ORIGINAL PAPER

The CC Model as Organizational Design Striving to Combine Relevance and Rigor

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Abstract   This paper addresses the design problem of ensuring engaged research's rigorous relevance and, especially, its implications regarding the engaged researcher's role. As a theoretical background, this paper firstly uses the "role concept" from the Business Engineering discipline where "role" is a fundamental element of generic method description. Secondly, it uses the "Design Science" paradigm's generic guidelines for the assessment of research activities and results to ensure that they meet both the rigor and relevance criteria. Based on these theories, the paper finally describes and discusses a collaborative research mode of practitioners and academics called the "Competence Center Model" (CC model). This model is a useful case to study what researchers actually do when they strive to combine rigor and relevance. With the benefit of hindsight, it is possible to discuss this research practice's effectiveness and its implied benefits for and strains on the researcher's role.

1 Relevance and rigor as challenges for the researcher

1.1 Conflicting expectations as dilemma for the researcher

In a recent Harvard Business Review article, Bennis and O'Toole criticized business schools for being on the wrong track with a less-than-relevant MBA curriculum. The authors suggest

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that business schools need to regain their relevance for practice—in other words—for the management profession. This can only be achieved when scholars are engaged in research and engaging in the practice itself. This sounds like a dilemma and from the viewpoint of researchers pursuing an academic career, these seem to be conflicting goals to pursue through their research practices' outcome. The HBR article states that academic incentive systems and recruiting criteria increasingly focus on academic achievements instead of field experience. "Deans may say they want practitioner-oriented research, but their schools reward scientific research designed to please academics." (Bennis and O'Toole 2005, p. 100). Young researchers striving to become "ideal" candidates for academic positions in the sense meant by Bennis and O'Toole will certainly be looking for a role that allows them to produce research output that meets highly rated academic journals' criteria and to provide relevant research and curricula. Researchers' challenge is therefore to combine relevance and rigor. Further evidence that this chasm is a pressing issue for the academic community, is the motto "Relevant rigour – Rigorous relevance" that was chosen for the 2007 European Conference of Information Systems (www.ecis2007.ch).

1.2. Relevance and rigor

In the action research tradition, relevance relates to how social scientists actively create sustainable solutions to local problems (Whyte 1991a and b). Empirical research's implications should also be implemented in practice. For the practitioner relevance furthermore implies changes in individual and social cognition and action.

Rigor, on the other hand, requires the generalizability of local problem solutions beyond the local context. Rigorous research is acknowledged by the scientific community and contributes to a discourse in the scientific field. Rigor also demands that values and norms are clarified and that integrity and an observational distance are kept while researchers are involved in the practice.

2 Theoretical foundation of the researcher's role description

This paper draws upon the Business Engineering discipline to provide a theoretical foundation for the definition and description of the researcher's role. Winter (2001) introduced BE as a discipline involving a collaborative, model-based conceptualization, design, and the implementation of company and public administration transformations. According to this definition, BE matches the criteria for engaged and relevant research well and we thus consider it a useful theoretical foundation. In BE, the concepts "roles" and "role model" formally describe the design of methods, a core element of this discipline. Gutzwiller (1994) analyzed numerous approaches to method engineering and derived the following five generally applicable method description elements

- activity,
- role,
- result,
- meta model, and
- technique.

Activities are construction tasks, e.g. the writing of documentation, that create certain results. Roles are a combination of activities performed by a person according to his or her job descriptions, or by an organizational unit. This framework is one of few approaches

found in a recent literature review of methods' basic elements (Braun et al. 2005) to explicitly include "role" (or actor).

In order to describe the role of the engaged researcher who provides relevant and rigorous research, we have to illustrate and analyze the combination of activities that he or she performs, and specify their results. Unfortunately, BE research has not as yet published a generic, formal description of the "researcher's role" as a reference model on which we can build. We therefore use the following questions to provide details of our analysis of the researcher's role (see Section 5), in which we describe what practitioners actually do when they undertake a research design that we consider as meeting the challenge to combine relevance and rigor:

- Who takes on roles? (What persons, organizational units? Who are in academia and who in field organizations?)
- What activities does this role's job description involve? Who is responsible for what?
- In which order do these activities have to be performed? (E.g. proposal writing – acquisition negotiations – project management – scientific writing). What events trigger which activities?
- What types of results come from these activities?
- What performance and quality goals are imposed on the engaged researcher by academia, and practice?
- What competencies does the engaged researcher require to perform these activities and produce good quality results?

3 Design science as the basis for combining rigor and relevance

Engaged research is a research practice in which the researcher actively pursues the solving of pertinent and practical problems in a local context. This understanding meets relevant research's criteria, but not explicitly the combination of relevancy and rigor. A theoretical basis that serves both aspects and requires engaged research is that of design science. To clarify this, we briefly describe the design science paradigm and how it relates to engaged research by drawing upon Hevner et al.'s (2004) article on design science in which they formulated generic guidelines to assess the quality of design science research's activities and results. In their conclusion, the authors state that given the artificial nature of organizations and the information systems that support them, the design science paradigm can play a significant role in resolving the fundamental dilemmas that have plagued information systems research: rigor, relevance, discipline boundaries, behavior, and technology (Lee 2000).

Design science is defined as fundamentally a problem-solving paradigm (Hevner et al. 2004, p. 76). It thus certainly qualifies as being based on engaged research practices. Hevner et al. (2004) distinguish between behavioral science (goal: to comprehend reality) and design science (goal: to design and/or change reality) and consider them complementary approaches. In their paper, they describe design science research's performance in information systems via a concise conceptual framework and clear guidelines for understanding, executing, and evaluating the research. In the design science paradigm, knowledge and understanding of a problem domain and its solution are achieved in building and applying the designed artefacts.

According to the guidelines for effective design science by Hevner et al. (2004, p. 82 f.), engaged research requires the creation of an innovative, purposeful artefact (Guideline 1) for a specified problem domain (Guideline 2). Because the artefact is purposeful, it must yield utility for a specified problem's owner or holder. Hence, thorough evaluation of the

artefact is crucial (Guideline 3). Novelty is also crucial since the artefact must be innovative, solving a currently unsolved problem, or solving a known problem in a more effective or efficient manner (Guideline 4). This therefore distinguishes design science research from the practice of design. (The authors make this important distinction between system-building efforts and design science research. Guidelines addressing evaluation, contributions, and rigor are especially important in making this distinction.) The artefact itself must be rigorously defined, formally represented, coherent, and internally consistent (Guideline 5). The process through which it is created, and often the artefact itself, incorporates or enables a search process whereby a problem space is constructed and a mechanism posed or enacted to find an effective solution (Guideline 6). Finally, the results of the design science research must be communicated effectively (Guideline 7), both to a technical audience (researchers who will extend them and practitioners who will implement them), and to a managerial audience (researchers who will study them in context, and practitioners who will decide whether the artefacts should be implemented within their organizations).

People, organizational elements and processes through which IT artefacts evolve over time are not included in the definition (Hevner et al. 2004, p. 82 f.). While these authors' article does not describe the guidelines from the perspective of "the role of the researcher", we are able to link their guidelines for activities and results to the design science researcher's role through the model described in Section 2. Another link to Business Engineering lies in the fact that the BE research approach builds upon the design science paradigm and extends it beyond the IT artefacts in Hevner et al.'s narrow sense.

The seven guidelines are specific for the information systems research discipline. Nevertheless, this does not impact their usefulness for our purpose: We will use an appropriate subset of these guidelines—creatively, as Hevner et al., propose, and not mandatory or by rote—for the discussion of a concrete organizational design and practice for engaged research. To analyze what research practitioners actually do, taking into consideration "role" and "guidelines for quality design science," we describe a research design that we consider meets the challenge of effectively combining relevance and rigor.

4 The CC model as organizational design for engaged research practice

This paper describes and analyzes a model of practitioners and academics' collaborative research called the "competence center model" (CC model). This CC model was brought into practice at the Institute of Information Management and has for more than 10 years now been the preferred research mode in its research program "Business Engineering" (BE). It is considered successful by the Institute and by business organizations, has raised substantial funds, produced spin-offs, and has provided researchers with successful academic careers. It is continuously evolving, reflecting both the challenges posed by demands that researchers deliver scientific output of quality and quantity as well as by the ever more difficult task of convincing business organizations to invest financial and time resources in collaborative research projects. It has been adopted as a blueprint for other HSG institutes' engaged research models. There are currently more than ten CCs altogether at the Institute of Information Management, the Institute of Technology Management, and the Institute of Management. The researcher's role in engaged research with its relevance-rigor challenge was addressed years ago, therefore, this role can be observed and analyzed as in a case study approach. The authors chose one CC, the "CC Knowledge Networks," as the object of the description and critical analysis of this type of engaged research. It is not only a typical representative of the CC model in general, but two disciplines, Information

Management and Strategic Management, joined forces in this venture. This provided an interdisciplinary start, which is an enabler of engaged research. Additionally, all the authors of this paper were heavily involved as either the CC Knowledge Networks research's heads or project leaders and can therefore offer detailed insights into a four-year period (1999–2003). The CC Knowledge Networks (CC KNN) was also chosen as an illustrative case because the period between its termination and today is sufficient to allow a critical reflection of the publication outcome as well as the value of its contributions to the participating companies. Such assessments would be difficult in more recent projects. We regard the CC KNN as a valid choice, as triangulation has been met: The CC Knowledge Networks builds upon several years of experience, evolutionary adaptations to changes in the economic and academic environment, and on "proof-of-concept" through this model's adoption by several institutes - research experts having made the adoption decision.

5 Description and analysis of the CC knowledge networks

5.1 Description of the CC knowledge networks

Andrea Back and Georg von Krogh started the CC Knowledge Networks (KNN) in 1999. Four companies contributed financial and personnel resources to the center (DaimlerChrysler, Hewlett Packard, Unilever and Lotus Notes/IBM). The CC's goal was to collaboratively develop a model of KNNs and especially a method for "managing" knowledge networks. Knowledge networks can be understood as connecting "knowledge owners" within companies and crossing organizational, functional and hierarchical borders in order to create new knowledge. In addition to the two founding professors, one senior researcher with a Ph.D. and four research assistants (Ph.D. students, two with a focus on the management discipline, two with a focus on information management) were involved in conducting the research within the CC. The KNN model and some of its elements were conceptually developed (see Seufert et al. 1999) before the CC started with the four partner companies. In a kick-off workshop, the model was introduced to them, and a project plan was set up, including agreements on how and when the model's elements should be covered and on bilateral projects to test and further develop the model within the partnering companies. The model was quite abstract and highly aggregated; it served as a common understanding for all the partners and was called the "reference model." A similar approach was taken in the CC's second contract period, called "Knowledge Networks for Business Growth" (2001 to 2003). Hewlett Packard and Unilever continued their membership, while Ernst & Young and RWE were newcomers. In this period, the general knowledge networks method (Back et al. 2005 and Back et al. 2006a) was specified for application in three areas of strategic growth: innovation, customer integration, and mergers and acquisitions (Back et al. 2006b).

5.2 The role of the engaged researcher in the CC approach

This section examines aspects of the researcher's role that were introduced in sub-section 2.

5.2.1 Roles

Planning was discussed in tri-annual workshops held at St. Gallen with two representatives (operative managers) from each corporate partner, and the results gained presented, discussed, and augmented by the representatives' own experiences. Between the workshops, bilaterally

applied research projects investigated particular research issues and problems, or identified and described relevant and good in-company practice. Each company could use the personnel resources (the research assistants/project leader) to conduct one bilateral project per year. In each of the eight bilateral projects, two research assistants provided assistance over a three- or four-month period. In addition to the workshops and bilateral projects, a steering committee, composed of the CC's two heads, the project leader and one higher management partner company representative, met twice and reviewed the results.

In order to understand the applied research process and the critical roles, the workshop design is described in more detail. Each workshop was dedicated to a specific topic (e.g. knowledge integration after M&A) that had been jointly chosen in the kick-off workshop. At the start, the project leader gave an overview of the day's agenda and goals. A research assistant and one partner company representative jointly presented the bilateral projects that matched the topic of the day. After the results and experiences had been thoroughly discussed, each partner company presented insights into their strategy, or illustrated their experience and learning regarding the workshop topic. The evening of the first workshop day was dedicated to a social activity (e.g. curling) to increase the social interaction between the partners and researchers. The second workshop day comprised a structured analysis of the insights gained on the first day and their consequences for KNN. The results of this collaboration were used to optimize or adapt the framework, review the project plan, and focus the activities on new important areas.

While the workshop structure was "standard" in the sense of a good practice template, the bilateral projects' structure varied according to the corporate partner's needs and possibilities, or the project's goal. A typical bilateral project was mainly conducted by two research assistants, one of whom acted as the permanent key contact for a company throughout the CC, while the other rotated. This approach fostered effective knowledge transfer between the projects. One of the operative managers and regular CC workshop participants took on the role of project leader. The corporate functions and number of people involved were project specific. The more theoretical work (e.g. developing hypotheses, analyzing theory, collecting best practices, preparing interview questionnaires etc.) was mostly done without the collaborative involvement of the partner companies under the CC project leader's supervision. Frequent workshops with company representatives ensured alignment with the partners. The fieldwork was done at the partner company's home base, which normally involved conducting interviews, collecting and analyzing internal documents, and organizing workshops to implement the concepts or models developed.

5.2.2 Activities and responsibilities

As illustrated above, engaged researchers need research methodology skills, especially in the (engineering) disciplines of developing models and methods, and in academic publishing. They also need expertise in project management, in communicating and implementing their work in practice, and in dealing with the uncertainties and challenges inherent in collaboration between academia and practice. Leadership skills are required, because the academic project manager is also responsible for advising the research assistants, and supporting the professor(s) who are ultimately responsible for the entire CC. Because Ph.D. students normally spend approximately three years working on their theses, the normal two-year work phase within the CC constitutes their major research activity and is the main data source for their dissertation. This relatively tight time line requires candidates to formulate a research question from the CC topic and to largely cover it during their CC work period.

5.2.3 Order of events and triggers

As described earlier, the start of a potential CC lies in defining a research theme that is interesting regarding both research and practice. This is mainly accomplished by analyzing literature and data sources, speaking with practitioners, and raising awareness by writing articles targeted at a management audience. The Institute and individuals' network is an entry point for the project leader's acquisition process. Because of the specificity and newness of the topics, the two-year timeline involvement and the resource commitments, this acquisition phase may last six months or more. Some partner companies usually wish to continue the successful cooperation after the two-year CC contract. The follow-up acquisition process already starts during the running CC's last six months. This should guarantee partners that prolong their CC participation continuity of activities. The project leader is responsible for transferring the knowledge from the first to the second CC phase, while a new generation of research assistants joins the project. Simultaneously, the project leader, together with the project chairs, is co-responsible for ensuring a successful project, for acquiring the companies, and for helping to advise the research assistants, thus experiencing relatively high pressure. Due to the limited time and resources, he or she tends to focus on complementing and producing academic research output in the research program's fifth year, which resembles a research sabbatical. This year is financed by funds accrued from the previous four CC years.

5.2.4 Results

The first results gained from the CC model of engaged research are the outcome of the bilateral projects within the companies, In the CC KNN results were, for example, the specifically designed and implemented knowledge networks. As part of preparing the bilateral projects, internal working papers were written that covered the state-of-the-art in theory and illustrated examples in practice. These papers generated and transferred knowledge, especially for the researchers and practitioners. Each finished bilateral project was covered as a case study in a project report that described the approach, the challenges, and the results. This mainly served to transfer knowledge to the other companies. Later, these reports were customized for publication in a book format in which the CC's overall work was presented. The research assistants' dissertations also represent substantial CC outcomes.

5.2.5 Performance goals

Both CCs have resulted in the publication of three books; one case book and two method books, four journal articles, ten conference papers, about fifteen working papers directly related to the CCs, as well as seven dissertation theses. The results indirectly connected to the CC (e.g. job offers for the research assistants, offers of a professorship for the assistant professor, research grants for the Institute's directors, reputation in practice etc.) and their learning value cannot be quantified and have not as yet been completed.

The CC participation and collaboration's value and their outcome for corporate practice mainly lie in the projects conducted within the CCs. The results of a survey of the partner companies regarding crucial competencies that involved researchers should have, revealed that social- and subject-matter-related competencies are both regarded as necessary. Beside the bilateral project results, the workshops with their specific topics as well as the exchange of experience with other practitioners were considered as having extreme practical relevance.

Electronic platforms and group rooms were judged as less efficient and were not frequently used.

5.2.6 Interests and competencies

The major challenge for all involved researchers is balancing the practice's demands with scientific research's requirement. Although practitioners demand that the concepts and models that the involved researchers develop should be strongly based on state-of-the-art academic knowledge, it is often hard to convince them to free up the time necessary to study research and theory. Another conflict results from research assistants primarily pursuing their personal goal of successfully completing their dissertations, yet the topics may not always fully match the research questions and methodical approaches posed by their assigned bilateral project. The majority of research assistants also seek a career in practice, consequently, they spend more time on the projects and less on the additional academic work required by their dissertations.

5.3 Discussion of the CC model's rigor and relevance

The following section discusses the CC model according to design science guidelines to ensure rigor and relevance. The role of the engaged researcher is illustrated on the basis of the CC KNN.

5.3.1 Design as an artefact (Guideline 1)

Although the term "artefact" is used in IS design science to mean computer-based artefacts, as well as constructs, models, and methods applied in the development and use of information systems (Hevner et al. 2004, p. 82), we broaden the definition by applying it to information systems more generally. In this sense, an artefact as the outcome of typical CC research is a reference model; CC KNN's model is depicted in Fig. 1. It prepares the ground for ideas, practices, technical capabilities, and products through which knowledge networks' analysis, design and implementation, and use can be effectively and efficiently accomplished (Hevner et al. 2004 p. 83). It depicts constructs that can guide thinking and conversations about problems involved in Knowledge Networks (KNN), and a model through which we represent and explore the phenomenon. The CC Knowledge Networks' research team analyzed so-called "knowledge silos" within companies and developed a reference model for knowledge networks. The design of the reference model includes three layers (see Fig. 1): the facilitating conditions layer, such as the organizational culture, management system; the process layer, such as the knowledge processes of locating, sharing and creating knowledge as well as the network processes of building and maintaining network relationships, and, finally, the architecture layer with its supporting organizational and IT tools. The model has proved to be robust for guiding research across different organizations.

5.3.2 Problem relevance (Guideline 2)

A problem can be defined as the difference between a goal state and the current state of a system. Problem solving can be defined as a search process using actions to reduce or eliminate these differences (Simon 1966 in Hevner et al. 2004). The KNN reference model was further developed and jointly refined together with practitioners as well as based on their needs. As mentioned before, knowledge silos within companies often hinder the

Fig. 1 Reference model of a Knowledge Network and its interrelated layers (Back et al. 2005)
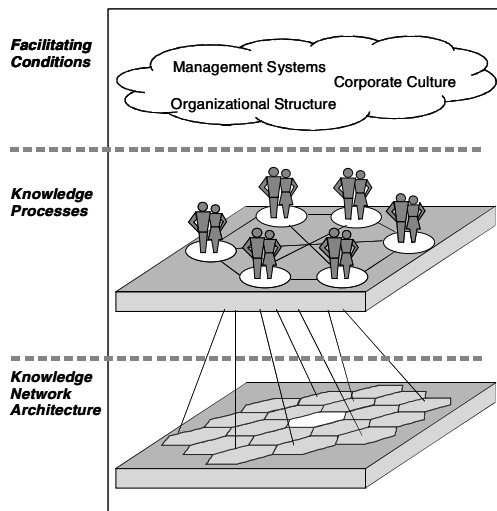
improvement of efficiency, the reduction of risk, and the increase in innovation output. We approached relevancy by taking business reality and problems into account by running frequent workshops with collaborative work modes involving academia and practice (see section 5).

5.3.3 Design evaluation (Guideline 3)

Rigorous demonstration of the design artefact's utility, quality, and efficacy through well-executed evaluation methods is often mentioned as a problem in action-based research (e.g. Guba and Lincoln 1989). In Hevner's view of Design Science, five design evaluation methods are available to ensure quality: observational, analytical, experimental, testing and descriptive methods. Evaluation includes the artefacts' integration within the practical environment's infrastructure and organizational setting.

We developed a method for establishing networks from scratch by using a combined approach involving observations, analytical methods, testing and descriptions. However, of the four partner companies, not all allowed observations and testing. In addition, we studied already established practices of nurturing communities of practice not involving CC KNN members. We analyzed them, and—based on informed argument—descriptively developed the KNN method.

In most of the bilateral projects, we only implemented some part of our network approach due to already established basics or specific settings. We were only able to help establish networks in four of the eight partner companies, which clearly limits the basis of our evaluation. This lack of "artefact" implementation is typical in CC settings. An unpublished internal empirical study of five CC projects at the Institute of Information Management revealed that successful knowledge transfer between researcher and companies in CC settings depends heavily on each partner company's contact person. Company representatives who take part in CC work often hold relatively low positions (without power to draw on human resources to implement the artefact), or sometimes have too little functional and implementation responsibility regarding the CC KNN results, especially if the CC contract happens to be seen mostly as sponsoring. Additionally, the company representative's motivation for using the

knowledge transferred, or for implementing the artefact often depends on how this person thinks this will increase his or her reputation. Adapting the vocabulary used in the CC to the company vocabulary, as well as adapting the documentation formats to the preferred forms of communication within such a company is an essential enabler for implementation, but a challenge for the university's research team.

Even though the full implementation of knowledge networks from scratch could only be done in half of the cases, frequent responses in workshops and in meetings within the bilateral projects enabled an iterative research-oriented development based on feedback from the practice. Positive feedback from questionnaires submitted after each of the CC's years as well as prolonged membership within a CC are indicators of a company's satisfaction with the CC model.

5.3.4 Research contribution (Guideline 4)

The conducted research's degree of novelty is described as the ultimate assessment of the research's contribution. As mentioned by Hevner et al. (2004, p. 87), design science research holds the potential for three types of research contributions based on the designed artefact's novelty, generality, and significance. When one or more of these contribution areas are present in a given research project, the project adds value to research. The first contribution the CC KNN made was the reference model of the knowledge networks itself. This model describes solutions to the problem of knowledge silos within organizations by showing how to connect people. The second contribution was the extension and improvement of existing foundations in the network literature. The CC developed a number of articles and books that provided knowledge networks' theoretical and practical foundations. The choice of books to report this research (rather than journal articles) may very well be a reflection of the limited number of settings in which the method was tested. The weakness lies in the limited contribution of academic articles for high quality journals. This was caused by the practitioners' lack of interest in investing in the work required for sound theoretical contributions. The third type of contribution, the method, has already gained positive feedback from practice. We developed and used the created method to build knowledge networks in the partner companies, but the method can be generalized. The method and cases were therefore published in three books, which received positive feedback from practice and researchers in the IS and management disciplines. To summarize, two types of contributions have been clearly made by the CC approach.

5.3.5 Research rigor (Guideline 5)

Research rigor in design science requires the application of rigorous methods in both the construction and evaluation of the designed artefact. Rigor is achieved by relevant means, ends, and laws, or by decomposing a problem into simpler sub-problems. In the CC, researchers first decomposed the problem into sub-problems, such as organizational facilitating conditions for knowledge sharing, IT infrastructure to support communication and capturing of explicit knowledge, and selection criteria for network leaders in order to find appropriate solutions for the single problems and then accumulated these solutions into a reference model. However, when creating a knowledge network framework and implementing networks according to this framework, it is impossible to determine the relevant means, ends, or laws. The CC's structure was meant to find solutions to the proposed problems in a resource efficient way and primarily for the corporate partners. In this sense, our objective was to contribute to local knowledge (Elden and Levin 1991). The solution only needs to be

examined across contexts in a second step to discover whether or not it is generally applicable to other environments and/or in other companies. Resource constraints hindered the creation of solutions to represent all possible environments and people (means), to determine models' utility and constraints (ends), and to specify all cost and benefit constants (laws).

5.3.6 Design as a search process (Guideline 6)

Design science is an iterative process to generate and test best or optimal designs that can be implemented in the business environment. As mentioned before, by decomposing the single aspects of knowledge networks, creating solutions for them, and testing these solutions in practice (within the bilateral projects), we established what could be regarded as a highly iterative search process. Simon (1996) argues that in such situations, the search concentrates on finding a satisfactory solution without explicitly specifying all possible solutions and choosing from them. We constructed artefacts that work well for the specified class of problems within the companies we studied. While a limited sample size (four) is a weak basis for generalization, we certainly observed an impact regarding creating awareness and mobilizing further internal initiatives. The partner companies continued the interactive heuristic search process and further improved the collaboratively developed artefact's design, but they chose not to involve the CC further in the process of these improvements' description, justification, and documentation.

5.3.7 Communication of research (Guideline 7)

Communication of the created artefact to a management community is an important aspect in design science research. Only communication of the artefact (knowledge networks), its applications (cases), and the method can ensure further application and discussion of the proposed solution. The CC KNN results were mainly published in books, and not in journal articles. This reflects that the focus on the current practical problems and the dependency on stakeholders from practice's collaboration complicate the integration of time into the CC work process for the sound documentation of the research into state-of-the-art academic knowledge that is necessary for communication and visibility in the academic community. Another communication weakness was the lack of resources (time and funds) available for preparing presentations and managerial documentation customized for the specific partner company. We found this necessary for "buy-in" within these companies. The CC managed to develop workable solutions for both stakeholder groups, but it failed to reach academic excellence and to create fast and practical solutions for the buy-in of each partner company's target group.

6 Conclusions

6.1 Critical reflections

Two aspects are included in the following critical reflections: The researcher's role as covered in this paper, and the CC model itself.

Regarding the researcher, "role" is one aspect that needs to be made explicit when describing a method (see Section 2) of doing engaged research. In the Business and Method Engineering disciplines, methods—including role (or actor)—are described in a specific formal notation. This paper does not use such a notation for the engaged research method

that we presented. The method description of the CC model limits itself to a less structured descriptive approach. Yet, developing such a method and making it explicit in a formal notation is considered a very valuable research thrust that should be approached in follow-up research. We decided to not go to these lengths at this stage of the discussion, as the underlying theoretical foundation does not yet provide enough detail for modeling the "role" aspect, which is this special issue's focus, and, moreover, as this paper's target is not a description from the method engineering perspective.

On examining the CC model, its research mode matches engaged research involving a team of researcher(s) and those "researched", jointly working on problem definition and problem solving, and through this process developing new knowledge. This knowledge is ideally local, but also constitutes new contributions for the academic community (theory). It differs from consultation (characterized by brief and comparatively shallow field work), since a CC venture has both a long durations (at least 2.5 to 3 years) and very high intensity field work. The CC model was designed to meet several criteria: practical relevance and academic rigor, accumulation of research knowledge, excellence in teaching, reputation building, financing of research activities and studies, and recruiting of researchers. In this respect, the CC model has proved useful. Benefits can be especially reaped regarding practice-relevant and research-oriented teaching if the CC research questions and results are regularly integrated into course content. The CC model is able to educate future researchers and to create practical knowledge,—knowledge generated by research with the potential to change practice (Stehr 1992). There are many examples where CC KNN research inspired new practices in the partner companies. One of the partners, for example, had several years' experience implementing the "community of practice" concept. Based on the bilateral projects on networks in other firms, literature reviews, and small controlled experiments within the partner firm, it used the insights from the CC to develop its own training program for community of practice participants. It is fair to say that the CC's input inspired a new and positive practice in the partner firm. However, it would be far-fetched to say that knowledge was generated and tested for cause and effect.

Overall, we think the CC model is a mode of research that performs well, but it is an "ideal" type of model. It should operate under real conditions, not under controlled lab conditions, which currently means that the CC model often operates under almost hostile conditions, especially if partner companies are under extreme pressure, e.g. as in a recession, or if there is competitive rivalry regarding the research outcomes. Furthermore, important elements of the CC system cannot be kept stable. While academia is a rather stable system regarding personnel, the study object in practice is often quite dynamic: Its elements change unexpectedly through ongoing restructuring (e.g. CC participants are promoted, fired, or are "moved" to other responsibilities). Under these circumstances, it is especially important to have a critical number of partner companies. We inductively consider six the minimum, which was barely achieved in the CC KNN, and which is currently hard to achieve in topic areas that are not timed exactly correctly. In summary, the CC model itself is satisfactory, but if it cannot "survive" because of lack of fit with the current environment (which we, as idealists, do not consider "healthy" in the long term), it will ultimately not be useful.

6.2 Conclusions for the engaged researcher

Choosing engaged research by means of the CC model means opting for complexity and taking risks if you take the above-mentioned uncertainties and dynamics of the "study object" into account. A CC researcher must have, or at least be willing to develop and use a broad set of competencies. An academic project leader in the CC takes on an integrator role. As such,

he or she is exposed to a constant tension with sometimes complementing, but often opposed forces pulling him or her towards pure research or pure practical utility. This requires very mature self-management abilities, high stress tolerance, and the intellectual flexibility to switch modes. Academic project leaders' situation can be compared to walking on a narrow mountain ridge: They always have the option to turn to this side (academia) or that (practice) –both of which provide solid ground. (This is not a hypothetical ideal; some researchers here turned towards academia while others took on leading positions in practice.) But if they want to have the best overview and retain the option to choose either path, they need to stay on the mountain ridge, balancing the gravitational forces. Merely working in the CC mode will generally not produce the convolute of deliverables required to meet top academic standards. An engaged researcher must be willing to invest, to go the "last mile." From our experience, such a researcher needs to invest a time-out of at least a year to refine and integrate the building blocks that originate from the CC work into a format that is respected and understood in the academic community, and to add pure research work building blocks to his or her individual creative work. This likewise applies to the Ph.D. students; they should spend approximately six months on this after their CC assignment ends.

Research is about knowledge creation. In knowledge management, knowledge "managers" are said to be "boundary spanners" who live in organizations "in-between" spaces. Accordingly, an engaged researcher who opts for the CC model is a boundary spanner between academia and practice. This places a researcher in an extreme learning situation, which is challenging, but rewarding for those with a personality that thrives on this type of stress and is motivated by being able to observe their thoughts and actions' immediate impact.

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