

Thesis - Design of a Community of Practice at Centric

A Case Study about the design of a CoP within the Suite4Basisgegevens
migration



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Design and evaluation of a Community of Practice to support IT implementation/migration processes

A Case Study about the design of a CoP within the Suite4Basisgegevens migration

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In Memoriam

Abstract

Centric IT Solutions is currently in the middle of a migration of its tax software for local governments. In order to support this migration it was opted to implement a Community of Practice to facilitate the knowledge management. Communities of Practice (CoPs) are groups of people who come together to share and to learn from one another.

In this thesis a design is proposed for Centric to implement a Community of Practice based on the formulated C5PE framework. This framework is based around the fundamental building elements which need to be supported to facilitate knowledge sharing: Content, Conversation, Connections, Context, Control, Purpose and Environment. Central to our design is the implementation process of Centric's software. This is the common denominator that links the members. This has lead to what we coin a Process Enhancing Community of Practice. In order to recruit members for the community we recommend using an invitation model. The recommended design of the invitation model uses the hierarchy of responsibility to guarantee the coverage of the whole process. In order to provide context to each implementation process step several features will need to be implemented.

The most important features of the design are:

- Focus on establishing connections between members
- Process-centred
- Tree-like growing pattern
- Invitation model with hierarchy of responsibility to enrol members
- Easy editing

The resulting design focuses on establishing connections and capturing the knowledge in a structured way. Another important aspect is the ease of use to share and view already available knowledge. Furthermore, the architecture is set up in a way that it is easily extended with new features to fulfill the needs of the CoP in future development stages.

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1 Introduction

Centric IT Solutions (see Appendix E for more information about the organization) is currently in the middle of a migration of its tax software for local governments. This migration stems from the government-wide change and standardization in data structure and storage in order to increase the quality of the public services. The Dutch government aims for a service and customer-orientation within the municipalities. Furthermore, these services will be provided more and more via the internet. This will lead to what is called ‘the other government’. A fundamental role within this vision of ‘the other government’ is played by the ‘base registrations’. In short, base registrations entail the nationwide standardized storage of the data which is used in numerous business processes within governmental organizations. This way, these data only needs to be stored once and is consistent across all processes.

The migration will introduce a more process-oriented thinking, the new software architecture of Centric (which is based on Service Oriented Architecture), and Centric’s new interface standard. Questions arised at Centric concerning the support that needs to be given to its clients to cope with these changes. The implementation of new organization-wide software is a challenge to say the least. A critical success factor of a good implementation is the acceptance of the software by the employees. Training and education are the most important means to reach this (Nah, Lau, & Kuang, 2001). During the interview with Adrie van Duren (Van Duren, 2008), member of the projecteam i-teams as coach e-advisors, it became clear that there is a need for knowledge and education on almost every aspect of the migration towards ‘the other government’.

Currently the consultants of Centric provide this support by giving presentations, either in-house at the client or in classrooms at Centric. However, the municipalities need to have their data BAG-compliant mid-2009. Centric estimates to reckon about half of the municipalities will use the new software of Centric (around 200). Given that the planned run time of the implementation track is 22 weeks (Conversieproces B&V, 2005), time is short. Building the reference file, a key component of the migration, for instance took the municipality of Helmond around 7,5 months (Van Tiggelen, 2007). This concurs with the estimations of VROM (2007), which reckon another 6-8 months for the phase they defined as ‘5: Extending the reference file to BRA and BGR’.

To give a short indication on the time pressure (see Figure 1): From now until mid 2009 there are around 78 weeks. Given that the run time of the implementation is around 22 weeks, there is room for $78/22 = 3,55$ tracks of sequential implementations. With 200 estimated municipalities this would mean that on average Centric will have to support the implementation of a little more than 56 municipalities in parallel. Even if the timeframe is extended until the end of 2009 there are still more than 42 municipalities which need to be supported in their implementation in parallel. Centric currently has five consultants to support these implementations.

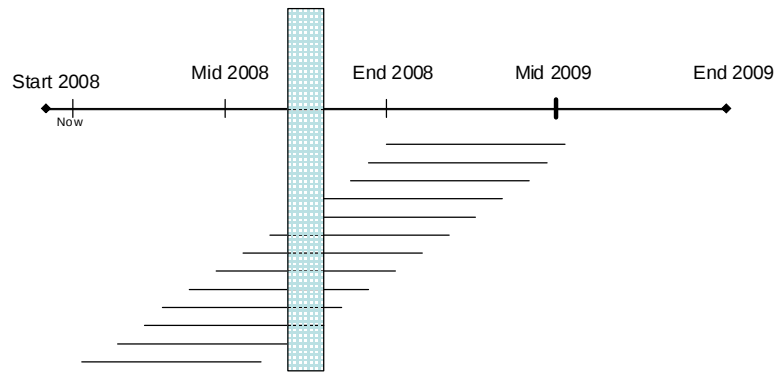


Figure 1. Timeframe of the migration with an indication of the municipalities doing the implementation in parallel.

During this implementation period a lot of information and knowledge is created and exchanged between the different actors. This knowledge however, is generally not stored or captured in a structured way. It is often only stored locally or even worse, only in the minds of the actors. The available knowledge is therefore more difficult to share and acquire. The current presentations only give a 'knowledge-update' every now and then. A more structured and real-time way of maintaining the knowledge base will help to offer more support during the implementation process.

Because of the geographical dispersion of the clients and the sparse time and the results of a previous study (Floor, 2006)), Centric came with the idea of designing an e-learning system. Following the development of learning in general and e-learning in particular, the orientation of this thesis became more focused around the creation and sharing of knowledge and experience.

An observation in literature is that experience is key during IT implementations and organizational change (Lyytinen & Robey, 1999). Experience, and thus known tacit knowledge, is one of the biggest qualities of a good consultant. During the implementation of a software system, the consultant has an important role in providing this experience and knowledge about the system to the client. Communities of Practice (CoPs), which are groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly (Wenger, 2004), are considered to be excellent means to share tacit knowledge between its members. CoPs are seen as an innovative way to manage knowledge in organizations and to combine working, learning and innovating (Dubé, Bourhis, & Jacob, 2005). Given the possibilities of a CoP it was decided by Centric to support a pilot project to design a CoP for its first new product in the new product line Suite4Basisgegevens. The design of or, as some prefer to say (Stuckey & Barab, 2007), *for* this CoP will be the topic of this thesis. The main question is how Centric has to organize the CoP facilitation such that clients and employees create, improve and share knowledge to optimize business processes (the software implementation process in particular) and customer relationship.

2 Theoretical framework

Communities of practice are complex and success is not guaranteed. The reasons why some efforts succeed while others fail are complex and varied (Schlager, Fusco, & Schank, 2002). This is especially true for intentionally created communities. Several authors have tried to find the elements that determine the success of a community (Gannon-Leary & Fontinha, 2007). In their C4P framework Hoadley & Kilner (2005) describe the elements of a CoP that are at the core of the activities that take place within the community. Knowledge is shared and created because of these activities. The greater these elements are present, “the more likely and effective the knowledge generation and transfer will be” (p. 33). The elements are *content*, *conversation*, *connections*, *(information) context*, and *purpose*. These elements can be considered the basic building blocks or key concepts of a CoP.

Content refers to explicit, static knowledge objects. *Conversation* refers to face-to-face or online discussions. The key distinction between content and conversation is that content involves a one-way communication of information, whereas conversation includes at least a two-way exchange. *Connections* refer to the interpersonal contacts between community members that involve some level of relationship. Information *context* is the who, what, where, when, why, and how that enables community members to assess whether and how information is relevant to them. Finally, *purpose* is the reason for which the members come together (Hoadley & Kilner, 2005). Purpose includes the motivation of people to share their knowledge with others.

Reasons to share

There are several motivators and barriers that influence whether people do or do not share. The most important reasons found in the study of Wasko & Faraj (2000) on to why people share are: the provision of tangible useful-valuable information, the learning aspect and the interaction with a peer group, reciprocity, and altruism. The study of Ardichvili, Page & Wentling (2003) adds a feeling of moral obligation to this list. Furthermore, the comprehensive study of Draaijer (2008) revealed that, when separating motivation factors in intrinsic and extrinsic benefits, intrinsic benefits have a stronger effect on knowledge sharing. More specifically, enjoyment in helping others and perceived identity verification have a significant positive effect on the knowledge contribution which corresponds to the altruism factor mentioned by Wasko & Faraj (2000).

The major barriers are group related and consist mainly of a mismatch between the norms and values of the individual and the group (Wasko & Faraj, 2000). Also the fear to lose face and to let down colleagues is a barrier to share knowledge (Ardichvili et al., 2003), although the latter can also be seen as an incentive to share. A major extrinsic ‘benefit’ for sharing which had a significant negative effect on knowledge contribution is the anticipated reciprocal relationship, “people contribute more knowledge when they expect not to develop reciprocal relationships” (Draaijer, 2008).

An interesting finding of the study of Draaijer (2008) is the significant moderation effect of offline activities. Although in recent developments around CoPs the internet and computers in general play a prevalent role, it is important to stress the importance of the offline ‘foundation’. It positively affects the effects of several benefit factors.

However, these elements don’t cover the whole domain of success factors. An important addition, especially for intentionally created CoPs, is the effect of the *environment* and the *management and control* on the CoP. The environment includes the culture and subcultures of the organization, the management styles and the whole political context (Dubé et al., 2005) and the technological facility

possibilities. Control is defined as the applied management activities to influence the environment which in turn influences how well the core elements flourish.

The fact that a control element is important for the success of a community is supported by various other studies (Dubé et al. 2004;2005;2006; Brazelton & Gorry, 2003; McDermott, 2000). “In addition to appropriate technology, experts in knowledge management cite leadership, alignment with business priorities, supportive organizational policies and practices, and measurement of benefits as critical to a successful effort” (Brazelton, & Gorry, 2003). “Communities are held together by people who care about the community. In most natural communities, an individual or small group takes on the job of holding the community together, keeping people informed of what others are doing and creating opportunities for people to get together to share ideas. In intentional communities, this role (called the community coordinator) is also critical to the community’s survival.” (McDermott, 2000).

The characteristics *environment* and *relevance* were of utmost importance to increase the likelihood of a VCoP to succeed (Dubé et al, 2005). In case this environment is obstructive management and sponsors can apply *operational leadership* management practices to positively influence the negative impacts (Dubé et al., 2005). “Selecting the person with the right set of skills and abilities to be the leader is a necessary ingredient to success. In addition, monitoring and taking action with regards to the leadership structure if a person leaves or does not perform is also highly necessary. A second important decision pertains to the allocation of necessary resources to the acquisition of a fulltime leader (Dubé et al. 2004: p. 26)”.

The environment and control can thus be seen as influencing layers around the core elements. Based on the C4P framework and the additional success elements, the used theoretical framework in this project is the resulting developed C5PE framework which is depicted in figure 2.

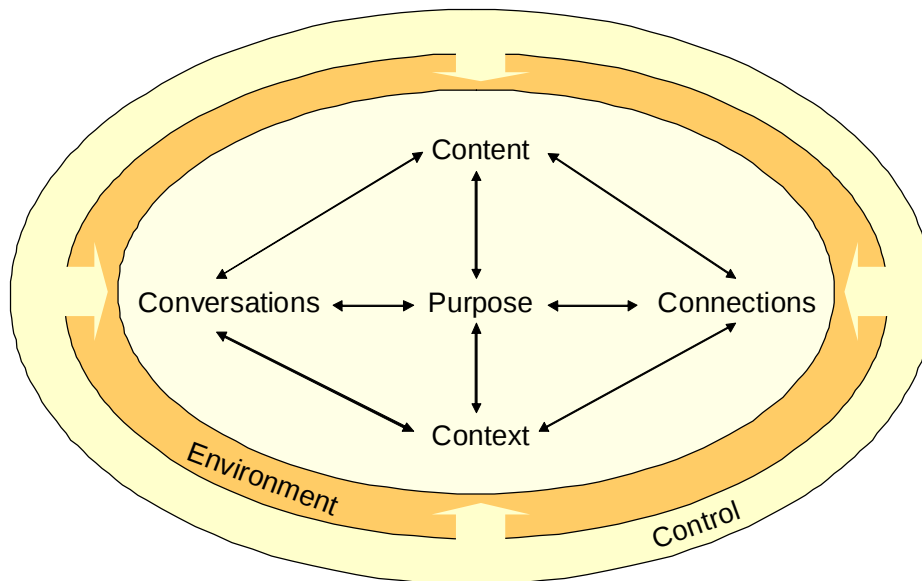


Figure 2. C5PE framework which indicates the elements influencing the effectiveness of a CoP

CoPs have structural characteristics which define its ‘personality’ (Dubé et al., 2006). Specific combinations of these characteristics create challenges that need to be acted upon (Dubé et al., 2006). These challenges affect the (core) elements of the C5PE framework. For example, a CoP young of age and at a low level of maturity will have a greater need for building up content and connections among its members. In order to describe the specific characteristics of the case at hand we’ll be using the typology of Dubé et al (2005). This will highlight the characteristics that increase the level of complexity and characteristics that are still open for design. The typology framework is added in Appendix B.

In line with the core elements of success, Wenger (2001) has identified 13 principles which, according to him, are important in order to facilitate a successful community (More details about the success elements are listed in Appendix C). In this project, these principles will be used as design guidelines. Each of the principles focuses primarily on one of the core elements. A mapping is added in the next subsection.

Mapping Wenger's elements of success to the C5PE framework

The elements of success defined by Wenger (2001) can be roughly linked to our C5PE framework, although many of the elements can serve an supporting role on multiple framework elements. *Conversation* is supported by knowledge-generating interactions and relationships. Among them the support of a discussion area and personal profiles with contact info are well suited to integrate in the web application. *Connections* is closely related but focuses more on the more passive functionalities, such as profiles, contact info and links. The success elements mentioned under 'presence and visibility' and 'personal identities' provide *Context* to the information shared and the community itself. They give some background about the member who shared the knowledge. The important *Control* element is supported by various management and monitoring features. Among them are rhythm (e.g. organizing regular events), monitoring health indicators and broadcasting/representing the community to 'the outside'. The main aspect of *Purpose* for many members will be the perceived value they get from participating in the community. Short and Long term value such as databases, Q&A, knowledge storage and search mechanisms are important in this respect but also reasonably easily integrated in a web application. To close, the *Environment* is related to the relationship with the 'outside' world and the available (technical) infrastructure.

<i>Content</i>	-
<i>Conversation</i>	3. Knowledge-generating interactions 10. Belonging and relationships
<i>Connections</i>	7. Connections to the world 9. Communal identities 10. Belonging and relationships
<i>Context</i>	1. Presence and visibility 8. Personal identities
<i>Control</i>	2. Rhythm 4. Efficiency of involvement 12. Evolution: maturation and integration 13. Active community building
<i>Purpose</i>	3. Knowledge-generating interactions 5. Short-term value 6. Long-term value
<i>Environment</i>	11. Complex boundaries 12. Evolution: maturation and integration

The characteristics of the CoP, described with Dubé's typology, will pose challenges to these core elements. The emphasis of the design will then thus lie on the design principles of the elements that are being challenged most.

This results in the following path towards the first design of the community of practice for Centric (see figure 3).

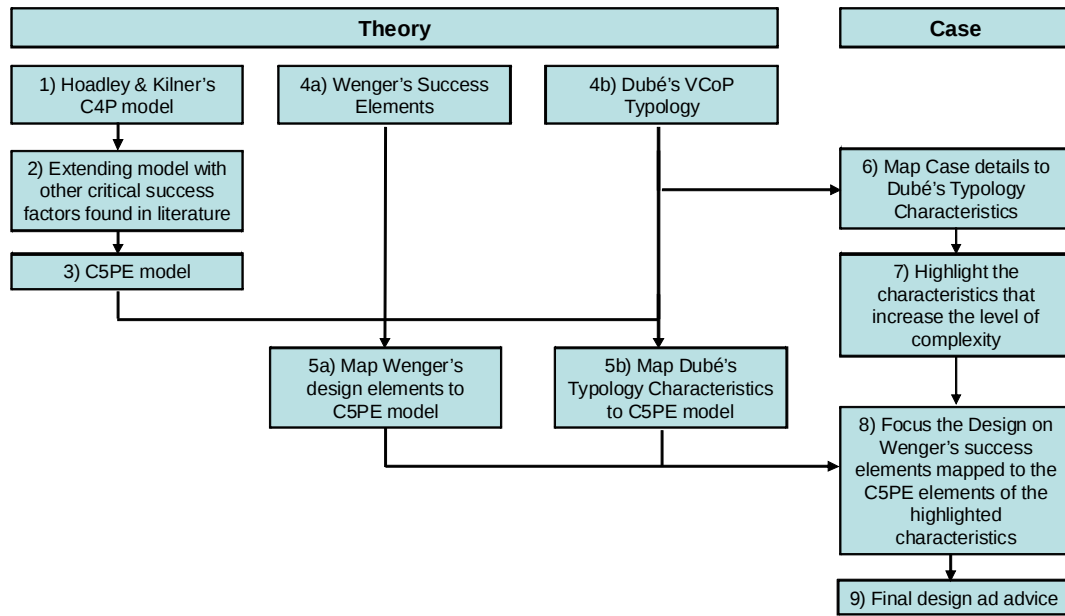


Figure 3. Path towards the design of the CoP.

3 Goal statement

The goal of this project is to give Centric an advice on how to design a Community of Practice that supports its clients in the migration to the new software. At the end of the project this will lead to an informed plan for realizing a CoP within Centric which is founded on literature and grounded in the case at hand.

In order to provide a well-founded advice this project uses, as depicted earlier in figure 4, two 'swimlanes'; theory and the case. Following the path of Figure 8, the following research questions will be answered:

- How does Centric need to design its Community of Practice?
 - What are the elements that define the success of a Community of Practice?
 - What are successful design principles to support the success of CoPs?
 - o How do these design principles relate to the success elements?
 - How can the case be characterised according to the typology of Dubé et al.?
 - o Which characteristics increase the level of complexity?
 - o Which characteristics are still open to design?
 - o Which core elements of success experience the most challenge?
 - How do these elements translate into the design?

4 Background

This chapter will discuss the relevant topics of this thesis separately and in more detail. These topics are; Learning, Communities of Practice and the Base Registrations. The quick reader can possibly skip this section and head to the design, which connects the background knowledge to the case at hand via the C5PE framework.

4.1 Learning

Beetham & Sharp (2007) and Mayes & de Freitas (2004) follow Greeno et al. (1996) with the distinction of three perspectives about the nature of learning within educational theory traditions: associative, cognitive and situative.

The associative view emphasises

- Learning is understood as building concepts or competences step by step.
- Routines of organised activity
- Clear goals and feedback
- Individualised pathways and routines – matched to the individual's prior performance

The cognitive view emphasises

- Learning is understood as achieving understanding through active discovery, dialogue and collaboration.
- Interactive environments for construction of understanding
- Teaching and Learning Activities (TLAs) that encourage experimentation and the discovery of broad principles
- Support for reflection

The situative view emphasises

- Learning is understood as developing practice in a particular community.
- Environments of participation in social practices of enquiry and learning
- Support for development of identities as capable and confident learners
- Dialogue that facilitates the development of learning relationships

(Beetham & Sharpe, 2007)

These perspectives have implications for the pedagogy, and approach and design of e-learning systems. Figure 2 depicts these implications in layers. For the development of an e-learning system the assessment layer is very important. This layer states on a clear way which learning processes need to be supported and how they need to be assessed; giving hints towards the technology requirements.

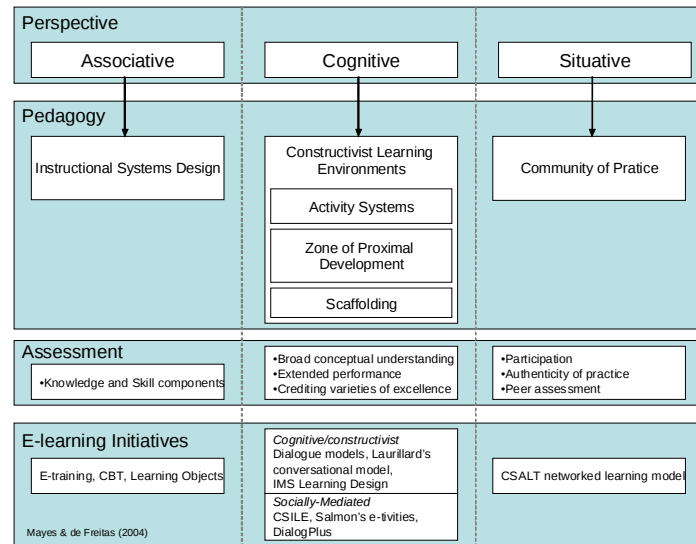


Figure 4. Layers of Learning Design (Based on Mayes & de Freitas, 2004)

There is a trend towards the social aspect of learning; learning on demand and on the job in a more informal way. Furthermore, “as knowledge continues to grow and evolve, access to what is needed is more important than what the learner currently possesses” (Siemens, 2004). This development is compared by Kozłowski (2007) as the hierarchical and collaborative way of learning (see Table 1). This same trend is also visible in the development of e-learning systems.

Table 1. Comparison between the Hierarchical way of learning and Collaborative way of learning (Kozłowski, 2007)

	Hierarchical Way of Learning	Collaborative Way of Learning
Roles	Clearly defined roles of educator (sender) and learner (recipient)	No clear distinction between educator and learner
Communication	mono-directional	multi-directional
Distribution of Power	Power lies with the teacher	Distribution of power between all parties
Definition of Learning Goals	By the teacher, or by an institutional framework	By the learners; there might be non-mandatory help from educator
Measuring of Learning Success	By the teacher based on his principles	By the learners; there might be non-mandatory help from educator

Conceptually e-learning is nothing more than learning with electronic means. The current means is mainly the internet, but in the basic is independent of it. Also education via the radio like for example in Australia (e.g. ‘School of Air’ in Alice Springs¹) can be called e-learning. An important characteristic of e-learning is the physical separation of the actors in the learning process: between teacher & learner and learner & learner. “At its best, e-learning is a reconceptualization of learning that makes use of not only instructor-led-pedagogy but all the flexibility that asynchronous, multi-party contribution can bring.” (Andrews, & Haythornthwaite, 2007)

When searching for e-learning the focus is a lot on the ‘e’; the technology. A list of technologies includes:

- screencasts
- ePortfolios
- electronic performance support system

¹ On the web: <http://www.assoa.nt.edu.au/>

- PDA's
 - MP3 Players with multimedia capabilities
 - web-based teaching materials
 - hypermedia in general
 - multimedia CD-ROMs
 - web sites and web 2.0 communities
 - discussion boards
 - collaborative software
 - e-mail
 - blogs
 - wiki
 - text chat
 - computer aided assessment
 - educational animation
 - simulations
 - games
 - learning management software
 - electronic voting systems
 - virtual classrooms
 - podcasts
- (Wikipedia.org)

Just like in learning there is also a trend towards the social aspect in the e-learning field. This trend is initiated by the possibilities of Web 2.0 and the changing demand on learners. Key technologies within the 2.0-paradigm are wikis and blogs. These two technologies facilitate the easy exchange of opinions, experiences and knowledge of individuals with a broad public.

“Today, one does not need to know the answer to every problem but to know where to find a solution. Today, when the problem is complex and the volumes of information are overwhelming, that ‘where’ is more likely to be found in social contexts than in terabytes of data.” (Andrews & Haythornthwaite, 2007; p. 454)

This trend has led to the evolution of e-learning to e-learning 2.0. E-learning 2.0 is best explained in relation with the traditional e-learning and its technologies. Karrer (2006) gives the following table (2):

Table 2. e-Learning trends (Karrer, 2006a)

	eLearning 1.0	eLearning 1.3	eLearning 2.0
<i>Main Components</i>	Courseware, LMS, authoring tool	Reference hybrids, LCMS, discussion groups	Wiki, Social Networking & Bookmarking, Add-ins, Mash-ups
<i>Ownership</i>	Top-down, one-way	Top-down, collaborative	Bottom-up, learner-driven, peer learning
<i>Development time</i>	Long	Rapid	None
<i>Content size</i>	60 minutes	15 minutes	1 minute
<i>Access time</i>	Prior to work	In between work	During work
<i>Delivery</i>	At one time	In many pieces	When you need it
<i>Content Access</i>	LMS	Email	Search, RSS feed
<i>Driver</i>	ID	Learner	Worker
<i>Content creator</i>	ID	SME	User
<i>Training's Role</i>	Gourmet Chef	Short-order cook	Food critic

4.2 Communities of Practice

Communities of Practice (CoPs), which are groups of people who come together to share and to learn from one another, are seen as an innovative way to manage knowledge in organizations and to combine working, learning and innovating (Dubé, Bourhis, & Jacob, 2005). Communities of practice are “an important vehicle for developing social capital in organizations” (Lesser, & Storck, 2001). In turn, this social capital improves the organizational performance (Lesser, & Storck, 2001).

The thought-leader about Communities of Practice is Etienne Wenger who defines them as “groups of people who share a concern or a passion for something they do, and learn how to do it better as they interact regularly” (Wenger, 2004a). Three characteristic dimensions are crucial (Wenger, 1998; 2004a):

- The domain – joint enterprise: Members of a community of practice have a shared competence and shared domain of interest that distinguishes them from other people.
- The community – mutual engagement: Relationships between the members are guided by the learning aspect of interaction. Sharing knowledge and information, engage in joint activities and discussions, and helping each other is what forms/makes the community.
- The practice – shared repertoire: Members of a community of practice are practitioners. They develop a shared repertoire of resources: experiences, stories, tools, ways of addressing recurring problems—in short a shared practice. This takes time and sustained interaction.

Based on this description from Wenger (2002; 2004a) Snyder & Briggs (2003) visualized the concept of Community of Practice as follows (see figure 3).

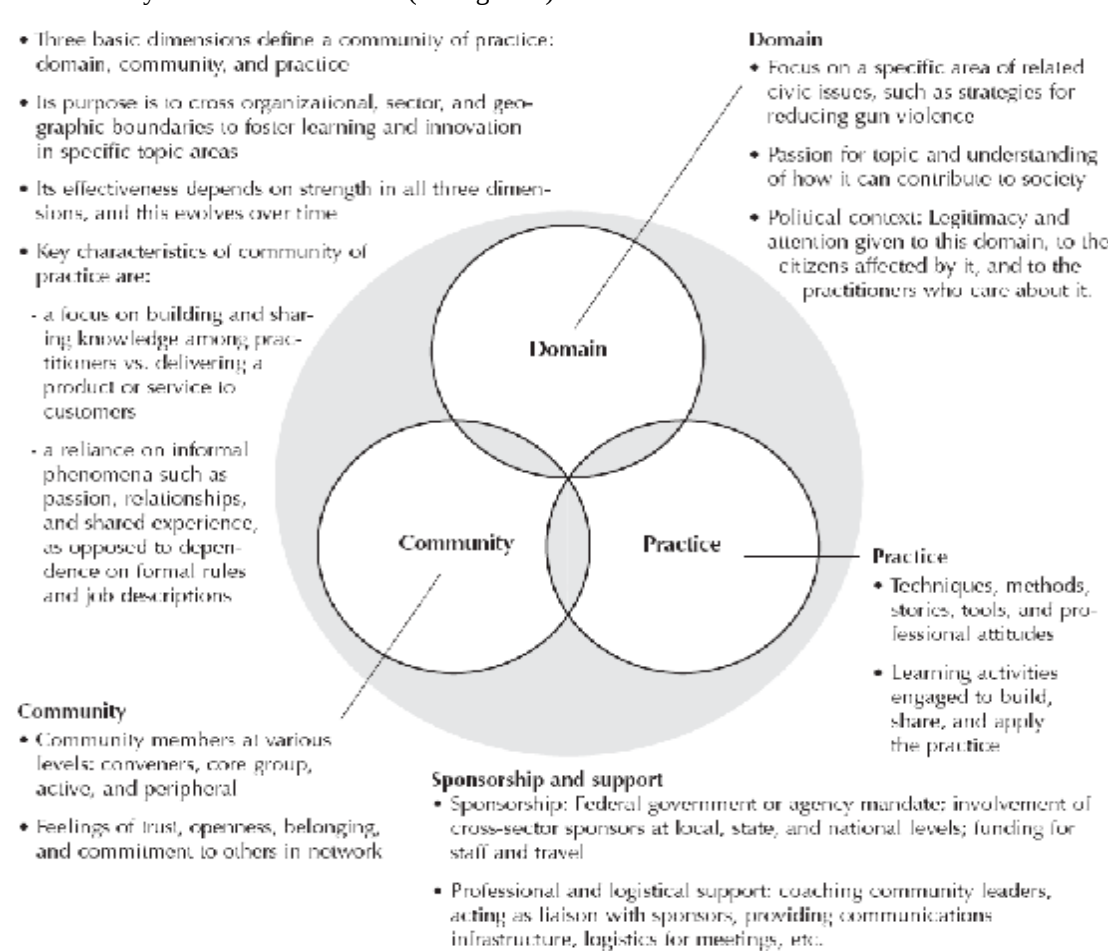


Figure 5. Structural dimensions of a Community of Practice (Snyder & Briggs, 2003)

The origins of the theory behind communities of practice lie within the situative learning perspective. Therefore great emphasis is given to the role of the situation in which the learning takes place and more importantly the relationships between the individuals that perform the same practice within that situation (Beetham, & Sharpe, 2007). Individuals learn with and from others by doing and participating.

The concepts identity and perceived expertise are therefore important (Andrews, & Haythornthwaite, 2007) in that they define the status of a person within the community and the scope of the community; who is in and who is out. Lave & Wenger (1991) characterize learning of practices as processes of participation in which beginners are initially relatively peripheral in the activities of a community and as they learn the practices their participation becomes more central. By becoming skilful, individuals will form an identity on which they are proud and which gives them gratification. This provides a major motivation to participate in a community, next to the individual career development.

In short they are an informal group of people interacting and discussing about the current and future 'way of doing' set with a common background knowledge shared among its members.

The idea is to connect people with a shared passion about what they do in practice on a regular/daily basis. Their passion and energy drives them to discuss the How's and Why's to develop *their* practice, resulting in improvements of efficiency and flexibility towards market demands.

The forming of these connections and groups of like-minded people is not a new phenomenon. It can even be traced back and compared to guilds in the middle ages. They naturally evolve within organizations. What is new, is that organizations more and more see the importance and business value of the knowledge creation and exchange capabilities within these communities. Recent developments increasingly focus on the intentional creation of communities of practice.

Organizations have recognized the unique possibilities of CoPs within their knowledge management strategy. CoPs can fill an important role in all of the processes defined in the renown spiral of organizational knowledge creation or SECI process (see Figure 6) of Nonaka (1994; 2000), especially in the support of the socialization (the facilitating of experience exchange) and externalization (by providing shared ways of expression) processes.

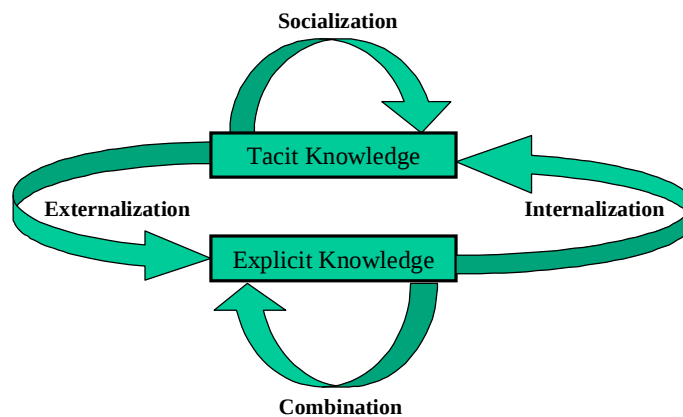


Figure 6. The Nonaka SECI process concerning organizational knowledge creation.

The question arises whether intentional CoPs are real CoPs. Some even argue that communities can't be designed and thus be intentional successfully (Stuckey & Barab, 2007). And aren't they too similar to teams or projects? Wenger and Snyder (2000) compared several common collaboration structures and summarized them in the table shown in Table 3. Although they differ, there is also a great resemblance, often even overlapping memberships. The thing which is unique to communities of practice is the passion and motivation of the members. However, an intentional CoP may be subject to

severe troubles to generate this passion. It risks losing its informal, unpushed and unconstrained nature. We therefore like to point at another important aspect of a CoP; the border crossing. Most topics are applied in very different settings and business processes. Therefore different people are involved in several ways on the same topic. A CoP facilitates the creation of social links between these people/experts who normally would have never met each other.

Being intentional also has implications on the development stages, which will be discussed in the next subsection.

Table 3. A comparison between CoP with other collaboration structures (Wenger & Snyder, 2000).

	What's the purpose?	Who belongs?	What holds it together?	How long does it last?
<i>Community of practice</i>	To develop members' capabilities; to build and exchange knowledge	Members who select themselves	Passion, commitment, and identification with the group's expertise	As long as there is interest in maintaining the group
<i>Formal work group</i>	To deliver a product	Everyone who reports to the group's manager	Job requirements and common goals	Until next reorganization
<i>Project team</i>	To accomplish a specified task	Employees assigned by senior managers	The project's milestones and goals	Until the project has been completed
<i>Informal network</i>	To collect and pass on business information	Friends and business acquaintances	Mutual needs	As long as people have a reason to connect

4.2.1 Community Development

Because of the informal nature, Communities of Practice are often 'grown out of human sociability' (Sharp, 1997). Therefore they tend to follow a growth development of an organism (Nickols, 2003b) and follow an evolution in time (Gongla & Rizutto, 2001). Several authors have identified certain development stages (Gongla & Rizutto, 2001; Nickols, 2003b; Snyder & Briggs, 2003; McDermott, 2000; Wenger et al., 2002). Although they differ in terms of timing of their stages, the elements emphasized, and the vocabulary used, they all describe the same process (Dubé, Bourhis, & Jacob, 2006). The typical community development stages are depicted in Figure 8 (Snyder, & Briggs, 2003).

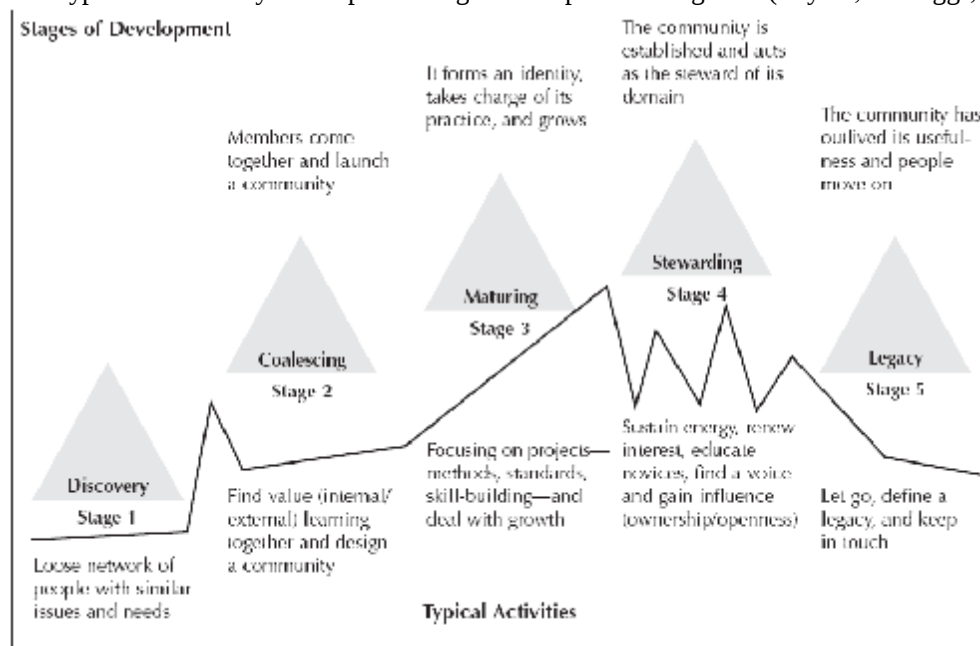


Figure 7. Developmental Model of Communities of Practice (Snyder, & Briggs, 2003)

Because of the intentional character of the community at hand, the first targeted development stage will be the coalescing stage. Intentional communities, such as the one at hand, will often skip the first development stage ‘Discovery’ to speed up the visibility of the community to the organization. This is not a problem for the immediate performance, as long as the community “returns to restructure of build elements from earlier stages that it may have shortchanged” (Gongla & Rizutto, 2001). The community will start with a careful design, but will therefore also partially skip the first, more informal and unconstrained, discovery stage.

4.2.2 Inter-Organizational Communities

Communities of practice are a mechanism within which collaboration between organizations can occur. A driver for increased collaboration is the recognition that success in a global economy comes from innovation in order to keep up with the rapid developments in technology, increasingly demanding customers and changes in the competitive environment through deregulations, social changes and the actions of competitors (Van Winkelen, 2003). Another driver comes from the idea that the more change there is in its environment, the more connections an organization needs with the outside world.

The challenge of inter-organizational communities is establishing “a culture of trust and openness” (Van Winkelen, 2003). Organizations fear opportunistic behaviour from competitors and need confidence, either through trust or formal legal mechanisms that other firms will be cooperative and not take competitive advantage of the knowledge-exchanges (Braun, 2002).

4.3 The domain – Base registrations

To support a smooth exchange and management of the data stream within the government, the most asked-for and used information will be collected in six so-called ‘Base Registrations’. These Base Registrations will form the fundament of a scheme. By recording the data in a scheme there will arise an ordering in the huge amount of data and will increase the quality of the data. The governments have been obliged to use of these Base Registrations. In the new situation, citizens and companies only have to offer their data one-off.

At the moment the following six base administrations are defined:

Gemeentelijke Basis Administratie (GBA)

This registration consists of the personal data of all citizens of The Netherlands. Example data are names, addresses, day of birth and gender;

Nieuw Handelsregister (NHR)

This registration contains the data of all companies and institutions. This includes the name, address, number of employees, venture form, description of main activities and the various offices;

Basisregistratie Kadaster (BRK)

Every parcel is registered at the Kadaster. This can be a building, but also a cornfield. Each parcel is described with information about the owner and which private law restrictions apply;

Basisregistratie Topografie (BRT)

This Base Registration consists of the topographical information of The Netherlands. A detailed map of the whole country is recorded;

Basis Registratie Adressen (BRA)

The BRA contains all addresses. This is of major importance for the GBA and NHR as they depend on the link to BRA;

Basis Gebouwen Registratie (BGR)

All company buildings, living apartments and monuments are registered in the BGR. Each is stored with its identifiable and several descriptive characteristics.

In the future the number of Base Registrations within the government will be expanded.

This research project will focus on the Base Registrations of Addresses and Buildings. On October the 4th 2007 the Tweede Kamer accepted the bill “Basisregistraties voor Adressen en Gebouwen” (BAG). Within this bill it is regulated that municipalities may only store a restricted amount of standardized data about buildings and addresses in an automated registration. Governmental institutions are obliged to use these data in the execution of their public tasks. Intended date of the introduction of the regulation is mid-2009. As of then, the municipal BAG-registrations have to be ready. Until mid-2011 they have the time to prepare for the use of the Base Registrations within their processes.

There will be a demand for the delivery of BAG-compliant software products from the municipalities. Centric is one of the software suppliers who is able to provide these. All suppliers, who have successfully completed the conformity tests of the ministry of VROM are: Centric, Getronics PinkRocade, GISkit, Gouw IT, Grontmij, OBTERRA en Virec (VROM, 2007).

4.3.1 Base Registrations for Addresses and Buildings (BAG)

The registrations for addresses and buildings are two of the Base Registrations that will form the core of the data housekeeping of the government. Within the Basic Building Registrations the foundation is made for an unambiguous indication of *panden*, *verblijfsobjecten*, *standplaatsen* and *ligplaatsen*. This way, the objects can be made mutually consistent and the data from the different processes can be used at other processes or together. The (trans)formation to unambiguous and consistent data is one of the key functions of the Base Registrations.

The objects ‘verblijfsobject’ (place of residence), ‘standplaats’ (dwelling) and ‘ligplaats’ (anchoring berth) are the only objects to which addresses can formally be assigned. The Basic Address Registration entails the complete list of these assigned addresses.

The software and registration support of the building registration comprises broadly the lifecycle of the object. At a certain point in time an object will be created on account of some event and on another time the object can lose its meaning on account of another event. The Base Registration provides tracking of these events by storing every mutation within the lifecycle of the object in its history. An event is formulated as a provable fact that has taken place in reality which has caused a standardized modification of the data in the registration.

Within the lifecycle of *panden* and *verblijfsobjecten* there is made a distinction between four phases in which events take place which give a cause for mutation of the data objects in the BGR:

- Planvorming (Planning)
- Bouwen pand (Building)
- Gebruik pand en verblijfsobject (Use)
- Sloop pand en verblijfsobject (Demolish)

Within the lifecycle of a *standplaats* and a *ligplaats* two main events can be distinguished:

- Benoemen standplaats of ligplaats (Denomination)
- Intrekken standplaats of ligplaats (Withdrawing)

The objects within the BRA only have a partially independent lifecycle; most of it is linked with other objects. For example, the lifecycle of a number indication is indissolubly connected with the verblijfsobject, standplaats or ligplaats. For public spaces (often the same as street name) and residences the denomination, withdrawal and mutation of the naming are the most important events. Next to these common events the following special events can be distinguished:

- Hernummeren verblijfsobject, standplaats of ligplaats (Renumbering)
- Geheel of gedeeltelijk tenietgaan van panden en verblijfsobjecten door calamiteiten ((partially) extinguishing because of catastrophes)

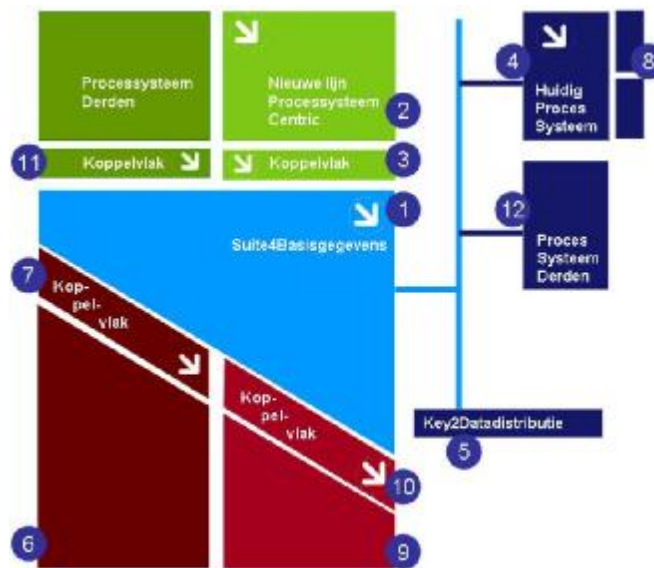
Panden and verblijfsobjecten are registered at the moment the building permit is granted, the real existence of the object is observed, or the existence of the object is noted by client of the Base Registration via a read back.

Panden and verblijfsobjecten also stay within the registration even after they are demolished or withdrawn. By means of the status data and the beginning and end date, the life cycle of the pand and verblijfsobject can be found out.

Standplaatsen and ligplaatsen are registered at the moment of denomination. The same is true for the number assignments, public spaces and residences. Also these objects will stay within the registration after withdrawal and therefore will also be able to provide an overview of its history.

Within the 'Processenhandboek Basisregistraties voor Adressen en Gebouwen' published by the ministry of VROM, the processes regarding the events mentioned above are described in detail.

The solution of Centric to support these events around the BAG is called Suite4Basisgegevens with the modules *Key2Adressen* and *Key2Gebouwen*. This software package will introduce both the new software architecture of Centric which based on Service Oriented Architecture, and its new interface standard. The new architecture encompasses a separation of storage and process knowledge. The Basisgegevens will form a separate Suite4Basisgegevens and contains several smaller (Key2)-modules which support the storage and querying of the several Base Registrations. The new software, Suite4Belastingen, will replace the current GISVG and HIS4all products and provides the support on process level. All other new process systems of Centric (e.g. Suite4Burgerzaken and Suite4Vergunningen) will use the information and storage services of the Suite4Basisgegevens. The new architectural situation is depicted in Figure 8, the interface change is depicted in Figure 9.



Note. 6: landelijke voorzieningen. 9: Base Registration of others.

Figure 8. Architecture and placement of Suite4Basisgegevens

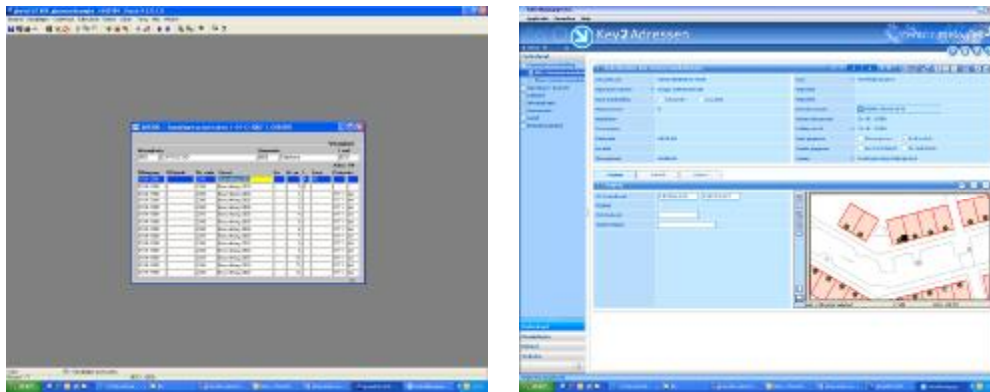


Figure 9. Interface change (old and new situation)

4.4 The practice – The implementation process of the BAG

Central to the CoP and this thesis is the practice of implementing a new software product, more specifically the implementation process for Suite4Basisgegevens and its modules within municipalities. Based on some internal documents, a model of the general implementation process is constructed. This model is added in Appendix A.

An important aspect of this process is the fact that many different people of several organizations and roles are involved in the process steps. For example, the step “Installation Key2Adressen and Key2Gebouwen” involves the system administrator at the municipality and a technical consultant of Centric, while the process step “Support/Training Key2Gebouwen” involves the application manager and end-users of the municipality and a training consultant with more didactical skills of Centric. This latter process step is the initial process step which raised the question of optimizing this support and training.

4.5 The Community – Description by means of a typology

Using the typology of Dubé (2006) the community of practice to be developed at Centric can be described to highlight the characteristics that pose challenges in the design. The described characteristics are also summarized in Appendix D.

4.5.1 Demographics

The community of practice will be created and formed by choice of the management and is therefore intentional. Furthermore, since the CoP still needs to be started, the age and level of maturity is still young and potential respectively.

The community of practice of Centric will have an operational focus. It is more oriented towards the daily operations of the organization in supporting the addressing of customers problems, than to define new products or segment markets. The life span of the CoP will initially be temporary. The effectiveness of the CoP will first be assessed in a pilot test case involving the software package Suite4Basisgegevens. On success the CoP is likely to be extended to other packages, of which Suite4Belastingen will be the first. The possible application of the design to other software products is an important requirement. The size of the intended CoP will start small but will gradually increase. Around 3 to 8 people at each of the municipalities will have some degree of membership with the community. Furthermore, 3 to 7 people at Centric per software package are estimated as being a member of the CoP (2-3 Consultants, 1 Project manager, 2-3 Developers). At a maximum the pilot will thus have around 500 members with 125 of them active at the same timeframe of the implementation.

4.5.2 Organizational context

As noted before, the environment is very important in the success of the community. The resource availability has yet to be determined. In concurrence with the environment and leadership, the management of Centric has to create a facilitating environment and allocate resources and clear responsibilities to persons such that this doesn't inhibit the growth of the community. It is best to assign individuals to specific roles within the community as this may lead to engagement and accountability, and helps people legitimate time spent working on the CoP (Dubé et al., 2006).

The degree of institutionalized formalism for the case at hand is more or less 'unrecognized' in that it will first be set up as a pilot project. The community is not formalized within Centric and the municipalities as new project teams or business units. The members of the community will stay within their current roles and organization.

Cultural diversity is influenced by three levels: the nation, organizational and professional culture (Wenger et al., 2002). Because the CoP will go across different organizations (Centric and the municipalities most prominently), the CoP will have a certain degree of both boundary crossing and cultural diversity. The cultural diversity is heterogeneous on both the organizational (difference between Centric and municipalities) and professional level (differences between system administrators, consultant, technical specialists, managers). Because the community will span across multiple organizations (multiple municipalities across the Netherlands), the geographic dispersion will also be medium-high. Since the Netherlands is a relatively small country (maximum of around 3 hours travel time), the dispersion could be qualified as medium in terms of Dubé's typology. The challenge of a higher distance is that it also encourages psychological distance; it takes more intentional participation efforts from members of the CoP to keep the community alive (Wenger et al., 2002). However, the size of the Netherlands still makes it possible to arrange face-to-face meetings if necessary.

4.5.3 Membership characteristics

The membership characteristics of the CoP are partially dependent on the design decision of who will be allowed access to the community. The community can be set up as relatively protected, in which only a selected number of people can join the community. They then need to authorize themselves to gain access to and add content to the community. This also has an impact on whether people will be able to join voluntarily or compulsorily. Self-selected members will generally have a higher motivation to participate in the community. However, without some management guidance and 'pressure' to join, people may feel a lack of legitimacy of the community. We advise to design a CoP comprised of a mix of voluntary and drafted members. At the start of the project the higher motivated people should be recruited. Finding motivated people shouldn't lead to too much trouble as the relevance of the topic is high on both the municipalities side (the implementation of the software is mandatory) as Centrics (for the consultants, supporting the client during the implementation process is part of their job).

An important characteristic of the community at hand is its membership stability, which is rather fluid. What's special about this case is that municipalities will probably come and go depending on their progress in the implementation process of the supported software package (initially Suite4basisgegevens). This means that it is important to 1) capture the knowledge so it can be used by municipalities joining later on, 2) make the Centric consultant the stable factor across the implementation processes, and 3) let the implementation process be the guide line within the community set-up. Incentives for 'older' municipalities to stay connected and reachable should be supported for a more stable membership.

The prior experience of the members regarding communities is little to none. This means that they have little experience with the several roles and norms within a community. As noted earlier,

management is best to assign individuals to specific roles within the community to give structure to the formation of the community. The specific roles and allocated persons are described in §6.1.

4.5.4 Technological context

While being a prominently virtual community of practice entails that ICT plays an important role, there are still possibilities for face-to-face meetings across the members. In fact, face-to-face meetings are noted as important both in literature (Kimble & Wright, 2000; Brazelton & Gorry, 2003; Dubé et al., 2005) as in the interviews of prior research conducted by Floor (2006). So although there is a reliance on technology to reach the cost and efficiency goals (a.o. no travel time, access on demand), the community is not extremely dependant on it since they can easily meet face-to-face. This also makes it easier to deal with the various amounts of ICT literacy among the members of the community. The literacy varies between relatively high (consultants and system administrators) and relatively low (software users). However, the general literacy should be acceptable as the members are also working with the software of Centric on a daily basis.

5 Vision of a successful CoP

It is important to have a clear vision about the future state of the CoP and how it connects to Centric and its customers. After everything is set up, installed and fully operational, a successful community at Centric will motivate people to share knowledge by increasing the enjoyment to help others, and will encourage the discussion of the *How's* and *Why's* of every day's business processes. Among them, the most important processes will be the ones which include contact with external parties (most importantly the customers). This includes discussing and sharing the business processes of these external partners. This way Centric can develop a better understanding of the way of working at their customers and better anticipate on this and provide better suited support. The informal discussions will lead to improvements of the processes and more customer satisfaction. The implementation processes of Centric's products are important examples of processes in which a good interaction between actors and their knowledge is fruitful.

Next to the discussion facilitation, the CoP will also serve as a knowledge base, providing relevant information and knowledge at each execution of tasks within the business processes. This includes digital versions of the communication between Centric and the municipalities (such as PowerPoint presentation, planning documents and reports). By providing an extensive knowledge base, together with the possibility to discuss and ask questions about these topics, will enable the municipalities to solve and answer problems and questions with less physical contact time of Centric consultants. This will save time for Centric and costs for the municipalities. Furthermore, the Centric consultants themselves will use the knowledge base to increase their own knowledge, since they have access to detailed information about other projects and can more easily discuss their way of working with each other.

Furthermore, a successful CoP facilitates the process of 'connecting people'; connecting members located at different municipalities, departments and hierarchy who all share a common aspect within their daily task (e.g. the topic, the specific technology, the solution or goal).

Because a CoP can be useful across many topics and departments multiple CoP are facilitated (e.g. for multiple software products such as Suite4Belastingen). To organize this facilitation a central specialized division within the service desk department is set up. This division hosts and maintains the CoP supporting systems. Business units request to start a CoP for their business process, and the service desk delivers a bare version. The business units will pay the service desk for this service.

6 Design

The classification of the CoP by means of Dubé typology revealed that the added value is mainly in establishing connections between the members of different municipalities and the consultants of Centric, as the main challenging characteristics are the that CoP is intentional, young and dispersed. The CoP will therefore be designed to facilitate and structure these connections. This is in line with the observed evolution enablers in the study of Gongla & Rizutto (2001). The design of the CoP at Centric should focus on the objectives of the first development stages (as were discussed in §4.2.1). The fundamental functions to support are ‘connection’ and ‘memory & context’. Later on, feedback functionality can be added to the CoP to evolve to the next, and for this community probably final, stage where the community manages itself as a stable source of knowledge. The later development stages are probably out of the scope of the goal of this community, mostly because of the relative short time frames of projects and because Centric has its own product development department. The community could evolve towards use within this department.

In our C5PE framework, this means that the focus lies on structuring the inner-circle elements connection & conversation in the first development stage and content & context in the second stage. The function of the control layer at this point is mainly providing support and establishing the environment by setting up the needed structures.

Wenger (2004) defines three structures which management has to set up in order to roll out the CoP strategy:

- Sponsorship structure: money, and political backup and legitimacy in that the ideas and proposals from the community find their way back into the organization.
- Recognition structure: entails a focus on the acknowledgements the participating members of the community get from their peers and the organization as a whole.
- Support structure: providing facilities which support the community in their performance.

To set up the structures one needs a combination of *people*, *processes* and *technology* (Gongla & Rizutto, 2001).

People

The Defense Acquisition University (DAU, 2007) has identified a variety of roles to support the ongoing activities of a community. Within these roles they make a distinction between roles specific to the community at hand and support roles. The latter are roles that can span multiple communities set up by the organization.

Community roles:

- Community sponsor: high level sponsorship and support.
- Community leader: guides community’s *purpose* and strategic intent.
- Subject Matter Expert: knowledgeable and experienced members of the community which provide the main *content*.
- Content Editor: maintains the accuracy of the *content*.
- Facilitator: fosters and facilitates member *interaction*.
- Member: participates and contributes/receives knowledge.

Support roles:

- Support team: provides operational infrastructure, procedural guidelines, technical support and direct community support.
- User Technical Support: provides help desk support associated with the basic tool functionality and member access.

Processes

During the first development stages of a community of practice the supporting processes and tasks focus on bringing community members together and storing the available knowledge. The following processes are the most important ones that need to be supported in both technological as organizational ways (Gongla & Rizutto, 2001; DAU, 2007; Draaijer, 2008):

- Identifying and Locating community members
- Facilitating bringing individuals together
- Classifying and storing knowledge
- Accessing and contributing to the knowledge
- Broadcast the existence and purpose of the community
- Planning of regular face-to-face meetings between the members
- Harvesting/creating new knowledge from experience and external sources
- Organize user-training sessions and helpdesk support
- Review and validation of submitted content (periodical and on submitting new content)
- Monitoring of community activity by means of metrics
- Perform outreach of the community results

To support the use of the community knowledge base, and to trigger adding knowledge to it, it is important to integrate the use of the community web application in current processes. An example is to direct users to the knowledge base to read some material before they get their face-to-face classroom meeting. Another example is to give training assignments that need to be delivered as a knowledge base contribution. Yet another way is to let consultants write short 'diary'-notes on each activity they perform related to a specific process step.

Furthermore, it is important to organize informal events at which members of the community can meet and contact each other. Since technology should play a supporting role within the context of communities of practice (Wenger, 2001). In fact, communities intentionally designed to support learning will rarely be successful if the interaction takes place exclusively online (Cothrel, & Williams, 1999; Schwen, & Hara, 2004).

Technology

The choice and functionality of the technology is subject to the goals and processes of the community. The processes and first goals of the community are focussed around bringing community members in contact with each other and each other's knowledge. Therefore, the technology needs to primarily facilitate contact information and content storage. This means the technology needs to be able to register personal information of each member and provide content management functionalities.

6.1 Design focus

Central to our design is the implementation process. This is the common denominator that links the members. An important feature of the CoP supporting system will be the modelling of a visual representation of this implementation process. This model provides the structure of the knowledge base within the CoP.

Every content page in the system can have a model. In turn, every modelled step is a content page. This will create a structure of increased detail about the implementation steps, ending at the most basic practical executed steps. This way a direct relationship and relevance to the daily practice is guaranteed.

This leads to what we coin a Process Enhancing Community of Practice. By visualising the process model and connecting all participants at a certain process layer, a situation occurs in which the process steps can be viewed and discussed from multiple points. It furthermore encourages the participants to consider the big-picture.

An important implication of this approach is the tree-like growth of the community and the supporting system. To elaborate on this metaphor, one seeds a community with a single overall and global process model. This will then grow and get branches which in turn also get branches, leafs and flowers/fruits. A potential branch can provide the fruits to grow a new tree. The members of a community can be seen as bees, moving around and buzzing over a certain branch. When members fly over to another branch they take some of the pollen of their previous flower which fosters the growth of the new one. The enrollment of the members should follow the essence of this natural growth.

Members' enrollment

In order to recruit members for the community we recommend using an invitation model. The recommended design of the invitation model uses the hierarchy of responsibility to guarantee the coverage of the whole process.

The principle behind the design is as follows: every time someone is assigned to do a job, that person is invited to the community by the assigner. In turn, that person assigns and thus invites other persons for jobs that are part of fulfilling his own job. In general the inviter will be a little higher (or at least at the same level) in the chain of responsibility, therefore the invitee is more willing (or pressed) to respond to the invitation. This creates a kind of social pressure/relationship which fuels the connection. This principle is supported by the theory of Social Influence and has proven to have an direct impact on knowledge sharing (Draaijer, 2008).

Assignment to a certain process step means that you are allowed to modify or set up the detailed models of this step and substeps.

Community roles

Because of the hierarchical structure of responsibilities, the role of each member depends on the level of the process model. At one level he is just a participant in a leaf, where at a lower level he is responsible for the whole management of the process. This means that most members will have multiple roles. If we review the roles defines by DAU (2007), we can allocate the following persons to the roles (Table 4):

Table 4. Allocation of Roles Specific to the Case

Role	Allocated person
Sponsor	Business unit (manager) of the implemented software product
Leader	Project leader/manager of both the customer as Centric
Subject matter expert (SME)	Assigned member, process step executer
Content editor	Assigner (thus 1 level up in hierarchy to the SME and ≥ 1 as the general member), process owner (the person responsible for carrying out the process)
Facilitator	Assigner (thus 1 level up in hierarchy to the SME and ≥ 1 as the general member), team leader
Member	Non-assigned member

The support roles can best be organized in a separate department which provides the service of hosting the system/facilities for the CoP. For the purpose of a pilot test, such an organization isn't realistic.

6.2 Technological features

In order to provide context to each implementation step several features will need to be implemented. Firstly, each member can be assigned to implementation steps/content pages. Secondly, each content page has a discussion area. Thirdly, documents and files can be connected to the content page. Fourthly, on every content page members can pose questions that are related to the implementation step which then can be answered by other members. And fifthly, project specific notes can be added.

Important aspect of the CoP support system is the free editing style, like Wiki; every member will be able to update most of the content and increase the knowledge assets. Process model modification is limited to members who have the overview, best knowledge and responsibility for the work processes (most notably the project managers). It is however important for the other members to discuss and question the models in the discussion areas. Only with their practice knowledge about the individual steps the process can be improved. Furthermore, each change will be logged and connected to the member. See Table 5.

Table 5. Important technical features of the CoP

	Technical features
1	Wiki WYSIWYG-editing
2	Forum
3	Discussion
4	Q&A – FAQ
5	Modular architecture (being able to switch on/off features)
6	Member Profile
7	Easy access to contact information (e-mail, telephone) of members assigned to process steps
8	Search facility (for resources, persons, questions, discussion)
9	Connecting files and relevant urls to content pages
10	Accountability for each edit by registering username of each change
11	Access rights for corresponding roles
12	Logging of health metrics

To design for the future (and the next CoP development stages) we propose a modular approach to develop the supporting system/internet application. The modules will mainly consist of features which can be connected to the process step article on a plug-and-play basis; turning it on and off and easy to implement. Many of the features mentioned above can be implemented as modules. A general overview of the website structure is given in Figure 10.

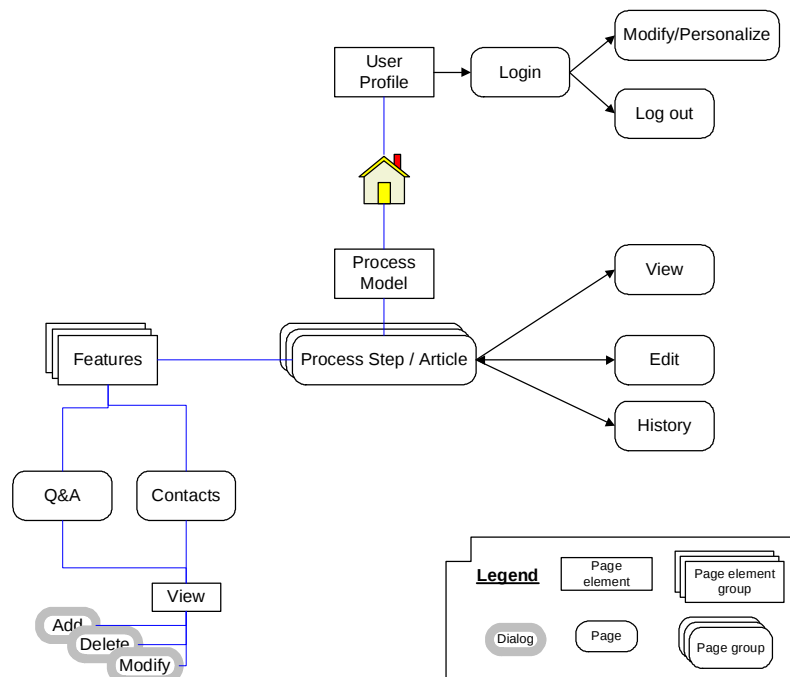


Figure 10. General website structure.

6.2.1 General Look and Feel of the Web Application

To give an impression about the structure and content areas of the envisioned web application to support the CoP, a sketchy (mock-up) prototype is made. A screenshot, with highlighted areas, is given in Figure 11. The prototype can also be viewed online at the following address: <http://www.tcwonderzoek.nl/centric/ccop/>. The final web application will correspond more with the style used in the new .NET software packages.

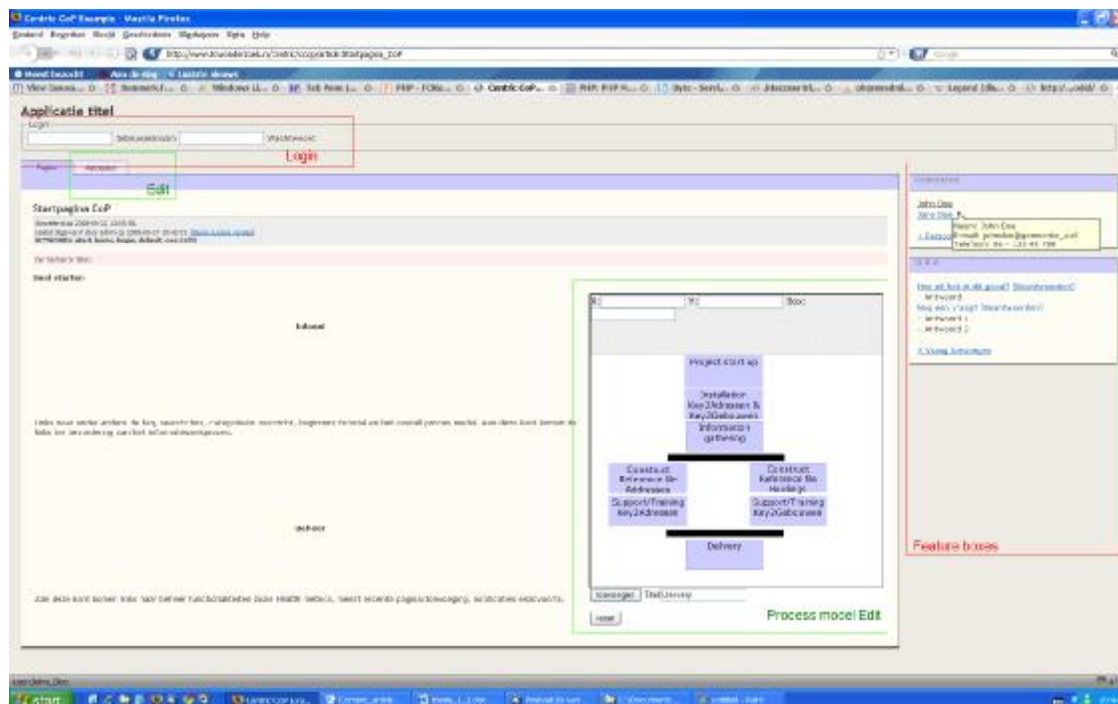


Figure 11. General look & feel of the prototype of the web application

6.2.2 Details on some specific features

In this section some of the foremost features will be described in more detail in order to give a better and more concrete understanding. The discussed features deal with the two functions ‘connection’ and ‘memory & context’ which were determined to be the most important for the case at hand in the first stage.

6.2.2.1 Easy, Fast and WYSIWYG-editing

Creating and updating content is important for the health of the community. It is therefore important to make these functions easily accessible and easy to use. The proposed design uses tabs to directly connect the functions to the article (see Figure 13). The content editing itself is done in a WYSIWYG (What You See Is What You Get) style, comparable to the Word functionality (see Figure 12 for the most basic editing options). This includes easily adding images and highlighting text with several styles. For users who are more web-savvy the editor also gives the option to edit the code (HTML).

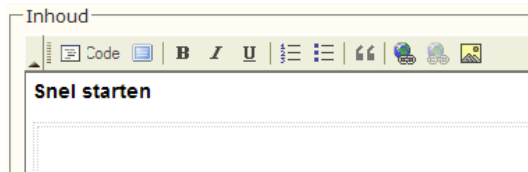


Figure 12. Compact editing possibilities in a Word-like style.

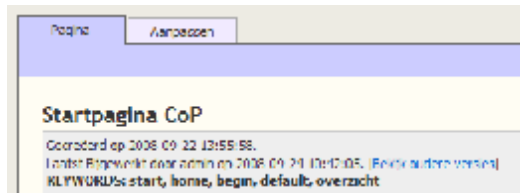


Figure 13. Fast access to the editing mode with a single click on the tab.

As shown in Figure 13 every single modification is logged and attributed to the logged in member. This creates a way to both address malicious edits and to give credits to the contributor. The latter can increase the enjoyment in helping others, which is identified as important to encourage knowledge sharing (Draaijer, 2008).

6.2.2.2 On-site Process Modelling

An important aspect of the design proposal is the addition of an on-site process modelling tool within the web application. In order to give some feeling about how this could work and look like, a first prototype is developed (see Figure 14). Within this prototype it is possible to freely create, delete and move ‘process blocks’ in a drawing like manner. Simply filling in the text and pushing the button creates another box on the drawing field. This box can then be dragged around to position it. Dragging a box into the gray area will delete it. Saving the model (not available in prototype) is easily and efficiently done by only storing the coordinates and the text. In the ‘view’-mode the boxes are clickable and will link to the given process step article page. A prototype of the editing functionality can be viewed online at: <http://www.tcwonderzoek.nl/centric/processmodel/>.

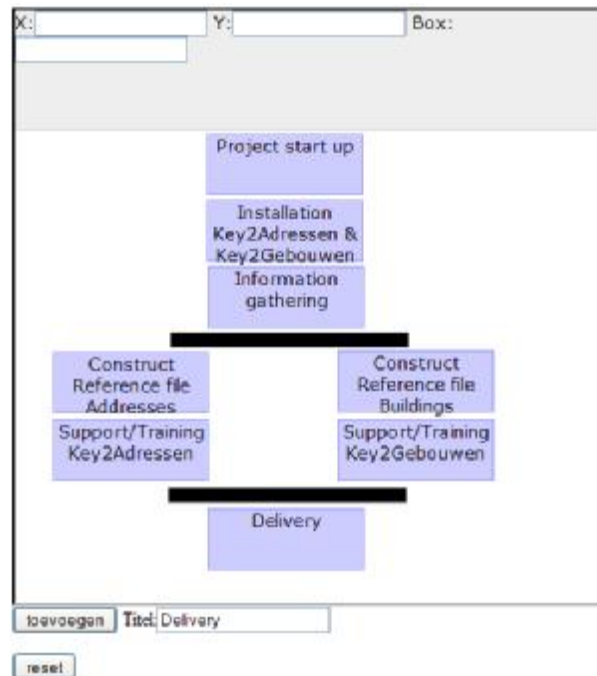


Figure 14. Simple process model drawn with the prototype

6.2.2.3 Questions & Answers – FAQ

The Q&A feature is implemented as a module in the feature box. It entails the adding, modifying and deleting of questions and answers. These questions are connected to a specific article/process step. In each box there is also a link to the general (and categorical) overview of all questions and answers available in the community. To better unlock the knowledge, a search facility will have to be implemented to search questions and answers. Another way to unlock the knowledge is by means of the FAQ (Frequently Asked Questions). Persons within the community who have a good understanding and overview of most processes and content are to be assigned to maintain a good FAQ; a good selection of available questions. To support their task, several functions are suggested:

- Notification of Q&A changes (newly submitted questions, answers, modifications);
- Overview of database statistics about the questions and answers (page views, feedback rating functionality).

6.2.2.4 Easy access to contact information

Another very important feature that needs to be supported within the web application is the easy access to contact information of relevant others. As noted before, connecting people is a main goal of the first development stages. In order to accomplish this fast access every article/process step has connected members/persons relevant to the process step. These are visible in the feature box area as a list of names. When the user moves over the name of the person a text balloon shows up with the most essential additional information like e-mail and telephone number to contact that person (see Figure 15). Clicking on the person's name will lead to the user profile page of that member (or a simple page with only contact info in case the person hasn't registered yet).

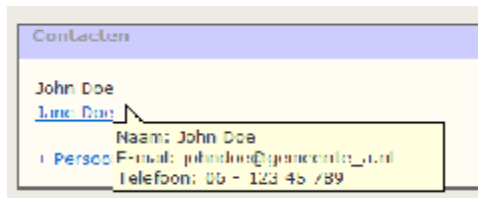


Figure 15. Example of a contact info text balloon

To connect a person to a process step you have two options depending on whether the person is already registered. When adding a person the web application first searches the member database (browsable by the user). If the right person is found, it can easily be added by selecting the person. In case the person isn't found you have to add a new person. Persons can easily be added by means of filling in a form with contact details. The person in question will receive an email-invitation to join the Community and register to update his/her profile. In the mean time the general contact info provided by the inviter is visible.

6.3 Object overview

An overview of the objects and their relationships which will be present in the supporting CoP system is depicted in the models below (Figure 16 and Figure 17). Figure 16 depicts the core of the web application, since all other information is directly connected to the process step articles. The split between Article and Content is made to efficiently store history/backup information to support rollback in case of malicious editing. All additional features will reference to the article_id.

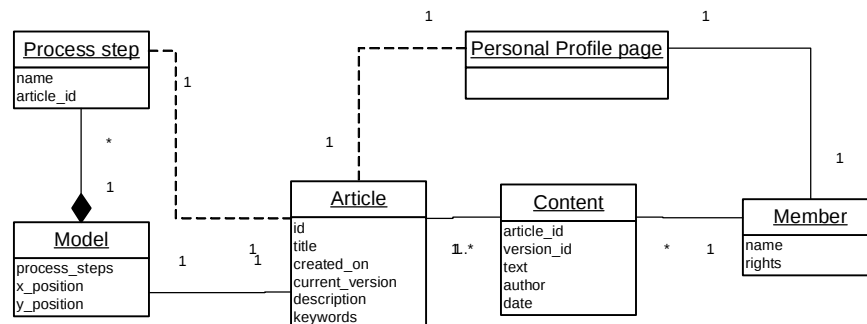


Figure 16. Relationship model zoomed in on the Article-Process-Model relationship

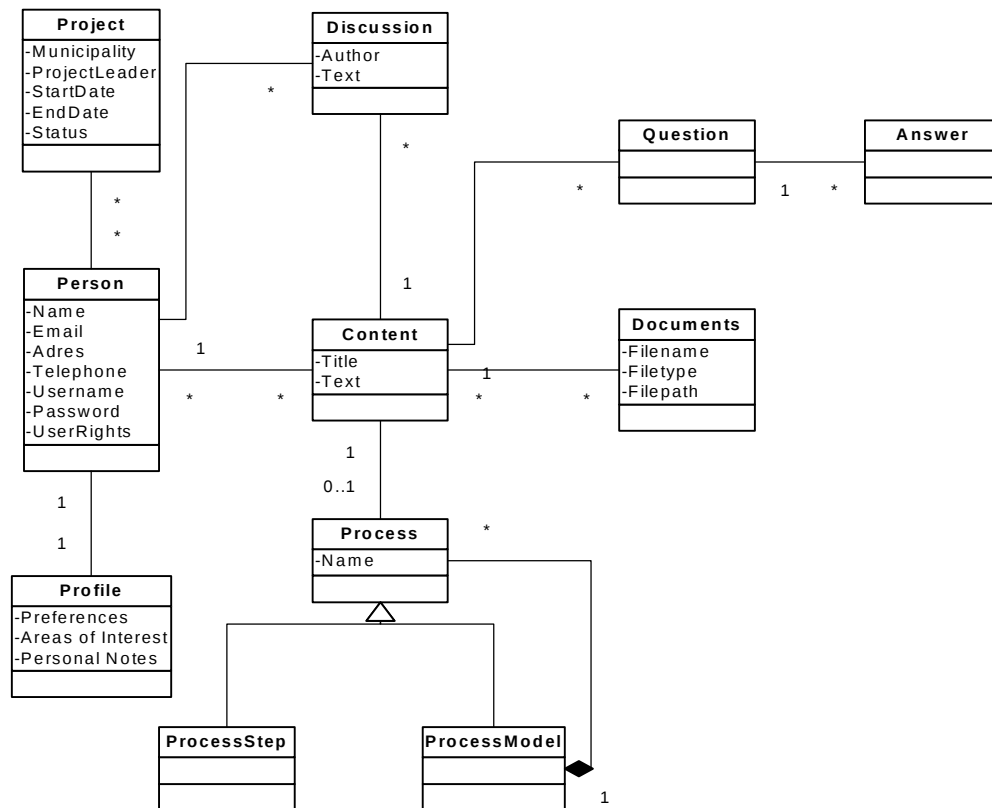


Figure 17. Relationship diagram which includes objects from multiple features

The Article or Content class is therefore the most important part of the system; it connects all functionalities.

6.4 Overall implementation guide

On the base of the design focus, technological features and organizational roles the following 14 steps have been formulated which need to be carried out to successfully implement the CoP at Centric.

Table 6. Implementation steps (steps marked with a '*' are not applicable in a pilot)

1. Build a system/platform which supports the features in a modular way to support switching on/off features.
2*. Set-up a dedicated CoP division within the technological service department
3*. Give assigned persons within the service desk department the responsibility of the CoP system maintenance and development.
4*. Set-up a CoP-request procedure: message to service desk a Service desk sets up a clean CoP framework for the requesting department
5. Hierarchical brainstorm sessions to model the processes at each necessary layer (from global to detail)
6. Modelling of the process within the CoP using the visual modelling tool to set up the structure
7. Appoint and invite people/members to the sub steps at each task assignment
8. Add a possibility to declare the time spent on the community within the hour registration system (OMA)
9. Add content, context and files from the daily practice to the steps
10. Repeat points 5 till 7 for each hierarchical process layer
11. Organize periodical meetings between the members who are active within the same process layer to discuss their main topics and how this is supported within the CoP. Encourage critical discussion about what is missing, what can be improved and the current practice.

12. Add information resulting from (customer) contact between members to the CoP on a daily basis (documents, presentations, notes).
13. Manage the health of the community by assessing several metrics (user satisfaction, use in terms of pageviews, downloads and logins), address areas that are under lit and safeguard the goals of the community (the number of questions/problems solved without physical time of a consultant).
14. Promoting the community in offline media such as conferences, expositions, the 'Centric Magazine voor de Overheid', the dIT (personnel magazine)

7 Conclusion

This chapter will provide short answers to the questions formulated in Chapter 3. At the end this will lead to a conclusion about the design for a community of practice for Centric.

- How does Centric need to design its Community of Practice?
 - What are the elements that define the success of a Community of Practice?

Several elements of success have been identified, which together form our C5PE framework. The main elements are: Content, Conversation, Connections, (information) Context, and Purpose, and the surrounding elements Environment and Control. Each of these elements needs to be addressed coherently to effectively generate and transfer knowledge.

- What are successful design principles to support the success of CoPs?

Among the many options and tools which can support a CoP, Wenger (2001) has identified 13 design principles which were present in successful projects. The principles are named as follows:

- Presence & Visibility;
- Rhythm
- Knowledge-generating interactions
- Efficiency of involvement
- Short-term value
- Long-term value
- Connections to the world
- Personal identities
- Communal identities
- Belonging and relationships
- Complex boundaries
- Evolution: maturation and integration
- Active community building.

These design principles have been described and added in Appendix C.

- o How do these design principles relate to the success elements?

Many of the principles share some common properties that can be related to the C5PE framework. We therefore mapped or categorized them according to the C5PE framework. This mapping is added in Chapter 2.

- How can the case be characterised according to the typology of Dubé et al.?
 - o Which characteristics increase the level of complexity?

In order to apply the rather general design principles to the case at hand, we've described the intended community using Dubé et al.'s (2006) typology in Chapter 4.5 and Appendix D. This description showed us that the main challenging characteristics are the intentional, young and dispersed properties. These are highlighted in bold in the Appendix.

- o Which characteristics are still open to design?

Three of Dubé's characteristics were still open for design: Resource availability, Leadership and Members' enrolment. Resource availability is 'just' a matter of how much time and money Centric (and the municipalities) wants to devote to the community. The other two characteristics have been

addressed in the design. The used design approach is to develop or ‘grow’ the community in a tree-like recursive manner with an invitation model. The principle behind the design is as follows: every time someone is assigned to do a job, that person is invited to the community by the assigner. In turn, that person assigns and thus invites other persons for jobs that are part of fulfilling his own job. In general the inviter will be a little higher (or at least at the same level) in the chain of responsibility, therefore the invitee is more willing (or pressed) to respond to the invitation (i.e. Social Influence, cf. Draaijer, 2008) . This creates a kind of social pressure/relationship which fuels the connection. This approach provides guidance for both the leadership (responsibilities) and enrolment of members.

o Which core elements of success experience the most challenge?

The added value of the CoP is mainly in establishing connections between the members of different municipalities and the consultants of Centric. This is also the most challenged element because of the boundary-crossing and cultural diversity, the distance, both physical as mental. The traditional relationship between Centric and the municipalities is of producer-consumer. The CoP knowledge sharing paradigm prospers a relationship in which the borders between the organizations disappear and the people become more like ‘colleagues’.

- How do these elements translate into the design?

The resulting design focuses on establishing connections and capturing the knowledge in a structured way. Another important aspect is the ease of use to share and view already available knowledge. Furthermore, the architecture is set up in a way that it is easily extended with new features to fulfil the needs of the CoP in future development stages.

To summarize, this document describes a possible design that Centric can follow in applying the community concept into their organization to support their implementation and customer support processes. This design is founded in literature and connects to the typical characteristics of the case at hand. The design provides a systematic growing pattern of the community which leads to a full coverage of all relevant potential participants. The choice of technological features is done in a best effort to connect to the success elements which are challenged most in this case. However, the precise filling in is kind of open. There are a lot of online (and offline) tools around which communities can use. The best thing is to let the exact use of tools evolve from within the community. However, the proposed system features all important facilities and content storage that provide a fundamental base.

8 Discussion

Implementing a Community of Practice isn't without its merits. The predictability of success of a specific CoP is very low. Communities of practice are complex and success is not guaranteed. The reasons why some efforts succeed while others fail are complex and varied (Schlager, Fusco, & Schank, 2002). Nevertheless we have found some principles and elements in literature which provide some guidance in the designing for a CoP.

The proposed system and process implementation design and strategy is focused around a modular and tree-like evolution. In this way the community can more easily increase their level of involvement and dedication. It can also more easily adapt itself to its current needs by developing custom features. Once a seed has been planted, the hierarchy and processes will reach more and more people to join the community. Because of this connection with the 'formal' business processes, it isn't as 'free' as a 'pure' CoP but you can see this as the difference between a wild garden where every plant has equal chance to grow and a gardener-tendered garden.

The huge amount of technical functionalities and features that can possibly support the CoP in improving the sharing of knowledge is somewhat overwhelming; a good example is the collection of technical implications Wenger (2001) gives in Appendix C. However, a good point to note is that many of the features can easily be integrated by implementing it as a module in the proposed web application since the core objects are modelled in a flexible way.

Next to all the advantages one can achieve with setting up a Community of Practice, one also needs to be aware of some of the risks. We will now list some risks of implementing a CoP in this particular case.

Risks:

- Too much direct contact with the consultants/experts will hinder their normal daily tasks. The helpdesk, which functions as a filter, is surpassed.
- Customers stop being involved in the community as soon as their project has finished.
- Users get overwhelmed by all the information about process steps in which they aren't involved.
- Privacy and non-disclosure issues of specific project details when municipality is also a customer of another software developing company for other parts of its BAG-infrastructure, resulting in a reluctance or inability to share all knowledge.
- Negative information (bugs, errors, crashes) spreading causing a negative complaining instead of a positive constructive atmosphere.

Designing a Community of Practice is also a little bit contradicting with the principles of it. As said in the introduction, some prefer to call it design *for* instead of *of* a CoP (Stuckey & Barab, 2007). This also leads to design consequences which aren't really in line with a 'pure' CoP, as the active support/'pushing' limits the spontaneity of the CoP creation. However, without a more structured way of growing a community there is little guarantee of success and positive effects for the organization. This balance between well-described concrete advice and general guidelines is something that caused some difficulties in finding the right tone and good literature to give Centric hands-on information such that they can start a CoP project right away.

However, the tree metaphor provides a good way of thinking about communities and also applies to the more 'pure' and self-rising forms. Trees can start to grow at any point; even following a bottom-up approach. When noticing bottom-up initiatives an important role is to connect the 'lower' branches into their 'upper' process.

These bottom-up communities can also rise from more lightweight initiatives. Some initiatives you can think of are organizing informal presentations about web 2.0 tools on the internet (like the presentation about SecondLife held at Centric) and addressing the topic of knowledge sharing in the *dIT* (the personnel magazine of Centric). Another lightweight solution is to ask a motivated consultant (or another employee) to record his daily way of working, contacts and the daily choice pros and cons and opinions of decisions during the whole implementation process in an online blog. The same initiative at the client side would even be more valuable for Centric. This 'online diary' can be used internally and externally in the same way as the proposed CoP system.

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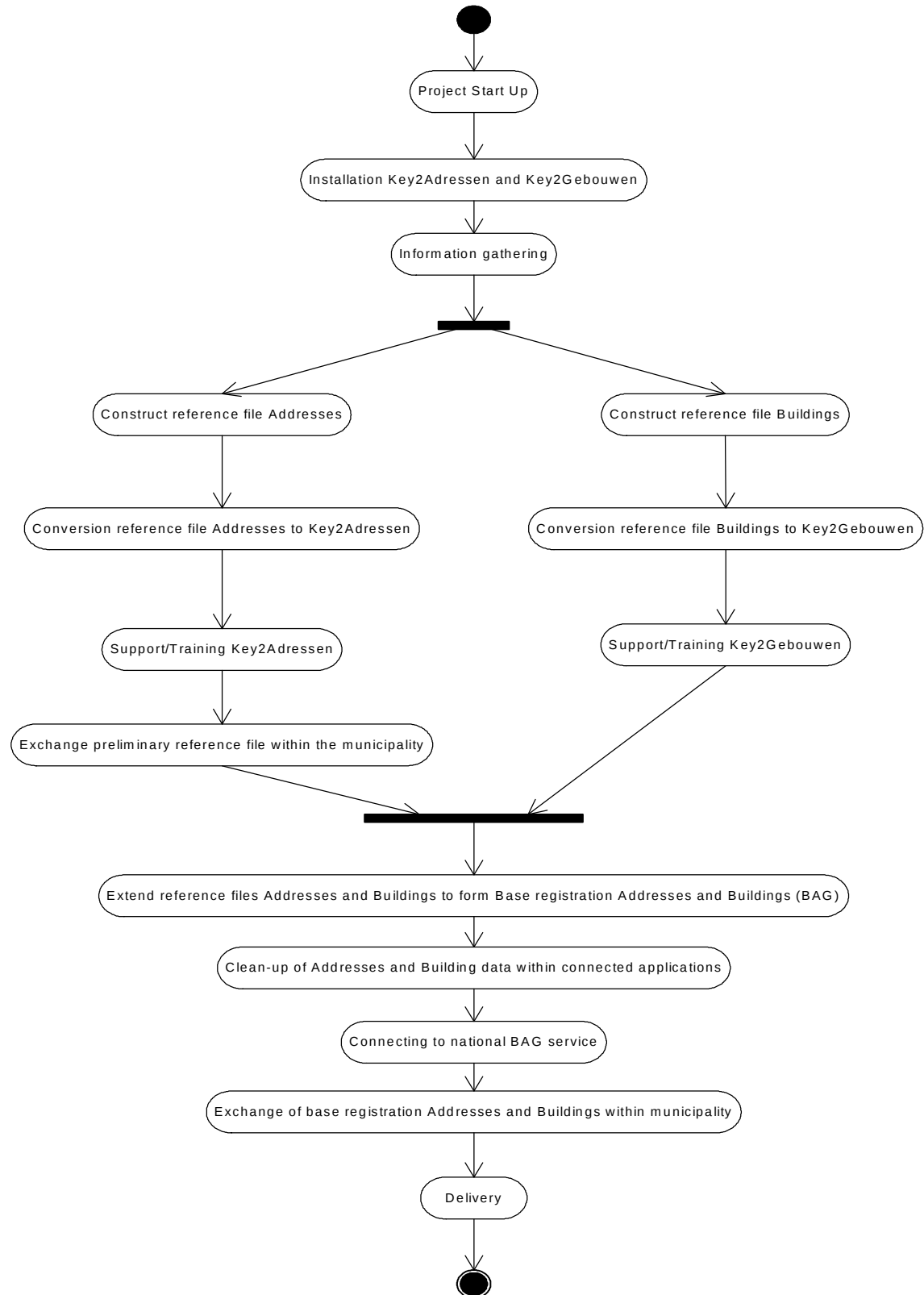
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Appendix A. Implementation process of the BAG



Appendix B. Typology of a Virtual Community of Practice

Structural Characteristics		Brief Definition
Demographics	Orientation	VCoPs may be created for different purposes; some have strategic implications while others are created to increase operational efficiency.
	Life span	A VCoP can be assembled on a temporary basis (short life span) to accomplish a specific purpose (for instance, a response to an ad hoc environmental change), but is more often than not created on a permanent basis (long life span) with no definite time frame in mind, as an on-going mechanism for information sharing.
	Age	Age defines the period of time the VCoP has to experiment and to progress to a productive level.
	Level of maturity	It is well documented that CoPs go through different phases throughout their life. Level of maturity refers to the phase reached by the VCoP.
Organizational context	Creation process	A VCoP can be deliberately established by management who will define its purpose and select key members (top-down approach) or can spontaneously emerge and be created by a number of interested members (bottom-up approach).
	Environment	Forces from the larger context include the characteristics of the environment, the culture and subcultures of the organization (or organizations) involved, the management style(s), and the whole political context. <i>(obstructive=environment not conducive to change; facilitating=environment receptive to change; neutral=not obstructive, nor facilitating environment)</i>
	Resource availability	Describes the general availability of resources in the environment into which the VCoP is created. <i>(low=little resource availability in the surrounding context; high=high resource availability in the surrounding context)</i>
	Degree of institutionalized formalism	Refers to the degree to which a VCoP has been integrated into the formal structure of an organization. In a high degree of formalism, the VCoP has been fully integrated and considered a formal unit of the organization.
	Leadership	An organization can find it valuable to create a VCoP formal governance structure where individuals are appointed to specific roles, or can leave roles and authority relationships to emerge through interaction around expertise.
Composition	Boundary crossing	VCoPs are often created to break organizational silos and promote collaboration, learning, and information sharing. It is therefore common for VCoPs to cross boundaries across work groups, organizational units and even organizations. <i>(low=same business unit; medium=across business units within the same organization; high=across organizations)</i>
	Cultural diversity	Cultural diversity is created by a mix of national, organizational, and professional cultures assembled into a VCoP. Refers to the level of cultural homogeneity in the VCoP. <i>(homogeneous=low cultural diversity among members; medium=intermediate level of diversity;</i>

		<i>heterogeneous=high cultural diversity)</i>
	Size	Refers to the number of members in the VCoP.
Membership	Geographic dispersion	Refers to the physical location of the participants. In one VCoP, members may all be in the same building (low dispersion) while in another one, members may be scattered around the world (high dispersion). <i>(low=in the same city; medium=in the same state; high=around the world)</i>
	Membership stability	VCoP can have an open membership whereby anyone can become a member and participate (ex. an Internet community) or a closed one (selected members only). Open or closed, membership may be relatively permanent, but can also have more fluidity. Even in a closed membership VCoP, membership may be fluid because of organizational turnover (Storck & Hill, 2000). <i>(open=new members may join anytime; closed=members are purposely asked to join and the number is quite stable; closed with changes=members are regularly replaced because of organizational turnover; closed and growing=members are regularly asked to join)</i>
	Members' enrollment	While members are more likely self-selected and volunteer to be part of a VCoP, members' participation can be "strongly" encouraged by management to the point where members do not feel free to turn down the proposition. <i>(voluntary=people freely agree to participate; compulsory=people's participation is made compulsory; mix=a mix of both voluntary and compulsory)</i>
	Members' prior community experience	An existing network of individuals may be the basis of a new CoP (Lesser & Everest, 2001) or a new group of people can be assembled around a common interest. <i>(none: members do not generally interact; medium: many informal networks exist among members; extensive: most members know each other and are used to interacting)</i>
	Topic's relevance to members	While day to day topics may vary, VCoPs are usually assigned a broad theme or objective that may be more or less relevant to its members' daily work. <i>(high=topic discussed in the VCoP is relevant to the daily work of most members; medium=topic discussed in the VCoP is moderately relevant to the daily work of most members; low=topic discussed in the VCoP is not connected to the daily work of most members)</i>
Technology	Degree of reliance on ICT	While a CoP needs to be predominantly using ICT to be called "virtual," VCoPs may use technology to varying degrees. <i>(low=face-to-face meetings are regularly held (on a monthly basis); medium=face-to-face meetings are held (six times a year); high=very few face-to-face meetings are held (less than six times a year)</i>
	Members' ICT literacy	Refers to the level of comfort of members with technology. <i>(low=most members have little experience with ICT; medium=most members have average experience with ICT; high=most members have extensive experience with ICT)</i>

Table 7. Typology of VCOPs' structuring characteristics. Adapted from Dubé et al. (2003).

Appendix C. Success elements and their technology implications

<i>Principle</i>	<i>Technology implications</i>
1. Presence and visibility	
In collocated communities, people meet each other in the hallway or in the cafeteria. The community reminds itself to members in many ways. It is also more visible. At meetings, they can see who is there, even if people do not say anything. • Presence of community in the organization • Presence of community to members • Presence of members to the community • Visibility of the community • Knowing what others know, do or care about • Impromptu interactions	• Pointers to the community • Directories of communities • Some “push” distribution, such as electronic newsletters, reminders, questions • Member directories • Who is doing what • Presence awareness • Instant messaging • Virtual coffee smell
2. Rhythm	
Communities exist in time and they need a rhythm of events and rituals that reasserts their existence over time. • Regular meetings bring a sense ongoing routine • Unusual meetings break the routine and bring some excitement • Milestones • Projects underway • Waves of hot topics	The web allows for asynchronous participation, but the danger of a pure webbased presence for a community is its timelessness. It is always possible to participate, but by the same token, there is never a special occasion to participate. A webbased presence can contribute to a sense of communal time: • Community calendar • Reminders • Synchronization of calendars • Synchronous events, such as teleconferences, virtual conferences or online meetings • Invitations • Minutes of recent events made available quickly afterwards • Hot topics
3. Knowledge-generating interactions	
Members of a community of practice need to be able to interact regularly and meaningfully in order to develop their shared practice. • Multiple channels and forms of interaction • Forums for thinking together • Problem-solving • Discussing ideas • Exchanging views • Sharing news • Lectures/workshops	Each community has unique needs and it is important to support the kind of interactions that enable community members to develop their knowledge. Standard offerings include: Asynchronous • E-mail and discussion boards • Document checkout/version control Synchronous • Lectures and large meetings • Application sharing • Web tours
4. Efficiency of involvement	
Communities of practice usually compete with other priorities in the lives of members. It is crucial to make participation as easy	Having to learn a whole new system makes it more difficult to participate. So does every additional click. A less than optimal solution

and efficient as possible: • Ease of participation • Integration with other aspects of life, like daily work or other communities • Management of attention • Flexibility in time management	that makes participation easy can often be better than a difficult optimal solution. • Integration with work systems • Personalized knowledge/application portals • Subscriptions • Tours of new activity • Content filtering and ordering • Archiving of interactions: interactions tend to leave a trace online
5. Short-term value	
Communities of practice thrive on the value they deliver to their members as well as to the organization. Members vote with their feet (or keyboards). In the short-term, they need to find immediate value in their participation: • Quick access to information • Access to expertise • Answer to questions • Help with problems • Preserving the time of experts is another important concern, which adds shortterm value to them. Generally, experts appreciate processes by which only really difficult questions and problems come to them.	• Mechanisms for asking questions • Lists of FAQ's • Databases of answers • Intelligent access to experts: even good search facilities can be frustrating and much of the community's knowledge is not explicit. A system can also support access to experts, while attempting to preserve expert time. • Forums for getting help with problems • Brainstorming facilities
6. Long-term value	
Because members also identify with their domain, the value that the community delivers also has a long-term dimension. It derives from a sense of accumulation over time • Define "best practices" or common methods and processes • Produce and store artifacts, tools, documents • Maintain the knowledge base to keep it up to date and usable • Learning agenda: a community can take charge of its practice and agree on a list of areas to develop • Practice-building projects: mature communities of practice often spawn project teams to work on specific practice-development tasks on their learning agenda, such as developing a template, a tool, or a manual	• Repositories for artifacts • Taxonomies • Search mechanisms • Discussing and updating a learning agenda • Project spaces for practice development • projects
7. Connections to the world	
The value of belonging to a community of practice derives not only from having access to peers, but also from having access to the leading-edge in the broader world: • What is happening	Technology cannot replace one's network of connections in a field. But it can provide some facilities. • News • Announcements of external events

• What is hot in the field • New developments, new technologies • Evaluation and reviews • External experts • Reference material	• Directory of external experts • Links to other sites • Library of references
8. Personal identities	
Personal identities are a crucial aspect of participation. Members bring their identities to the community and their participation both develops and shapes their identities. Over time, community participation creates both commonality and differences between people. • Personal passions • Competence • Areas of specialization • Reputation/assessment/rewards • Various roles people play in the community • Multimembership: people belong to more than one community or group at any one time • Personal trajectory: people's identities change over time within a community and as they move from one community to another.	• Profiles • Synchronizing profiles across communities, with multiple views • Reputation and ranking • Preferences • Personal history • Private places
9. Communal identities	
A community of practice thrives on a sense of communal identity. Members inherit this communal identity. A sense of place can help a community develop an identity, but many communities do not have a physical place. In addition, a communal identity depends on: • Clarity about domain and sense of mission • Personal passion • Reputation of the community • Value to the organization • Success stories • A distinctive style	• Being able to have and furnish a communal place • Give the community a public presence • Giving public access to the "source documents" of the community (mission, domain definition, "constitution," policies) • News about the effects of the community, success stories • Have a distinctive look and feel
10. Belonging and relationships	
Belonging to a community of practice can be an intensely personal experience based on deep relationships with other members. • Professional connections • Peer interactions • Personal relationships • Trust • Helping, mentoring, teaching • Reciprocity • Finding a voice	While there are no substitute yet for face-to-face interactions for this purpose, technology can provide some support. • Personal profiles can reveal unexpected aspect of member's lives • Supporting private interactions and interpersonal relationships • Supporting mentoring relationships • Some people find it easier to express themselves in writing and they suddenly find a voice when the conversation moves online • Chat moderators have observed that it is less easy for "powerful" people to hold the floor with longwinded discourses

11. Complex boundaries	
Managing boundaries is an important challenge for communities. Boundaries around a community of practice are both unavoidable (only some people are practitioners) and useful (it is necessary to know who is a member in order to communicate efficiently). Managing community boundaries is difficult, however, because these boundaries are complex. • It is crucial to design multiple levels and types of participation, allowing people to have different relationships with the community • An active core group may need to have special interactions • Peripheral participation: many people who are not full members have an interest in the domain of a community • Subcommunities and special interest groups are very common especially as a community grows.	This is a difficult aspect for most systems because boundaries in communities of practice are both porous and fluid. • Differential access rights • Lurking facilities • Public areas as well as restricted community space • Subspaces • Nested features • This has implication for the pricing structure
12. Evolution: maturation and integration	
A community of practice evolves over time. What brings it together, how members interact, and how it develops knowledge in its domain all change as the community matures. A community evolves in two directions. • It goes through developmental stages internally. • It changes its relationship with its environment.	It is important for a platform to be able to evolve along with the community so members do not have to move to another platform and learn a whole new system. This creates a tension in developing a general platform: • Not too expensive to start so that initial commitment can be somewhat tentative • Have enough features to support maturation • Flexibility in configuration • Ongoing reflection, assessment, and redirection
13. Active community building	
Thriving communities usually have members who take an active role in cultivating the community. For instance, an apt community coordinator is a good predictor of how alive a community is. But it is a sign of health when other members get involved also. • Coordination/administration • Self-governance • Managing the repository • Reflection on the vitality of the community • Evaluation of its achievements • Assessment of value delivered • Monitoring the health of the community	Systems to support communities of practice must offer a variety of administrative tools to monitor and configure the use and effectiveness of the community space. • Logs and statistics for monitoring • Polling and voting facilities • Assessment tools and surveys • Health indicators • Administrative help and reminders • Switches and policy enforcement algorithms

Table 8. Adapted from Wenger (2001)

Appendix D Challenging characteristics of the community

Characteristic	Case value
Orientation	Operational
Life span	Temporary
Age	Young
Level of maturity	Potential stage
Creation process	Intentional
Environment	Facilitating
Resource availability	<i>Design decision</i>
Degree of institutionalized formalism	Pilot, not formalized in organization
Leadership	<i>Design decision</i>
Boundary crossing	High
Cultural diversity	Heterogeneous
Size	Medium, partially depends on design decision about who is allowed
Geographic dispersion	High
Membership stability	Fluid, municipalities tend to come and go as their implementation is fulfilled
Members' enrollment	<i>Design decision</i>
Members' prior community experience	None-Little
Topic's relevance to members	High
Degree of reliance on ICT	Medium, face-to-face was recognised as being important and is possible
Members' ICT literacy	Various

Appendix E History and background of Centric

In 1978 Gerard Sanderink started as an independent entrepreneur and founded together with Hans Quellhorst 'ICT'. Some years later, Sanderink decided to follow his own path and started the Sanderink Group in 1992. By means of own growth and take-overs Sanderink Group expanded to become one of the top providers in The Netherlands. Since 2001 the name changed to Centric. In 2005 Centric expanded its services with the acquisitions of Oranjewoud (consultancy- and engineering services) and Finace (finance, accounting and security).

The activities of the Centric Holding (excluding Oranjewoud and Finace) are concentrated around consultancy, IT solutions, software engineering, e-business, systems integration, managed ICT services and training. Centric delivers total solutions regarding IT for several market segments like the government (e.g. ministries and municipalities (>60%)), financial services, housing corporations (33%), commercial enterprises and healthcare institutions. Centric currently has around 5500 employees and it's latest (2006) revenue and profit after taxes were €631mln and €39.1mln respectively.

The structure of the Centric Holding can be divided into three divisions: Managed ICT Services, IT Solutions and Software Engineering. This project is situated within the IT Solutions division, Business unit "Belastingen & Vastgoed" (Taxes & Real Estate). This division focuses on the development of standard software applications to support the primary processes within the strategic market segments mentioned earlier.

The position of Centric on the scale of application versus process consultancy companies is shown in Figure 18.

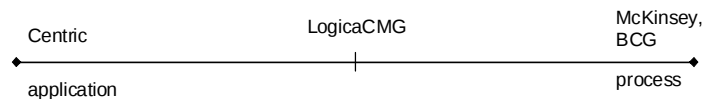


Figure 18. Application vs. Process orientation

Being at the heart of the application, since they make it themselves, Centric has the advantage of knowing every detail of the BAG software. The knowledge provided by and with Centric is therefore on the level of the application managers. This is where Centric has the knowledge.