on to other parts of the organization where it becomes part of the corporate or organizational store of knowledge (Nonaka & Takeuchi, 1995; Stahl, 2000).

In summary, Brown and Duguid found that CoPs are knowledge-building environments that play an important role in facilitating problem solving, building and verifying new knowledge and contribute to organizational learning by increasing individual effectiveness and innovating.

### *3.2.2 Wenger (1998)*

Wenger (1998) studied a group of claims processors in a large insurance firm for a year long. This research helped him to further develop the idea that CoPs link individual learning, social practice and organizational learning. What Wenger found was that the group of claims processors was going through several different and simultaneous processes. Newcomers were being introduced and participating in the CoP on a regular basis, and much of their learning on the job could be ascribed to participation in it. In this sense the CoP functioned as a strong, social-cognitive learning environment for novices, much like the one described in the work of Lave and Wenger (1991). In the narrative of the claims processors, one reads that the CoP of which they were part of was important because it helped them to form a professional identity, to give meaning to their work and to allow for reflection on their practice.

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What Wenger (1998) found was that learning is the collaborative negotiation of new concepts or artifacts introduced into the CoP by either the individual or the external environment in which the CoP operates. Learning is stimulated because the equilibrium in the group's social and social-cognitive structure is disturbed by the introduction of these new concepts, and new learning is needed to bring the group back in balance (Hakkarainen, Palonen et al., 2004). Through an iterative process of reflection and negotiation with new ideas and concepts, learning takes place within the social connections of the group. This relational-based perspective on learning differs from other individual cognitive based learning theories because it considers that the group forms the actual basis for individual member learning. Especially important is that learning is a process that results in new artifacts in the form of stories, new processes and new knowledge, which through the practice of the participants, becomes part of the organizational routine, or corporate body of knowledge, and thus OL has occurred.

#### *3.2.3 Wenger, McDermott and Snyder (2002)*

In their book, "Cultivating Communities of Practice" (Wenger et al., 2002), the authors take a managerialistic perspective on CoPs. Their approach to CoPs is prescriptive rather than descriptive in nature – they discuss CoPs as being effective instruments for organizational learning. On the positive side, their approach helps broaden the understanding of what CoPs can lead to in an organizational framework: for the first time in the literature, CoPs are purposely organized as forums for knowledge building in the service of organization learning. On a more negative side, CoPs – once a naturally occurring learning environment where individuals became competent through increased degrees of peripheral participation – are now used in the service of management to solve organizational problems. The emphasis in Wenger, et is thus no longer focused on (social-cognitive) learning mostly benefiting the individual members of the CoP, but on the returns for the organization as a whole. And while both value to organizations and community members is part of the discussion, the connection to cultivating CoPs as an instrument for increasing organizational capabilities is emphasized. See for example, the first chapter entitled "Communities of Practice and Their Value to Organizations."

The following conclusions can be made from the literature discussed above; 1) individuals gain domain competence through participation in a CoP 2) groups

functioning as a CoP produce new knowledge as a result of their learning, and 3) increasing individual capability and producing new knowledge leads to organizational learning. These notions form the basis for the conceptual research model shown in Figure 3.2 below. An important point is that learning can be conceptualized as both a process and an outcome. The research model proposed here focuses on outcomes in order to evaluate and measure effects of the system.

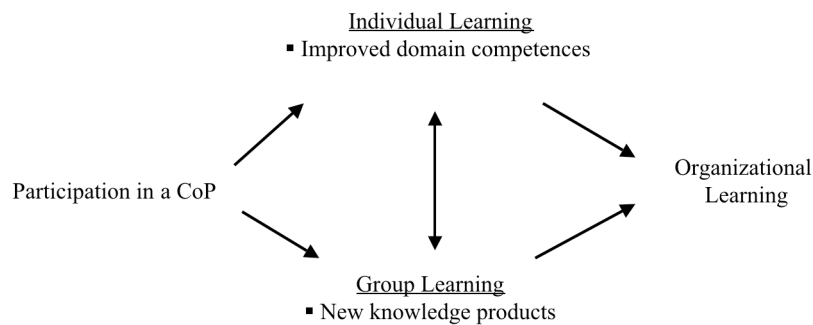


Figure 3.2. Conceptual model for testing the system

In the next section this conceptual model for testing is expanded upon. Other outcomes of learning in CoPs, which can be specifically linked to OL are discussed, starting with individual learning.

### 3.2.4 Beyond Competence: reflection as learning

The perspective on individual learning used in this study is that it is a dynamic process that takes place in a social setting and is focused on activities associated with the domain of the community of practice in which the individual participates. Learning in professional CoPs is situated in the context of the workplace and reflects the activities of a broader organizational structure. In Lave and Wenger's (1991) model, an individual becomes more competent through interacting with actors and artifacts within the activity system focused on a specific domain. Learning in this way means that the longer one is a member of the CoP, the more one's behavior is situated in the activities of the social system, and the more expert one becomes in practicing the activities associated with that specific domain. This result of learning is illustrated in the model above, namely improved domain competence. However, some types of learning that occur in CoPs are not related to any specific domain and consider the ability to reflect (Illeris, 2002).



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Reflection, especially critical reflection, plays an important role in learning processes and is crucial for what is known as accommodative learning to take place. This type of learning transcends context. Accommodative learning "...is more than the accumulation of facts. It is learning that makes a difference – in the individual's behavior, in the course of action he chooses in the future, in his attitudes and personality" (Rogers, 1961, p. 280 in Illeris, p.35). It is also the form of learning that advances the individual's development the most (Illeris, 2002, p. 37). Argyris and Schön (1996) refer to accommodative learning as 'double-loop learning', which they maintain can be directly linked to organizational learning because it serves both individual and organizational goals. Thus, one learning outcome of participation in a CoP that can be linked to organizational learning is an ability to critically reflect in a way that leads to accommodative learning (Illeris, 2002). Also, reflection in a work environment - especially critical reflection - may lead to action, an important component for organizational learning and change (Gray, 2007). Furthermore, working and learning in a reflective way is valuable to organizations in itself by contributing to organizational capability and employee self-efficacy (Bandura, 1997).

In her research on learning at the workplace, Van Woerkom (2003) defined a specific reflective behavior that she found to increase the learning capabilities of the organization. This behavior she called Critically Reflective Work Behavior (CRWB) and is based on the concept of experiential learning at the workplace. Experiential learning at the workplace is nearly identical with learning in a CoP (Illeris, 2002; van Woerkom, 2003). CRWB especially considers the importance of reflection for fostering accommodative learning. Van Woerkom uses Argyris and Schön's (1996) notion of double loop learning to help conceptualize CRWB, which she defines as "...a set of connected activities, carried out individually or in interaction with others, aimed at optimizing individual or collective practices, or critically analyzing and trying to change organizational or individual values" (p.85). This definition fits well with Wenger's (2000) idea of what it means to be part of a social learning system like a CoP. According to Wenger (2000, pp. 227-228), belonging to a CoP has three aspects: 1) engagement, which is an outcome of doing things together, for example solving problems, participating in a meeting or producing new artifacts; 2) imagination, which means constructing an image of ourselves, of our communities, and of our world, in order to reflect on our situa-

tion and explore our possibilities and; 3) alignment, which is checking to see if our local activities are aligned enough with other organizational processes in order for them to be effective outside of our local engagement.

Van Woerkom (2003) considers CRWB to be both a process of learning in a social system like a CoP, as well an outcome of participating in CoPs, and as such can be observed. This means that learning in a CoP should result in improved domain competence as well as increased levels of CRWB for the individual. The next section expands the research model further by looking at outcomes of learning in CoPs at a group level.

### *3.2.5 Improved group potential as a learning outcome*

The idea that learning in the workplace should lead to economic improvements is an important one for prescriptive research such as this. It also means that CoPs situated in an organization should be effective environments for participant and group learning in general. I propose that CoPs specifically stimulate effective learning environments by promoting both a positive learning climate and a learning-goal orientation.

Bunderson and Sutcliffe (2003) found that learning climates affect group goal orientation, one variable of effective group learning. They first distinguish between a learning goal orientation, where emphasis is placed on gaining competence, and a performance goal orientation, which emphasizes proving competence. According to the authors, a group that has a learning goal orientation shows more adaptive behaviors than a group with a performance goal orientation. Bunderson and Sutcliffe (2003) also found that a learning goal orientation, as a variable of group learning climate, was a predictor variable for process and product innovations. They state that "...a team learning orientation reflects a shared perception of team goals related to learning and competence development; goals that guide the extent, scope and magnitude of learning behaviors within a team" (p. 553). Although the original conception of CoPs as an emergent collective appears to be somewhat distant from the concept of a team, there are close similarities in the way they learn. More importantly, a CoP is a learning environment rather than a performing one, and functions as a space for improvisation and experimentation, where behaviors are constantly being adapted (Brown & Duguid, 2000, 2001; Swan et al., 2002).

Thus a positive group-learning climate together with a high level of team learning orientation should be two outcomes directly related to group learning in a CoP.

### 3.3 Hypotheses

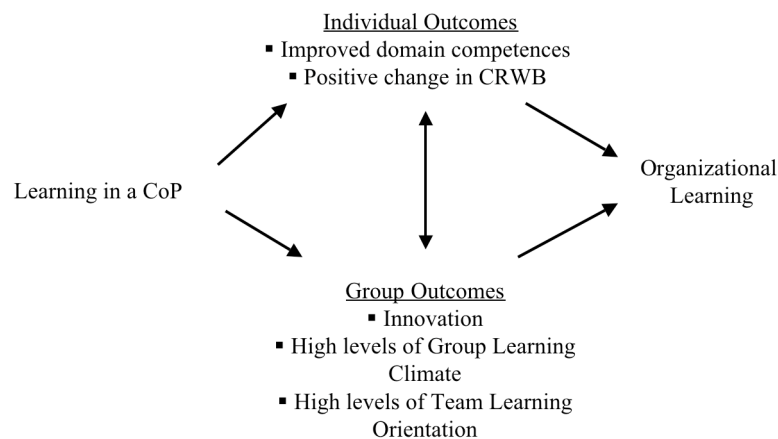
The theoretical models developed in this chapter and chapter two are part of the empirical cycle of fundamental research. The purpose of the empirical cycle is to develop and test a theory. The theoretical model showing effective CoPs, the design of the CoPOS and the theoretical outcomes of CoPs provide the elements for the following hypotheses that are tested in this study:

H1: Participants of CoPs organized using the system will contribute to organizational learning by having improved domain competence and higher levels of critically reflective work behavior.

H2: CoPs organized using the system will exhibit high levels of Team Learning Orientation and Group Learning Climate.

H3: CoPs organized using the system will contribute to organizational learning by developing new knowledge products in the form of innovations.

The following research model shown in Figure 3.3 reflects the hypotheses.



*Figure 3.3. Expanded model for testing the CoPOS*

The next section looks at the actual research design, which employs a combination of quantitative and qualitative approaches.

### 3.4 Research design

In order to test the model a quasi-experimental design based on what Cook and Campbell (1979) refer to as an “Untreated Control Group Design with Pretest and Posttest” was used. In situations where external variables cannot be extensively checked, or natural, existing groups are used, this is one of the more effective methods (Cook, 1983). According to Cook and Campbell (1979) “... this is perhaps the most frequently used design in social science research and is fortunately often interpretable” (p.103). The specific type of quasi-experiment used in this study falls under the category of quasi-experiments called “non-equivalent control groups”. The experimental design is pictured in Figure 3.4 below.

CoP members	O1	X	O1
	O2		O2
	O3		O3
	O4		O4
			O5
-----			
Comparison group	O2		O2
	O3		O3
	O4		O4
-----			
O1 Domain competences	O4 Team learning orientation		
O2 CRWB	X CoPOS implemented		
O3 Group learning climate	O5 Innovation		

*Figure 3.4. The general quasi-experimental design of this research*

In order to assuage any confusion, I need to point out two things. First, there were not comparison groups in each of the iterations. In three cases this was not possible. Secondly, and more importantly, the control groups are more what Wilkinson (1999) would call ‘contrast groups’ or ‘comparison groups’. This is because of the problems with non-random assigning of groups where groups are naturally occurring. In each of the cases, comparison groups were people who had attended no more than one of the CoP meetings. Meticulous record keeping allowed these respondents to be culled out from the larger whole. However, because of the way

the iterations transpired, it was not really feasible to approach respondents for any other measure except CRWB. In two cases where members of existing teams took part in the experiment, these were asked to complete the group learning climate and team learning orientation items using the team as their frame of reference, while members of the CoP were, of course, instructed to use the CoP as theirs.

### **3.5 Instrumentation**

The dependent variables in this research are the learning outcomes of individuals and the CoP, or group. Individual learning outcomes were measured in regards to domain competence and changes in levels of CRWB. Three different instruments were used to measure individual learning outcomes because of the different domains of the CoP participants. Group learning outcomes were measured by; 1) number of innovations 2) group learning climate and 3) group learning orientation. The instrumentation is discussed in more detail below.

#### *3.5.1 Individual learning outcomes*

Individual learning outcomes were measured using three instruments either designed especially or adjusted for the specific group being studied. The instruments looking at domain competences were developed to show explicit links between changes in the level of competence and participation in the CoP.

#### *Individual learning outcomes for teachers*

In order to gauge improvements in domain competence for teachers, an instrument was developed based on a list of competences that make up a self-evaluation survey for teachers in higher professional education. The survey is a product of the Citogroep and ICLON, two well-known Dutch institutes specialized in the field of teacher education and faculty development. In total there are 18 competences divided into the five groups. These and the individual competences are shown in Table 3.1 below.

*Table 3.1. List of teacher competences*

<b>Competence group</b>	<b>Specific competence</b>
Teaching preparation	1. Preparing course curricula
	2. Didactical preparation
	3. Facilitating individual learning

<b>Competence group</b>	<b>Specific competence</b>	
Teaching	4. Preparing learning activities linked to practice	
	5. Effective use of ICT	
	6. Giving explanations	
	7. Guiding class discussions	
	8. Guiding learning processes	
	9. Organizing learning environments	
	10. Creating a positive learning climate	
	11. Stimulating a positive attitude among students towards learning.	
	Testing and evaluation	12. Developing exams
		13. Using testing instruments
		14. Evaluation and adjustment of curricula
Functioning in organization	15. Working within the rules and regulations of the university	
	16. Preparing for and taking part in (department) meetings	
Professional development	17. Individual professional development linked to teaching skills	
	18. Professional development in groups	

Respondents are asked to rate their level of competence on a scale of 1 to 10 at the start of the first CoP meeting and after the fifth one. The same survey asks if the respondent can make a connection between specific interventions in the CoP and the change in competence. An example of this change is also asked for.

There are also several open questions on the survey asking about motivation for participation, comments on possible improvements and innovations resulting from participation.

I administered the survey at the end of the fifth CoP meeting. The survey was explained in regards to the competences as well. If questions arose about an item, I answered it. Follow up interviews were also held in order to clarify some of the open questions.

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*Management consultants*

In order to see any improvements in domain competences for the management consultant CoPs, an instrument was developed based on an official document drawn up by the Dutch Order of Organizational Advisers (OOA) which gives a detailed description of the competences attended to in professional development trajectories for organizational consultants (van Katwijk, Kranenburg, deLange, & Slijderink, 2002). There are seven competence groups defined and a total of 23 competences. These are shown in Table 3.2.

*Table 3.2. List of management consultant competences*

<b>Competence group</b>	<b>Specific competence</b>
General	1. Specializing
	2. Organizing and managing
	3. Changing
	4. Professional development
	5. Advising clients
Acquiring contracts and starting process	6. Acquiring fitting work
	7. Understanding the market and profiling
	8. Performing an intake interview
	9. Performing introductory research
	10. Building client relationships
Estimating and contracting	11. Developing estimates and agreements
	12. Developing contracts
	13. Agreeing upon rolls and responsibilities
Researching and conceptualizing	14. Orientating in the contract organization
	15. Determining research methods and techniques
Developing solutions, solving problems	16. Developing and evaluating alternative solutions
	17. Giving advice

Competence group	Specific competence
Implementing	18. Choosing and employing change strategies
	19. Research change readiness
	20. Intervening in the organization
Completing and evaluating	21. Facilitating groups
	22. Evaluating
	23. Reflecting

This survey is set up the same as the one for teachers, and is implemented the same as well. Open questions also concern the same topics as for teachers.

*CRWB*

In order to measure CRWB, an instrument developed by van Woerkom (2003) was used. This instrument is a six-point Likert scale (1=completely disagree, 6=completely agree) of 52 items that have a mean alpha score of .76. Items are divided into the seven dimensions of CRWB. The items and alpha's for each variable are shown below in Table 3.3.

Table 3.3. Variables of CRWB and items

Variables CRWB and items
<i>Reflection (α = .68)</i>
1. I reflect on the way I do my work.
2. I think about my communication with colleagues.
3. I find it difficult to pinpoint what I have learned in the last year. (-)
4. I ponder on what I find important in my work.
5. I compare my organization with similar ones.
6. I compare my performance with how I performed a year ago.
7. I think about what I have not done well in the past year.
8. I compare my performance with that of my colleagues.
<i>Critical opinion-sharing (α = .83)</i>
1. I come up with ideas how things could be organized differently here.
2. I make suggestions to my supervisor about a different working method.



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3. I give my opinion about developments at work.
4. I call this organization's policy into question.
5. I put critical questions to my supervisor about the working of this organization.
6. I make suggestions to my colleagues about a different working method.

*Career awareness ( $\alpha = .80$ )*

1. I am consciously occupied with my career.
2. I think it is important to have a job in which I can develop.
3. I think about what sort of work I will be doing in five years' time.
4. I am continually occupied with my career development.
5. I discuss with my colleagues our criteria for performing well

*Challenging groupthink ( $\alpha = .75$ )*

1. When everyone at work is in agreement with each other, I remain critical.
2. When I do not agree with the way a colleague does his work, I keep quiet. (-)
3. I do not easily express criticism of my colleagues or supervisor. (-)
4. When I do not agree the way a colleague works, I say so.
5. When I am the only one to disagree with the rest, I just keep quiet. (-)
6. When I do not agree with something at work, I find it hard to say so. (-)

*Learning from mistakes ( $\alpha = .71$ )*

1. If I do not know what I really should know, I try to hide the fact. (-)
2. I do not mind making mistakes.
3. If I have not done something well, I prefer to keep quiet about it.
4. If people at work see that I am doing something wrong, I have the feeling I have lost face.(-)
5. If I make a mistake, I find it hard to forgive myself.
6. If I have not done something well, I try to forget about it as soon as possible.
7. I get embarrassed if I make a mistake. (-)

*Sharing knowledge ( $\alpha = .57$ )*

1. I think I have the right to keep my knowledge to myself. (-)
2. It has advantages not to share your knowledge with others. (-)
3. I enjoy helping colleagues.
4. I find it annoying when other people take advantage of my knowledge. (-)

### *Design and instrumentation*

5. I enjoy sharing knowledge with other people.

#### *Experimentation ( $\alpha = .75$ )*

1. I like to work according to tried and tested ideas or methods. (-)
2. I feel comfortable when my work goes according to a fixed routine. (-)
3. I do not like to deviate from the prescribed working method. (-)
4. I like to try things out, even if it sometimes leads nowhere.
5. I experiment with other working methods.
6. I try out new working methods.

#### *Asking for feedback ( $\alpha = .83$ )*

1. I discuss with colleagues how I have developed.
  2. I discuss future developments at work with colleagues.
  3. If I think I have not done my work well, then I discuss this with colleagues.
  4. If I think I have done my work badly then I discuss this with my supervisor.
  5. I ask my supervisor for feedback.
  6. I ask my colleagues for feedback.
  7. I ask my customers (internal and external) what they think of my services or products.
  8. I discuss with my colleagues what I find important in my work.
  9. I invite colleagues to assess my work critically.
- 

The CRWB questionnaire was administered at the start of the first meeting of each group and after the end of the fifth one. For control groups a similar time frame was maintained.

#### *3.5.2 Group learning outcomes*

Group learning outcomes were split into two categories; new knowledge products in the form of innovations and group learning climate/team learning orientation. In order to find innovations or other knowledge products, I looked at community artifacts such as minutes of meetings, documents pertaining to solving problems, developing new processes or other types of communication that document and disseminate new knowledge to the CoP or to the wider organization.

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Two existing scales were used to measure Group Learning Climate (GLC) and Team Learning Orientation (TLO). The Team Learning Orientation scale shown in Table 3.4 was developed by Bunderson and Sutcliffe (2003) and consists of self-assessment of five items on a seven-point Likert scale (1=never, 7=always) in reply to the question “to what extent does your team do the following?” Cronbach’s alpha for this scale is .95.

*Table 3.4. Team learning orientation items*

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<b>Team Learning Orientation (<math>\alpha = .95</math>)</b>	
1.	Like to work on things that require a lot of skill and ability?
2.	See learning and developing skills as very important?
3.	To what extent is your team willing to take risks on new ideas in order to find out what works?
4.	Look for new opportunities to develop new skills and knowledge?
5.	Like challenging and difficult assignments that teach new things?

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Edmonson (1999) developed the two scales shown in Table 3.5 as a subset of GLC; one that measures team efficacy, which consists of three items (Cronbach alpha of .63) and one that measures team psychological safety, which has seven items (Cronbach alpha of .82). Respondents are asked to indicate to what extent their team does the following. Both scales use a seven-point Likert scale (1=completely disagree, 7=completely agree).

*Table 3.5. Group learning climate variables and items*

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<b>Group Learning Climate variables and items</b>	
<i>Team Efficacy (<math>\alpha = .63</math>)</i>	
1.	Achieving this team’s goal is well within its reach.
2.	This team can achieve its tasks without us having to put in too much time or effort.
3.	With focus and effort, this team can do anything we set out to accomplish.
<i>Team Psychological Safety (<math>\alpha = .82</math>)</i>	
4.	If you make a mistake on this team, it is often held against you.
5.	Members of this team are able to bring up problems and tough issues.
6.	People on this team sometimes reject others for being different.
7.	It is safe to take a risk on this team.

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**Group Learning Climate variables and items**

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8. It is difficult to ask other members of this team for help.
  9. No one on this team would deliberately act in a way that undermines my efforts.
  11. Working with members of this team, my unique skills and talents are valued and utilized.
- 

**3.5.3**      *Other*

Along with the scales discussed above, control questions were asked regarding age, sex, educational background, length of service in the organization, outside schooling and other formal and informal workplace learning activities.

All scales except that for the consultant competences were double –back translated into the native language of the participants. The ‘BoKs’, or list of competences for management consultants, was originally written in Dutch. Because the groups of advisors taking part in the study were all Dutch, there was no need for translation.

**3.6**      **Evaluation of process**

The instruments presented above were used in order to gauge the effects of the system on the participants through an outcome-oriented perspective. However, in order to have an understanding of the processes that *contributed* to the outcomes, there needs to be an evaluation of the implementation. In other words, I need to understand whether or not the CoPOS was implemented well.

**3.6.1**      *Evaluative survey*

In order to evaluate the CoP’s functioning in the first iteration, I used the framework given in the last chapter under the intervention ‘Evaluating the CoP’ (see Table 2.7. *Evaluation framework for the CoP*). But after the first iteration I found that this tool was not sufficient because it took too much time and did not give me any real insight into whether or not specific mechanisms had been triggered. For this reason I developed a quantitative survey based largely on the factors shown in Figure 2.1 as well as on critical success factors for CoPs (Ropes, 2009; Saint-Onge & Wallace, 2003; Smith & McKeen, 2003; Wenger et al., 2002). I also used some items from an existing evaluation form from CIBIT (a Dutch knowledge

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management consultancy) that fit with the model. Besides serving as a tool for group reflection, the survey helps to understand three things; 1) the level of perceived importance, or to what extent participants feel the particular factors of effective CoPs are significant to their CoP's functioning (measured on a six-point Likert scale, 1=unimportant, 6=extremely important), 2) the level of satisfaction experienced by participants in regards to these factors measured on a six-point Likert scale (1=extremely dissatisfied, 6=extremely satisfied), and 3) the mean difference between perceived importance and satisfaction scores. This last aspect serves to indicate what points need to be improved upon in the implementation of the CoPOS as well as give an indication of effectiveness used later in the cross-case analysis. There were also open questions on the survey. One was "would you consider this CoP a success or a failure and why?" and "what would you do to improve the CoP?"

I was not able to distribute the survey until the third iteration, but did use the factors shown in Table 3.6 as a framework for evaluating one of the case study CoPs.

*Table 3.6. Items used on evaluative survey*

<b>Evaluative survey factors and item</b>	
<i>Coordinative factors (<math>\alpha=.76</math>)</i>	
Contact moments	Management support
Coordination	Long-range focus
Sufficient time available	
<i>Social factors (<math>\alpha=.76</math>)</i>	
Personal relationships	High level of enthusiasm
Group cohesion	Perceived value
Information-sharing culture	Motivation for participation
Openness for creativity	
<i>Cognitive factors (<math>\alpha=.82</math>)</i>	
Interactivity	Focus on new issues
Different types of activity	Individual and group reflection
Focus on relevant topics	Clear domain
Links to (daily) practice	
<i>Motivational factors (<math>\alpha=.84</math>)</i>	
New knowledge for solving problems	New product/ process/system development

Evaluative survey factors and item	
New knowledge for innovation	New (knowledge) alliances
Improved professional competences	

I discuss the survey in more detail in the third case study, where it was first implemented.

### 3.6.2 Interviews

I interviewed each of the CoP members after the fifth meeting. I did this in order to check the validity of other data. The questions I asked were also designed to further evaluate the implementation of the CoPOS, to allow CoP participants a chance to give feedback on the processes they were experiencing and to uncover any new information not detected by the quantitative surveys in regards to learning, and collaborating. The questions asked on the survey and during the interviews are shown in Table 3.7. Open questions/interview questions

Table 3.7. Open questions/interview questions

Open questions
1. Why did you participate in the CoP?
2. Would you participate in another CoP? Yes/no (circle one)
3. If yes, why? If no, why not?
4. Would you consider this CoP a success? Yes/no (circle one)
5. If yes, what made this CoP successful?
6. If no, what would have made it a success?
7. Were there any innovations as a result of your participation in the CoP? (Think about new curricula, new teaching units, articles, concepts, etc.) Yes/no (circle one)
8. If you answered yes to question 7, what was produced?
9. Is the innovation mentioned above used in other parts of the organization? Yes/no (circle one); How is it used?
(Space for) other comments.

### 3.6.3 Observation

This research was interventionist in the sense that I was present at literally each of the CoP meetings (I was the facilitator in all the cases) and where applicable, also present at the meetings of the organizers too. During all the meetings I took copi-

ous notes on what I observed as well as my role in the process. My research notes I used later to help give further understanding as to what was going within the group. Data is also triangulated in this way too.

### **3.7 Reliability and validity: Plausible rival explanations and the design of this research**

In 1963, Don Campbell and fellow social scientist Julian Stanley started using the term plausible rival explanations when looking at the validity and reliability of research results (Campbell & Stanley, 1963). Basically they argued that any research, regardless of the methodology used, should be open to criticism; criticism that can be formulated as believable alternative conclusions taken from the same data (Campbell & Stanley, 1963; Cook, 1983). This means that the researcher should actively look for, and be aware of, all potential alternative explanations for an effect, and then find those that are the most plausible (Perrin, 2000). I used the concept of plausible rival explanations for designing the research (Yin, 2000) as well as a strategy for analyzing the data (Patton, 2002; Yin, 2003).

Yin (2000) discusses two main types of plausible rival explanations, namely “craft rivals” and “real-life rivals”. Craft rivals deal specifically with methodological issues, such as concerns about internal validity, problems with biased data collection, and other notions that the design of the research itself should attempt to eliminate, or mitigate (Verma & Mallick, 1999). In this sense they are related closely to the validity of the data. Real-life rivals on the other hand, take into account forces that may or may not be controllable – they are a reflection of the complexity of natural, real-life social situations in which quasi-experiments take place. Both craft and real-life rivals are important to the research design and so are discussed in some detail below.

#### *3.7.1 Craft Rivals*

Craft rivals are rival explanations associated with the design of the research and include; the Null Hypothesis, threats to validity and researcher bias. Each of these is discussed along with how the research design deals with them .

##### *The Null hypothesis*

A null hypothesis basically states that chance may also explain the effect of the intervention. However, through the use of comparison groups, the threat of this

rival explanation is mitigated to some extent (Cook & Campbell, 1979). Also the domain competence surveys attempt to make clear links between the interventions and the outcomes.

*Threats to validity*

Validity has both internal and external dimensions. Internal validity is the basic minimum without which any experiment is uninterpretable. Internal validity is related to the question: 'Did in fact the experimental treatments make a difference in this specific experimental instance?' External validity is about applying results to other situations or contexts and asks the question: 'To what populations, setting treatment variables, and measurement variables can this effect be generalized?' (Campbell & Stanley, 1963, p.5) In general, quasi-experiments are relatively more susceptible to both types of threats than other research designs.

The research design is implicitly 'safe' from all but four of the eight internal threats to validity (Campbell & Stanley, 1963; Cook & Campbell, 1979). These are listed below with an explanation of how they have been dealt with.

*History.* The effect might be due to another event that happened between the pretest and posttest. For example, participants underwent other trainings or professionalization interventions. Control questions on the survey relating to other formal and informal learning help to point out if this threat is actually present.

*Maturation.* Participants become smarter, wiser, more experienced, etc. between pretest and posttest. For example, teachers become more professional by virtue of working in a professional environment. The scales measuring changes in domain competence explicitly search for links between the intervention and the outcome, thus lessening this threat.

*Instrumentation.* Changes in measuring instrument between pretest and posttest. For example, the instrument for measuring professionalization is changed due to circumstances, or a researcher other than myself administers the test. This was not the case; instruments remained the same and I administered all of the tests personally, instructing respondents and answering any questions posed at the time.

*Interaction of Selection and Maturation, History and Instrumentation.* Validity threats interact with selection to produce spurious results. This threat is mitigated



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because similar groups operating within similar contexts participated in the CoPs. In some cases a control group was also used.

#### *Threats to external validity*

External validity, or generalizability, concerns the notion that research artifacts can transcend contexts and scale. While assuring for internal validity is considered to be primal to research design, in applied research such as this, generalizability is of lesser importance (Cook, 2000). This is because a specific problem is trying to be solved in a specific context. Due to the situated nature of design-based research generalization – in particular across populations – may be seen as being rather problematic.

However, certain generalizations are made from data collected at different points in the intervention. Bannan (2003) looks to the stages in the evaluation of an intervention that can lead to generalizability. While the first stage in the model she proposes looks at local level impact, the “...goal of the second stage is to look at issues of ecological validity and successful dissemination and adoption in a broader context and to a broader audience” (p.23). Generalizability is for this research is not especially problematic because the scales that are generalized to are modest.

Another consideration is the type of research done here and the artifacts produced by it. From a DBR perspective, research results can be generalized by understanding the generative mechanisms that are triggered by the intervention (Pawson & Tilley, 1997). As I discussed earlier, generative mechanisms help explain events but not predict; they serve to explain the link between two variables when understood in light of the context in which they were triggered (Elster, 1998; Gambetta, 1998; Sayer, 1984). Understanding contextual differences between settings – crucial to transfer of DBR artifacts - are expected to be understood by professionals working in the field who have had formal training in it (Kessels, 1995). In the case of this research then, conclusions can be generalized by those working in the specific field of human resource development or training.

#### *Researcher Bias*

Subjectivity in interventionist research is a substantial threat to the quality of the research artifacts. However, researchers working from other perspectives propose the idea that subjectivity is not a negative trait of qualitative research, but just that

it needs to be addressed in the research design itself. Although DBR methodologies may be inherently subjective, the methods built into this research design that minimize researcher bias are; triangulation of multiple data sources (Baumgartner, 2003); explicit clarifications of personal values and ethics (Husen, 1999; Susman & Evered, 1978); reporting in a way that systematically supports the phenomenon being researched (Cobb et al., 2003) and the underpinnings of the research – for example, theory about how the intervention is supposed to work (Yin, 2000) – are clearly explicated throughout this dissertation and especially in the case study descriptions.

### *3.7.2 Real life rivals*

Because of the ‘messy reality’ in which this research (and DBR in general) takes place, the possibility of real-life plausible rival explanations is large and may greatly influence the results. I have attempted to rule out most of the threats to my research, but this was not always possible; in this sense I leave the final judgment of whether my knowledge claims are warranted or not to those researchers and practitioners that make up the community in which I work.

I frame this next part of the discussion using Table 3.8, which comes directly from Yin (2000). Although I look at each rival explanation individually in the light of my research design, it was not necessary to consider all these rivals when reporting on the data, simply because not all of them are plausible. However, “...the more powerful investigations entertain several plausible rivals within the same study, not just a single rival.” (Yin, 2000, p. 258) Common sense should be a constant guide.

Table 3.8. Real-life rivals

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**Rivals Related to the Targeted Intervention**

1. **Direct (practice or policy) Rival:** *Claims that a different type of intervention, not the targeted intervention, accounts for the observed result*
2. **Commingled (practice or policy) Rival:** *Claims that another intervention, of the same type, co-occurring with the targeted intervention, accounts for the observed effect.*

**Rivals related to Implementation**

3. **Implementation Rival:** *Claims that the pattern of implementation accounts for the observed result*

**Rivals Related to Theory**

4. **Rival Theory:** *Claims that an alternative theoretical perspective can explain the observed result better.*

**Rivals Related to External Conditions**

5. **Super Rival:** *Claims that the targeted intervention and the observed results are but part of a larger and more potent process that accounts for the results.*
  6. **Societal Rival:** *Claims that some salient social, political or economic condition accounts for the result.*
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**Rivals Related to the Targeted Intervention**

1. *Direct (practice or policy) Rival (“The Butler Did It”).* This rival can be compared to the Hawthorne Effect. Brown (1992) is not especially concerned with the Hawthorne Effect affecting the validity of her findings. This is because the improvements are so specific they can be attributed to the intervention in a causal relationship. In my case two of the four data collection instruments were designed specifically to eliminate this threat.

2. *Commingled (Practice or Policy) Rival (“It Wasn’t Only Me”).* Although this rival is not easily ruled out, again my instruments are designed to minimize the threat by asking respondents what other formal or informal training they had had during the iteration.

**Rivals related to Implementation**

3. *Implementation Rival (“Did We Do it Right?”).* Beta testing of the CoPOS - or implementation by a second party in a test situation (Stam, 2007) - was attempted in the second case but failed. However, the implementation of the system is

probably simple enough for any professional facilitator to do it. Also, an evaluation form is used to check this.

#### Rivals Related to Theory

4. *Rival Theory* (“*It’s Elementary, My Dear Watson*”). According to Yin (2000), “Using rival theories calls for bringing different conceptual perspectives to the same set of facts.” (p. 255) In order to minimize the threat of this rival, I outline some of the alternative theories that may plausibly explain the results of the experiments as well as the processes in the case studies. For example, in a CoP where low levels of social capital were present, then rational choice theory might better explain why a CoP was a success anyway.

#### Rivals Related to External Conditions

5. *Super Rival* (“*It’s Bigger Than Both of Us*”). This considers that there may be a larger systemic process going on that influences the results and may even be the real reason for the outcome. Once again, this will require insight into the whole system, or organization in my case, in order to rule this threat out. I will try and mitigate this threat by providing rich descriptions of the contexts in which the research takes place. For example, one CoP that was failing to organize gained new momentum when management was threatened with a pressing accreditation from the greater polytechnic system, and decided to facilitate the CoP more intensively.

6. *Societal Rival* (“*The Times They Are A-Changin’*”). Yin brings this concept up in order to highlight the threats society-wide changes could have on the outcomes of an intervention. For my work, there may be a shift in the cultural attitude of the Netherlands towards teaching, or perhaps a change in the funding of higher education. For example, entrepreneurship (the theme of one CoP I helped organize) is seen as a chance for regional development and general lifestyle improvement in developing countries. Maybe this caused a more pressing need to learn about it. It certainly affected management support of the CoP.

The following chapter is a report on the empirical testing of the system.