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Multilevel Tensions and Misguided Coping Strategies

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RESEARCH ARTICLE

Explaining Persistent Ineffectiveness in Professional Online Communities: Multilevel Tensions and Misguided Coping Strategies

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Abstract

Online communities (OCs) have become an increasingly prevalent way for organizations to bring people together to collaborate and create value. However, despite the abundance of extant literature, many studies still point to the lack of long-term sustainability of OCs. We contend that communities become dormant or obsolete over time because of manifestations of ineffectiveness-a state of the community that hinders the attainment of individual and collective desired outcomes. While ineffectiveness in OCs is common, it is less apparent why such ineffectiveness persists. Two knowledge gaps are particularly significant here. First, while the multilevel nature of OCs is acknowledged, corresponding difficulties in aligning individual and collective interests and behaviors have often been neglected in past studies. Second, rare longitudinal studies have revealed that community members respond to ineffectiveness with various coping behaviors. However, the impact of these coping behaviors may not turn out as desired. Consequently, we investigate the persistence of ineffectiveness from the perspective of multilevel and coping effects, addressing the following research question: How and why does ineffectiveness persist in online communities? Our critical realist case study offers a threestep explanatory framework: (1) underlying multilevel tensions in the community contribute to usage ineffectiveness (i.e., members are unable to use the OC effectively); (2) misguided coping behaviors contribute to ineffective adaptation (i.e., members are unable to cope with not being able to use the OC effectively); and (3) ineffectiveness persists due to the interaction between usage and adaptation ineffectiveness.

Keywords: Online Community, Multilevel Research, Ineffectiveness, Coping Behavior, Tensions, Persistence of Ineffectiveness, Qualitative Research

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1 Introduction

Online communities (OCs), i.e., "technology-enabled collectives, [which] bring together large numbers of geographically dispersed individuals in support of an activity, interest, or identity," have become an increasingly pervasive way for organizations to co-create value through collaboration and innovation (Faraj et al. 2014). Despite an abundance of extant literature on OCs (Chiu et al., 2015; Ray et al., 2014; Ren et al., 2012), many studies have alluded to the absence of long-term success for online or virtual communities:¹ "empirical

of OCs can also meet face to face (Cranefield et al., 2015, p. 217, based on Dubé et al., 2006). This study is situated in the context of OCs.

¹ The main distinction between an OC and a virtual community is that interactions within virtual communities take place entirely through digital means, whereas members

evidence shows that many initially active virtual communities fail to retain their active members and become obsolete over time" (Bock et al., 2015, p. 419), and "systematic reviews find that most online communities lack participants and lie dormant" (Ray et al., 2014, p. 528).

Prior research has revealed that members are more inclined to contribute to OCs when they deem that participation bolsters their professional reputation (Wasko & Faraj, 2005). Likewise, Chiu et al. (2015) discovered that the fulfillment of functional needs (e.g., achievement of mastery goals in the likes of knowledge sharing and self-reflective learning or boost in professional reputation) affects members' satisfaction with OCs, thereby culminating in communal citizenship behaviors. Conceivably, when desired outcomes are unattainable, members become less likely to contribute, causing the community to become dormant over time. Consequently, OCs are effective when they facilitate their members' attainment of desired outcomes on both individual and collective levels (e.g., acquire new skills individually and/or support each other's learning collectively). In contrast, dormant communities can be attributed to ineffectiveness, which we define to be a state of an online community that hinders the attainment of desired outcomes.

Our review of extant literature ² indicates that considerable scholarly attention has been devoted to identifying drivers of effectiveness within OCs. Content, governance structure, interactive environment, members' motivations, supportive communication technologies, and external circumstances have all been construed as potential drivers of effectiveness, with the lack thereof being touted as determinants of ineffectiveness within OCs (Bock et al., 2015; Chen et al., 2011; Cranefield et al., 2015; Lin, 2008; Mamykina et al., 2011; Phang et al., 2009; Ridings & Wasko, 2010; Ren et al., 2012). Extending this line of work, a separate stream of research also aims to unveil actions or coping behaviors that can help turn a troubled, ineffective community into a thriving, effective one (Mamvkina et al., 2011; Ridings & Wasko, 2010). Yet despite extensive research into the factors driving effectiveness within OCs and prescriptive advice on plausible coping behaviors for mitigating ineffectiveness, empirical evidence continues to document instances of ineffectiveness in such communities (Ren et al., 2012; Ridings & Wasko, 2010).

Through a closer inspection of the extant literature, we observe two distinct knowledge gaps whose resolution can, in our view, better elucidate the persistence of ineffectiveness within OCs. First, although past studies have acknowledged the multilevel nature of OCs, it is often not explicitly accounted for in previous work. The role of misalignments between individual and collective interests and behaviors in driving the persistence of ineffectiveness is, therefore, worth exploring. Second, contemporary studies are often cross-sectional in nature, concentrating on a few select drivers of (in)effectiveness at a given moment in time. Longitudinal studies (e.g., Ridings & Wasko, 2010) have revealed that members of OCs respond to ineffectiveness with a multitude of coping behaviors and that the impact of these coping behaviors is far from trivial or predictable. Ridings and Wasko found that when an OC grows to an unmanageable size, members cope by either abandoning the community or engaging in citizenship behaviors (e.g., developing appreciation and norms for increased social exchange among core members). Interestingly, while these citizenship behaviors can stabilize an OC by assembling a strong collective core of members who are well acquainted with one another, they can also lead to the stagnation of informational content, thereby eroding the OC's appeal to prospective members (Ridings & Wasko, 2010). In other words, there is a distinct possibility that coping behaviors may contribute to ineffectiveness within OCs.

To address the two abovementioned knowledge gaps, we attempt to shed light on the persistence of ineffectiveness within OCs by embracing a multilevel, longitudinal view of how such communities function. In particular, we endeavor to provide an answer to the following research question: How and why does ineffectiveness persist in online communities? The OC that constitutes our empirical context, was established by an enterprise software company (EntCorp) in 2006 as a means of augmenting the work of software architects-key personnel tasked with ensuring the successful implementation of software products offered by the company. Many of the software architects who participated in the community for several years suspect that their behavior could be hindering the attainment of desired outcomes on both individual and collective levels. However, it is often difficult for these architects to clearly grasp why ineffectiveness arises. Furthermore, in spite of the fact that these architects have taken steps to mitigate observable problems, ineffectiveness continues to persist in the community. We are hence intrigued by the case of EntCorp because it allows us to gain an in-depth appreciation of how and why ineffectiveness continues to occur in OCs. Through a critical realist case study (Wynn & Williams, 2012) drawing on data gathered from a group of twenty software architects, we explore the causes underlying the persistence of ineffectiveness in this community.

² Our review focuses on research published in the Senior Scholars' Basket of Eight journals:

https://aisnet.org/general/custom.asp?page=SeniorScholarBasket.

Our contribution is both conceptual and explanatory. We contribute to the extant literature on OCs by identifying two underexplored causes that underpin the persistence of ineffectiveness in OCs: multilevel tensions culminating in usage ineffectiveness and coping behaviors leading to ineffective adaptation. Tensions denote the more elusive underlying causes of usage ineffectiveness, which are not always detectable by members of OCs nor addressable by corresponding coping behaviors. Consequently, when usage ineffectiveness cannot be resolved through coping behaviors (i.e., ineffective adaptation), the state of an OC in hindering the attainment of desired outcomes becomes persistent or self-reinforcing.

The remainder of this paper is structured as follows. First, we introduce focal concepts that are pertinent to guiding our study of ineffectiveness within OCs from a multilevel perspective. We then describe the case setting in which we carried out our empirical work, followed by a review of the chosen method. Next, we present excerpts from the case data and our analysis. We conclude by highlighting the theoretical and practical implications of our proposed multilevel, cyclical model of ineffectiveness within OCs.

2 Online Communities: A Multilevel Perspective

OCs generally resemble fluid collections of individuals with complementary interests who rely on computermediated communication technologies for interaction in pursuit of a joint purpose and are bound by communal "policies" such as implicit rules and social norms (Cranefield et al., 2015; Phang et al., 2009; Preece, 2000; Ren et al., 2012). More recently, scholars have begun to conceptualize OCs "as part of a larger, poly-contextual ecosystem that comprises diverse online and offline settings" (Cranefield et al., 2015, p. 218), thereby recognizing the fact that members of OCs may also interact with one another via physical channels.

In this study, we are interested in professional OCs whose purpose is largely constrained to information or knowledge sharing (Chiu et al., 2015). Since OCs can be characterized as collectives of self-organizing individuals who are bound by a shared mission and engage in social exchanges in pursuit of a communal goal (see Appendix A), it is not surprising that these communities exemplify a multilevel phenomenon. Not only must OCs accommodate the diverse motivations of individual members, behavioral interdependencies among members also shape the collective. OCs are not constituted from the mere aggregation of individuals and their behaviors; instead, they embody complex interactions and interdependencies among members. To comprehend ineffectiveness within OCs, it is imperative for us to theorize these communities from a multilevel perspective. To this end, we draw on Burton-Jones and Gallivan's (2007) multilevel framework to disentangle these interdependencies within OCs. Although Burton-Jones and Gallivan's (2007) framework was originally advanced for the purpose of investigating multilevel IT use ("a user's employment of a system to perform a task", p. 659), we contend that the framework is also suited for deciphering members' behaviors within professional OCs (see Table 1). In our view, the framework is especially informative for analyzing professional OCs whose members join with predefined goals in mind and harness the technical capabilities of such communities to interact with their peers in ways that aid in the achievement of these goals.

The function of behavior captures the desired outcomes that individuals and the community, as a collective, expect to attain. Professional OCs are often established to enhance learning among both individuals and the collective, thereby implying the same function across levels.

Structure of behavior refers to the actions and interactions among individuals that aid in the accomplishment of intended functions (Burton-Jones & Gallivan, 2007). Typical individual behaviors in professional OCs entail both information seeking (asking questions and searching through posts on online forums) and contributing (answering questions and/or posting on online forums). Together, these behaviors can aid individuals in attaining their desired outcomes (e.g., acquiring new skills) from participating in OCs. Nevertheless, the behaviors of individual members tend to be interdependent (Burton-Jones & Gallivan, 2007). Interdependency may be fostered through, for example, the collective assignment of tasks to individuals and/or the evolution of interactive norms among community members. Evidence of communication, collaboration, and coordination among individual members within the community is indicative of the existence of collective form(s) of communal behavior, in addition to individual behaviors (Burton-Jones & Gallivan, 2007). A typical collective behavior in professional OCs is decorum maintenance, whereby individual members maintain collaborate to congeniality and professionalism within the community.

Collective behaviors can assume two distinct forms: configural or shared (Burton-Jones & Gallivan, 2007). The shared form of collective behavior is expressed through homogeneity in the behavior of the collective so much so that comparable levels of intensity, frequency, and/or breadth of participation can be observed among members of a community. For example, community members may cultivate a shared behavior of checking the community forums once a day in the afternoon.

Relevant guideline	Definition	Purpose
<i>Function of behavior</i> <i>on community</i> Identifying the <i>intended function</i> of the community, that is, the goal or desired outcome to be accomplished from participation in the community; the function may be the same and/or different at the individual and collective levels		Following this guideline helps us to appreciate (1) the personal goals of individual members, and (2) the shared goals of the community (which may be influenced by the sponsoring organization)
Structure of behavior on community	Pinpointing <i>actions</i> of individual members and their interactions that also generate communal behaviors at the collective level: (1) <i>interdependencies</i> among individual members of a collective and their behaviors within the community, and (2) <i>form of collective behavior</i> (shared or configural)	Following this guideline helps us to appreciate (1) the norms at play within the community, and (2) the impact of these norms on the interdependencies among individual members' behaviors
Context of behavior on community	Deriving <i>contextual factors</i> affecting the attainment of desired outcomes and the emergence of collective behavior from the (inter)actions among individual members; these may include factors related to the members, technical systems, tasks, and time	Following this guideline helps us to appreciate how (1) membership composition (e.g., internal and external software architects in our community of interest) and (2) technical systems (e.g., communication channels) can influence both the purpose of the community and the behaviors within it.

Table 1.	Guidelines for	Investigating	Professional	Online (Communities	from a	Multilevel	Perspective
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Conversely, the configural form of collective behavior refers to distinct patterns of collective behavior among members of a community that may be repeated for different tasks or at different times. For example, one set of community members may engage in the collective behavior of answering questions on forums every Tuesday, while another set of members may post new materials every day. It is important to note that these configural or shared forms of collective behavior are distinct from informal or formal subgroups in the community, the latter of which often emerge from existing ties, similar interests, and the like. For example, architects working for EntCorp's clients formed a formal subgroup in the community (with a private space on the platform), but did not develop a collective way of behaving. Meanwhile, architects working for EntCorp did not form a subgroup within the community. Rather, they represented a collection of individuals who just happened to work for EntCorp but possessed separate domains of expertise and interests. Yet these architects did develop a collective behavioral pattern in the community, as we discuss in the findings. For this reason, we are interested in the individual and collective behaviors in the community rather than in the subgroups.

3 (In)effectiveness in Online Communities

While OCs have witnessed explosive growth in recent years (Faraj et al., 2014), it is not uncommon for studies to bear witness to communities that fail to retain active members and/or become dormant or even obsolete over time (Bock et al., 2015; Ray et al., 2014). We consider professional OCs effective when they support their members in attaining desired outcomes on both individual and collective levels (e.g., finding relevant information, receiving support from other members, and sustaining the community). Accordingly, we conceive ineffectiveness to be a state of an OC that hinders the attainment of desired functions or outcomes. Consequently, becoming dormant or obsolete can be viewed as manifestations of ineffectiveness in OCs.

More than a decade of research has been conducted on the drivers of effectiveness (e.g., member loyalty and participation) (Bock et al., 2015; Chiu et al., 2015) and ineffectiveness (e.g., inability to retain existing members or attract new members and lack of knowledge sharing) within OCs (Ardichvili et al., 2003; Ren et al., 2012; Ridings & Wasko, 2010) (see Table 2). As discernible from Table 2, certain factors have been treated exclusively as enablers of effectiveness in OCs (e.g., trust), giving rise to facilitating conditions for individuals or the collective to attain their desired outcomes. Other factors straddle both facilitating and hindering conditions, or fail to foster conducive conditions for individuals or the collective to attain their desired outcomes from the OC-we label these as enablers and inhibitors. For example, the concern of an individual for the community (e.g., fear of letting colleagues down) may drive the individual to both share and not share information with community members (Ardichvili et al., 2003), thereby contributing to both effectiveness and ineffectiveness. Interestingly, we did not uncover any research that centers exclusively on inhibitors (see Table 2).

Drivers of (in)effectiveness	Levels	Illustrative examples
	Individual	• Knowledge self-efficacy facilitates OC attachment and citizenship behaviors toward community (Chiu et al., 2015; Ray et al., 2014)
		• Self-esteem enhancement and social enhancement facilitate OC member satisfaction and citizenship behaviors toward individuals (Chiu et al., 2015)
		• Reputation enhancement facilitates OC knowledge contribution (Wasko & Faraj, 2005)
		• Need-, affect-, and obligation-based commitment to the community facilitates reading, posting, and moderating behaviors in the OC (Bateman et al., 2011)
		• Compliance (subjective norm), identification (social identity), and internalization (group norm) facilitates OC engagement (Ma & Agarwal, 2007; Ray et al., 2014; Zhou, 2011; Tsai & Bagozzi, 2014)
Enablers		• Information accuracy and quality (perceived by individual) facilitate OC member satisfaction and loyalty (Lin, 2008; Ardichvili et al., 2003)
	Collective	• "Invisible" communal activities, such as "managing the knowledge agenda," facilitate community spirit (Cranefield et al., 2015)
		• Collective identity practices reflected in the language used in the OC facilitate the creation of a "we-sense" (Fayard & DeSanctis, 2010)
	Cross-level	• We-intention (i.e., the collective intention rooted in a person's self-conception as a member of a particular group) facilitates individual contributions (Tsai & Bagozzi, 2014)
		• The degree of reciprocity (individual reciprocating behaviors) fosters interdependencies that facilitate collective community behaviors (Preece, 2000)
		• Emotional ties and clique size (emotional ties in a collective and formation of cliques) facilitate individual intentions to stay in the community (Bock et al., 2015)
	Individual	• Technical features fostering bond-based attachment (emphasizing individuals) facilitate individual participation but not retention (Ren et al., 2012)
		• Moral obligation to the community (fear of letting colleagues down) both facilitate and hinder individual participation (Ardichvili et al., 2003)
		• Ecosystem (e.g., other channels available to individual) both facilitate and hinder individual participation (Cranefield et al., 2015)
Enablers and inhibitors	Collective	• Moderation of community behaviors (moderation of low-reputation commentators) may lead to oscillation in effort (Chen et al., 2011)
		• Communicative genres employed by different groups (affirmation, sharing, advice, social glue) both facilitate and hinder different kinds of contributions (Moser et al., 2013)
		• Membership turnover improves collective knowledge creation and retention up to an optimal point and impairs both thereafter (Ransbotham & Kane, 2011)
	Cross-level	• Technical features fostering identity-based attachment facilitate individual behaviors that help attain collectively desired outcomes but do not facilitate member retention (Ren et al., 2012)
	Individual	• Continuous engagement by community owners (Mamykina et al., 2011) facilitates community effectiveness and can be employed by community owners to cope with ineffectiveness
Coping behaviors	Collective	• Efforts of the critical mass can boost collective participation by the core group but can hinder new member attraction (Ridings & Wasko, 2010)
		• Aggregate coping behaviors of leaving posts unanswered and ignoring certain community members can boost collective participation by the core group but hinder participation by novices (Ridings & Wasko, 2010)
	Cross-level	• N/A

Table 2. Overview of Extant Literature on (In)effectiveness in Online Communities

A handful of studies have also shed light on coping behaviors that can help turn a troubled, ineffective community into a thriving, effective one (Mamykina et al., 2011; Ridings & Wasko, 2010) (see Table 2). Given that OCs function on multiple levels, it is unsurprising that past studies have explored enablers and inhibitors of (in)effectiveness and coping behaviors on both individual and collective levels. Yet, as is apparent from Table 2, there is a dearth of research that disentangles the influence of cross-level factors.

We mapped the identified enablers and inhibitors and coping behaviors to Burton-Jones and Gallivan's (2007) multilevel framework (see Figure 1). Enablers and inhibitors identified in previous work can best be interpreted as factors that mediate the relationship between individual and collective behaviors in the community and the attainment of desired outcomes. When individuals behave in ways that bolster their own reputation and create need-based personal commitment to the community (Bateman et al., 2011; Wasko and Faraj, 2005), they are more likely to attain desired individualized outcomes. The same applies to collective outcomes.

Moreover, we observe that prior research (Bock et al., 2015; Cranefield et al., 2015; Lin, 2008; Ridings & Wasko, 2010) considers many of the enablers and inhibitors of (in)effectiveness to be governed by the contextual characteristics of OCs (e.g., technical systems and features, and membership composition).

These contextual characteristics may influence how members envision the purpose of the community and how they behave (see Figure 1). Ridings & Wasko (2010), for example, noted that as OCs grow larger in size (membership composition changes), they can reach a point where it becomes difficult for members to attain their desired outcomes. This in turn can prompt individuals to cope by altering their communicative behaviors. We have depicted this with feedback loops from outcomes to behavior in Figure 1.

Arguably, the above discussion points to three issues that complicate our understanding of community (in)effectiveness over time. First, the same factor (e.g., community attachment) can be an enabler and inhibitor of effectiveness-even though attachment can boost participation, it may not be able to prevent a community from becoming dormant over time because of retention issues. Second, from a longitudinal standpoint, coping behaviors, which supposedly deal with ineffectiveness (e.g., citizenship behaviors by the critical mass) can, in fact, also perpetuate ineffectiveness. Third, there is a gap in our comprehension of cross-level influences. As highlighted above, most studies subscribe to a single level of analysis-either individual or collective. We therefore contend that considerations of cross-level influences may aid in offering partial explanations for the conflicting evidence from past studies, as well as the unexpected impact of coping behaviors.



Figure 1. Mapping Enablers and Inhibitors in Online Communities to Burton-Jones and Gallivan's (2007) Multilevel Framework

4 Research Setting

To explore the causes underlying the persistence of ineffectiveness in professional OCs, we negotiated access to one such community that has been established by EntCorp, an enterprise software company, in 2006 to augment the work of software architects-key personnel tasked with ensuring the successful implementation of software products offered by the company. EntCorp is a global corporation specializing in the development, retail, and implementation of software solutions aimed at improving clients' operational functions, focusing primarily on areas such as business process management (BPM), enterprise mobility, and integration. EntCorp's headquarters are located in Western Europe and EntCorp employs around 450 staff members distributed across every continent. Additionally, the company cooperates with an extensive network of domestic and international implementation partners and resellers. The senior management at EntCorp is keen to boost the sales figures for their software solutions and views the implementation of their products as a potential hurdle to overcome in this regard. Therefore, EntCorp management would like to increase the probability of successful implementations.

Against this backdrop, EntCorp decided to launch an online knowledge³ sharing community in 2006. Members of the community include employees of EntCorp, as well as geographically dispersed clients, partners, resellers, and anyone interested in BPM or EntCorp's products. Joining the community requires registration because there are certain areas of the community that are designated as private and can only be accessed by clients or partners. At the time of data collection (from early 2012 to late 2013), there were about 7,000 members that belonged to the community, of which a few hundred could be regarded as the critical mass of active participants who generate the bulk of the contributions. A key group of actors in the community is the software architects (referred to as architects from here on). Architects play a central role in the adoption process of EntCorp's products because they analyze the organization's business problems and may or may not recommend EntCorp's products as an appropriate fix for these problems. Equipping architects with relevant knowledge and continuous support via the community hence constitutes a strategic initiative at EntCorp. As noted earlier, EntCorp and the architects were aware that the community did not function quite as anticipated in supporting architects to bolster the probability of successful implementations. We were thus approached by EntCorp to dissect the inner workings of the

encounter difficulties in unlocking the value of the community. In turn, this opened up an exclusive window of opportunity to explore why ineffectiveness persists in professional online communities.

community and shed light on why they continue to

5 Methodology

Stemming from the phenomenon under inquiry, we opted for a critical realist (CR) case study (Wynn & Williams, 2012) as our methodological approach, drawing on previous work in the field of information systems (Mingers et al., 2013; Volkoff and Strong, 2013). CR blends ontological realism with epistemic relativism, which holds that there is an "existing, causally efficacious, world independent of our knowledge"; however, our access to this world is limited because of our local context as well as our perceptual and theoretical lenses (Mingers et al., 2013, p. 795). The main appeal of CR resides in its ability to isolate causally efficacious mechanisms that may not be immediately evident to our fallible senses. In OCs, it is imperative to have a deeper understanding of the "underlying mechanisms [driving] ongoing contributions of active [virtual community] members" because these mechanisms may shift as communities expand and evolve (Bock et al., 2015, p. 424). While we can directly observe tangible aspects (e.g., membership size) of OCs, the underlying governance and relational mechanisms (e.g., formation of emotional bonds) are much less visible even though the latter could be equally (if not more) informative in illuminating the persistence of (in)effectiveness in such communities (Bock et al., 2015; Ridings & Wasko, 2010).

According to CR, the world can be stratified into domains of the real, the actual, and the empirical (Figure 2): the "real contains mechanisms, events, and experiences (i.e., the whole of reality); the actual consists of events that do (or perhaps do not) occur and includes the empirical, [i.e.,] those events that are observed or experienced" (Mingers et al., 2013, p. 796). The core premise is that "social structures, natural objects, material artifacts, and conceptual entities such as language, opinions, and goals (all of which we will refer to collectively as structures) are real and exist independently of our perception of them" (Volkoff and Strong, 2013, p. 820). In turn, these structures give rise to generative mechanismstendencies with the potential to generate observable events that may or may not do so depending on circumstances (Volkoff and Strong, 2013).

³ We embrace a broader view of the term "knowledge." Arguably, it would be more accurate to describe what takes place within the community as online information sharing, but knowledge sharing is a term more widely utilized in prior

research. Scholarly deliberations on what knowledge is are beyond the scope of this study.



Figure 2. Stratified Ontology of Critical Realism (adapted from Wynn & Williams, 2012)

Interviewees' location (country)	Number of interviewees			
Netherlands	7			
India	6			
Germany	2			
Spain	1			
US	1			
UK	1			
Australia	1			
Japan	1			
Total	20			
Position held by interviewee	Number of interviewees			
Architect (internal; current EntCorp employee)	6			
Architect (former employee of EntCorp)	3			
Architect (external; partner organization; client of EntCorp)	11			
Total	20			
Note: A disproportionate number of interviewees were recruited from Western Europe bec	ause EntCorp is essentially a European company, with			

Fable 3. Interviewees	by	Geographical	Location and	Hierarchical	Position
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the majority of clients situated in the same geographical region.

Element observed per architect	Definition
No. of questions asked	Contribution of a specific question on the forum (counting those questions that were initiated by the architect; questions posed within a topic initiated by someone else were counted as comments)
No. of answers given	Contribution of an answer to someone else's question on the forum
No. of posts	Contribution of documentation/information about EntCorp's products ("lessons learned," "how-tos," common problems-answers)
No. of edits	Contribution of editing posted documentation and/or information
No. of comments	Contribution of commenting on posts or questions
Other	Contribution of other traceable activity (e.g., profile edit)
Total number of contributions in 2012	Sum of all contributions made in 2012 per architect
Total number of contributions in 2013	Sum of all contributions made in 2013 per architect

Table 4. Types of Secondary Data Collected from Online Community

By treating discernible manifestations of ineffectiveness (e.g., observed imbalances in knowledge contributions, inability to retain members, or attract new members) in an OC as the empirical domain, we sought to uncover the causal mechanisms that generate these instances. To do so, we adhered to the principles of critical realist case studies as advocated by Wynn and Williams (2012) (see Appendix B). We began by triangulating multiple sources of data. Primary data was gathered from semistructured interviews conducted between 2012 and 2013 with twenty architects. A breakdown of interviewees by geographical location and hierarchical position is detailed in Table 3. Architects stationed across North America, Europe, and Asia were interviewed in order to fairly represent the actual composition of the community members. On average, interviews lasted from 30 to 60 minutes. All interviews were recorded and fully transcribed, yielding 176 pages of interview transcripts.

Additionally, we collected secondary data in the form of direct observations of interviewees' behaviors in the community. We documented all visible behavioral traces of interviewees by tracking the activities of each interviewee within the community (henceforth referred to as "contributions"). A summary of the activities tracked can be found in Table 4 and a detailed breakdown of these activities is shown in Appendix C.

5.1 Data Analysis

Our data analysis adhered to an iterative analytical process, as illustrated in Figure 3. We began by describing the community from a multilevel perspective (Burton-Jones & Gallivan, 2007). Based on our interview data, we first identified the range of functions that motivated the architects to participate in the community at the individual level. Combining both interview and observational data, we then inspected the structure of their behavior at the individual level. The behavioral profile of each individual architect is summarized in Appendix D. We triangulated the interview and observational data as follows: first, information about the architect's position (e.g., internal or external), their level of experience, the function(s) for which they utilized (or wanted to utilize) the community, their own perceptions of how they contributed to the community as well as why the community was important to them were gleaned from interview data. We then tracked the behavior of each architect in the community to uncover the actual structure of their behavior-that is, how much, during the years 2012 and 2013, did they post, comment, etc.



Figure 3. Iterative Analytical Process

Interview excerpts	Descriptive codes (underlined) Theoretical concepts (bulleted)	Pattern codes (italicized): Emerging themes, explanations	
Architect #5 (internal, experienced): "I do relatively little [information dissemination] because it is quite time consuming Mainly [I do it] when it's a friend from a known project." "What I want to avoid is that I give a wrong answer I think as an employee of EntCorp's, the information you provide should be correct. Because in the community value is given to the fact that someone is from EntCorp." "I think few people in the community are currently using it to find people; many people use the community to find information I think our community should focus on bringing people together to solve problems." Architect #9 (internal, experienced): "We are using Technobabble [internal mailing list] to a buge avent for	Personal ties <u>Time</u> <u>Info dissemination</u> <u>Credibility</u> • Bonds between individuals • Reputation; moral obligation to community • Resource contribution (limited responder) <u>Public / private</u> Technobabble "parallel" world	Comparing these passages (Architects #5 and #9) about information dissemination and personal ties reveals that the main factors contributing to ineffective tendencies in internal architects' behavior are <i>ecosystem</i> and <i>bonds between</i> <i>individuals</i> . Internal architects prefer to utilize Technobabble for private conversations and are guided by a strong norm to look credible in the community (reputation over resource contribution). This time- consuming maintenance of two	
Itechnobabble [internal mailing list] to a huge extent for internal communication. I cannot post any question on the wiki if we did an implementation of this at one of our customers—that cannot be a public discussion. But in the beginning there have been some people filtering the Technobabble and posting interesting articles in the community but I think that has stopped now and we are having two parallel worlds." "If you are that long with the company you know the people who are experts in certain areas and you directly ask them instead of posting to the whole community"	 Duplication of effort Personal ties Ecosystem (other competing channels) Bonds between individuals Information quality (redundancy) 	parallel worlds as well as the community having a limited role in creating personal networks impedes the internal architects' involvement in the OC.	
Architect #8 (external, not experienced): "Right now I have this problem with the installation, the only thing that is important for me is that someone has had this problem before and that he has found the solution but for example if you are looking for a best practice, it is important to see that the person who is providing this information knows exactly what he is speaking about it would be useful to know his experience." "I don't write that many things on the community Mostly I post questions or look for [information] if I don't get an answer from what is already there, I post questions."	Information availability & quality Level of experience Info search (no dissemination) • Need-based commitment to community • Trust, reputation • Resource contribution (seeker)	Comparing these passages (Architects #8 and #20) about information search and quality reveals the main factors contributing to ineffective tendencies in external architects' behavior are <i>need-based</i> <i>commitment to community</i> and <i>lack of knowledge self-efficacy</i> . Novices and experts alike utilize the community to find information. Novices, however, have more difficulty in making	
 Architect #20 (external, some experience): "Well, people are fun, but I ask a question, of course, because of what I want to know and those who answered—I do not care who it is if it's a good answer. So, it seems logical to me that I'm there for the content and not for the people." "I do not share on the community. Because I am still too uncertain I have little experience so I was looking for specific information, I did not respond to outstanding questions." "I often find information that is too specific or too general. A general flyer about using EntCorp's products and information on a manual level and in-between is for me a blank spot that is not covered." 	 <u>Info search (no dissemination)</u> <u>Level of experience</u> <u>Blank spot in info</u> Need-based commitment to community Lack of knowledge self-efficacy Resource contribution (seeker) Information quality (missing info) 	they do not yet speak the jargon used by the experienced architects. Novices, thus, feel inexperienced, perpetuating their tendency to not disseminate information themselves. Thus, information is produced only by very experienced architects. Their expertise, collected through years, is often difficult to codify in the community, creating a "blank spot" within information.	

Table 5. Coding Examples

We then moved on to identifying collective-level functions and deriving collective behaviors by analyzing data across individuals. Collective functions were identified from interview data (the functions of the community that architects identified as serving collective needs). Collective behaviors were derived from a cross-examination of individual behavioral profiles (Appendix D). This included the interdependencies identification of between individual behaviors and the form (shared or configural) of collective behavior. As specified earlier, collective behaviors emerge from the interdependencies between individual members rather than from self-identified subgroups in the community. In many cases, the architects themselves remain unaware of these collective behaviors even though they can easily name the subgroups they belong to.

Once we arrived at a general overview of multilevel behaviors within the community, we narrowed our investigation to ineffectiveness in the community. To do this, we isolated exemplary cases that demonstrate distinctive ineffective tendencies in individual and collective behaviors, as well as cross-level influences. In the first round of coding, we relied on descriptive coding (Miles & Huberman, 1994; Saldana, 2013) to pinpoint these tendencies. For instance, we observed that while external architects argued for the necessity in deriving "best practices" on a collective level, they themselves refrained from disseminating information on an individual level, leaving it entirely to the internal architects. We collated multiple descriptive codes based on their association with theoretical concepts that were revealed as inhibitors of effectiveness in prior research (e.g., imbalances in resource contributions, lack of knowledge self-efficacy and competing channels in the ecosystem). Illustrative examples of our coding are depicted in Table 5.

Descriptive coding lay the groundwork for our second round of coding where we applied pattern coding pattern codes are "explanatory or inferential codes, ones that identify an emergent theme, configuration, or explanation" (Miles & Huberman, 1994, p. 69). Pattern coding aids in generating focal themes from the data as well as facilitating the search for explanations (Saldana, 2013, p. 210). We employed pattern coding to outline explanations for why the observed ineffectiveness persisted. We develop these explanations in the next sections.

6 Case Analysis and Findings

In this section, we present the first- and second-level findings from our case analysis: the empirical manifestations of ineffectiveness in EntCorp's OC and the underlying generative mechanisms—multilevel tensions—that can aid in explaining the ineffectiveness. We begin by describing the community functions, followed by the individual and collective behaviors of architects. Next, we describe and analyze individual, collective, and cross-level usage ineffectiveness, followed by our findings related to coping ineffectiveness. Then, we present our discussion, where we theorize how the underlying generative mechanisms and their interactions can aid in explaining why ineffectiveness persists in the community.

6.1 Community Functions on Individual and Collective Levels

EntCorp's strategic vision in launching the community was to convert members in the online knowledge sharing community into competent architects who, preferably, would recommend the company's products to potential clients. Consequently, the intention is not only to bring together and sustain a community of experienced architects but also to steadily transform the community into a conducive environment for novices to mature and acquire essential knowledge shared by more experienced architects. Learning or acquiring new knowledge is thus the main desired function of the community, both at the individual and collective levels.

6.2 Individual Behaviors within the Community

From our case analysis, we notice three typical individual behaviors aimed at achieving this desired function. A less experienced external architect will often choose to concentrate on enhancing their expertise towards EntCorp's products:

If I want to learn something, to learn the EntCorp's product well ... community is the only course to be done... that's what I'm requiring from this community. If I don't find an answer in documentation, then I will definitely post the question in the forum. For now, that is the most important aspect of the community for me because I am using EntCorp's products for the last three months only, so I need to develop my expertise. (Architect #10, external, less than half a year of experience)

Conversely, a more experienced external architect who is actively working on projects is likely to exploit the community for acquiring knowledge to help with technical troubleshooting. This is often accomplished through searching preexisting threads on the forum or posing targeted questions to other members: "Pretty much whatever I need, I directly go into the community and check for solutions there" (Architect #19, external, over 12 years of experience).

Nonetheless, the community has not always been the first medium of choice for problem solving when deadlines are imminent:

Often our implementation is so tightly scheduled that we don't get that time to look for somebody to reply in the community ... people are always busy so it will not happen that anybody would answer immediately. So we prefer to go for a personal contact and get that answer as soon as possible. (Architect #7, external, over 4 years of experience)

An experienced internal architect, on the other hand, tends to rely on private communication systems when sourcing for knowledge (e.g., Technobabble—an internal mailing list) and treat the community primarily as an avenue for knowledge dissemination:

If you are that long with the company, you know the people who are experts in certain areas and you directly ask them instead of posting to the whole community ... We are using Technobabble [an internal mailing list] to a huge extent for internal communication. I cannot post any question on the wiki if we did an implementation at one of our customers that cannot be a public discussion ... But in the beginning, there have been some people filtering the Technobabble and posting interesting articles in the community. (Architect #9, internal)

6.3 Collective Behaviors within the Community

Two communal norms permeate the community and govern how individual architects interact with one another and create interdependencies. These norms pertain to members' credibility and reciprocity. First, EntCorp's internal architects face considerable reputational pressure to always portray a sense of credibility within the community: they are so averse to giving an incorrect answer that they would rather remain silent on matters they are unsure about than participate in collective problem solving. Additionally, architects who view themselves as being inexperienced (e.g., Architect #20, see Table 5) display a tendency to shy away from commenting in the community, engaging solely in information searching. Second, interactions within the community are subjected to differing norms of reciprocity: while some architects participated in the community purely "for the content," others only responded to questions when they felt obliged or were acquainted with the individual asking. In this sense, architects, despite expecting "tit for tat" interactions, cannot always depend on reciprocity.

Given these interdependencies, we derived three configurations of collective behavior in the community (Table 6) (Burton-Jones & Gallivan, 2007).⁴ We label these configurations of behaviors as *boosting, supporting,* and *freeriding.*⁵ In short, boosting behaviors keep the community alive. While supporting behaviors embrace the ideals of the community, neither supporting nor freeriding behaviors contribute to the boosting activities that sustain the community. In the next section, we elaborate on the experiences of persistent ineffectiveness, as identified by the architects themselves.

6.4 Usage Ineffectiveness

In this section, we analyze usage ineffectiveness in the OC, including ineffectiveness experienced by the architects (domain of the empirical), ineffectiveness present but not experienced by the architects (domain of the actual), and the underlying mechanisms—i.e., tensions within the OC—that generate ineffectiveness (domain of the real).

For the purposes of this paper, we define *tension* as an oppositional pull arising from contradictory poles within an OC (Carlo et al., 2012; Ribes and Finholt, 2009; Sutanto et al., 2013). Contradictions are inherent to social reality and represent the poles of perspective that frequently work against one another, creating oppositional pulls, or tensions, that vary in degree (Benson, 1977). From our case findings, we infer that contradictory poles are inherent in OCs-there are always tensions arising from the push-pull between contrasting forces in a given situation (e.g., individuals may be pulled into behaving in oppositional ways by differing norms or desired individual outcomes, which could coexist and/or conflict with desired collective outcomes). It is also important to point out that in Ocs, which inherently involve multilevel goals and use behaviors, tensions are also multilevel. By embracing the CR (Wynn & Williams, 2012) lens, we are able to: (1) differentiate between underlying tensions as generative mechanisms of usage ineffectiveness and the experienced manifestations of usage ineffectiveness, and (2) draw attention to the fact that observable, experienced problems in OC use represent only the "tip of the iceberg." Thus, many tensions exist in the structures of behavior within an OC; these tensions generate ineffectiveness in usage behavior, hindering the attainment of individual and collective desired outcomes. However, ineffectiveness is not experienced by all members of the community. We find that architects, by far, experience usage ineffectiveness at the individual level to the greatest extent, which is reflected in the interview data presented below.

⁴ One individual did not conform to any configuration. Architect #17 was, at the time of the study, not an active member of the community and not involved in any EntCorprelated project.

⁵ As indicated above, these labels describe collective *behaviors*, not collectives (i.e., groups).

Configuration	Individuals	Description of collective behavioral pattern
Boosting	# 1, 2, 3, 5, 7, 9 & 19	Boosting behavior leverages the community for disseminating knowledge to increase the collective level of expertise with EntCorp's products but relies on a combination of private communication systems (e.g., Technobabble) for knowledge acquisition. It is mainly the individual behaviors of EntCorp's internal architects that constitute the collective boosting behavior.
Supporting	# 6, 8, 10, 11, 12, 14, 16, 18 & 20	Supporting behavior leverages in the community for gathering knowledge and actively requests for more information but tends not to include engagement in knowledge dissemination. It is mainly the individual behaviors of external novice architects that constitute the collective supporting behavior.
Freeriding	#4, 13 & 15	Freeriding behavior leverages in the community for increasing one's individual expertise (rather than the collective's) and relies on a combination of communication systems to accomplish this outcome, including the community, phone, and email. There is no discernible pattern in the types of architects whose individual behaviors constitute the collective freeriding behavior.

Table 6. Three Configurations of	Collective Behavior: Boos	ting, Supporting and]	Freeriding

6.4.1 Individual Usage Ineffectiveness Generated by System Misfit Tensions

According to the architects, the main struggle confronting individual members within the community relates to issues of information and system quality. For both internal and external architects, the ease with which they can turn to alternate sources besides the community (e.g., Technobabble and professional networks beyond the community) to gain new knowledge disincentivizes them from participating in the community. Internal architects often lament that the community offers no functional advantage (i.e., system quality issue) over Technobabble. The community not only duplicates many of the discussions on Technobabble, but it also requires the internal architects to practice self-censorship when disseminating knowledge to the community (to maintain their credibility and safeguard against disclosure of corporate secrets). Furthermore, missing features and poor usability were cited as contributing to the community's limited desirability:

Template needs to be defined... it is not just you write an article and you post comments ... features should be added ... in the landing page itself I want to see what are the top five things in the different sectors ... so OK, I am interested in security or in BPM ... so you should be able to create a kind of dashboard and then whenever I log in ... it's saying, OK, this is what happened in your area of interest. So right now, to be honest it is quite blank ... we see all the updates, but I need to drill down to so many levels ... I can't customize it the way I want to have it. (Architect #3, internal)

For external architects, the community is meant to operate as a knowledge repository. Unfortunately, since even the internal architects (i.e., major contributors of knowledge) often favor alternate technologies (e.g., Technobabble), it is inevitable that this will also have a negative impact on the information quality within the community. Indeed, we discover that most external architects also struggle to locate relevant knowledge in the community:

What I think is a problem is that I find information that is often too specific or too general. Like a flyer about using EntCorp's products ... And information on a manual level and in-between is for me a blank spot that is not covered. (Architect #20, external, over 6 years of experience)

Moreover, most external architects can just as easily bypass the community by tapping into their own personal and professional networks:

Q: Would you say that this community is a central point ... ? A: No, it is not ... Well, regardless of how it should be, but it is not for me. It's more of a product reference ... there is an enormous shortcoming of documentation ... and when you cannot find it here then you go to your professional network. (Architect #6, external, over 5 years of experience)

Issues of information and system quality impede members' participation in the community, which in turn hinders the attainment of desired outcomes for both internal and external architects on an individual level. Both information and system quality are known individual-level enablers of OC effectiveness (Ardichvili et al., 2003; Lin, 2008). For this reason, our findings not only affirm the importance of both information and system quality in terms of contributing to effectiveness, but they further elucidate *system misfit tensions* as a more general mechanism underlying individual usage ineffectiveness. System misfit tensions (see Table 7) describe a particular system (in terms of functionality, information quality, and usability) as not being an optimal fit with an individual user.

Level /	Domain of the real	Domain of the empirical	Domain of the actual
domain	• tensions	 ineffectiveness generated by experienced tensions 	 ineffectiveness generated by unexperienced tensions
Individual	System misfit tensions	<i>Individual usage ineffectiveness</i> For example, architects are aware of a "blank spot" in the data (lack of fit between available and desired information).	No evidence
Collective	Interest misalignment tensions	<i>Collective usage ineffectiveness</i> For example, architects are aware of a lack of commitment to collective learning.	Architects do not seem to be aware of the fact that internal and external architects have formed different configurations of collective behaviors (boosting and supporting) that exacerbate collective struggles (lack of commitment)
Cross-level	Activity misrepresentation tensions	<i>Cross-level usage ineffectiveness</i> For example, architects are aware that some of their individual behaviors (e.g., using Technobabble) hinder the achievement of collective learning by creating parallel worlds.	Architects do not seem to be aware of each other's norms of behavior and how these norms create interdependencies and different collective behaviors and seem to be unaware that collective behaviors of boosting, supporting, and freeriding exacerbate individual struggles ("blank spot").

Table 7. Multilevel Tensions as Generative Mechanisms of Usage Ineffectiveness

For example, EntCorp OC pushes individuals into opposing behaviors that counteract each other in supporting the individual in attaining their desired outcomes from the OC (e.g., bypassing the OC and turning to one's professional network due to missing documentation). Our findings suggest that usage ineffectiveness generated by individual-level tensions becomes, to a large extent, experienced by the individual community members. In short, hindrances to the achievement of one's immediate goal are the easiest to detect because they are the control of the individual.

6.4.2 Collective Usage Ineffectiveness Generated by Interest Misalignment Tensions

According to the architects, the main struggle confronting the community relates to issues of commitment. Fundamentally, the architects recognize that the community operates more like an assembly of independent members with partisan interests than as a collective in pursuit of a communal objective. Lack of collective commitment (e.g., everyone doing their share) was cited as a plausible reason for fragmentation within the community:

We have a section on the Wiki where you can share experiences, only unfortunately in practice there is very little use of it ... we have the solution architect club founded last year with the intention that people share their experiences there and thereby a kind of vibrant community would arise but that's still not really very good ... you see that people there give little priority to one another. And why ...

I don't know maybe EntCorp is not important to what they do. (Architect #1, internal)

Furthermore, EntCorp's vision for the community (create a collective of competent architects who would recommend the company's products to potential clients) does not necessarily align with the vision of the architects in the community seeking like-minded people. With mainly internal architects engaging in information sharing in the community (boosting behavior), external architects do not feel the community is living up to its mission:

I would like to get information from people like me ... those who are using it [EntCorp's products]. So basically I want the users of the EntCorp's platform ... the integrators ... their experiences. Because if I look at information from EntCorp's experts, since it is their own product, they like to sell it ... right ... so I don't want their perspective. I want the integrators who are using it and who are facing problems or who are benefitting from it. (Architect #10, external)

In short, the lack of collective commitment and patterns of collective behavior (boosting, supporting, and freeriding) hinder the attainment of desired outcomes for the architects on a collective level. "Invisible" communal activities (Cranefield et al., 2015) are a known collectivelevel enabler of OC effectiveness. Again, our findings not only attest to the importance of communal activities in contributing to effectiveness, but they also point to *interest misalignment tensions* as a more general mechanism underlying collective usage ineffectiveness.

Interest misalignment tensions (see Table 7) describe interdependent individuals as being unable to align their interests when it comes to collective behavior and/or function (e.g., community members do not take each other's desired outcomes into account or are unaware of one another's collective behaviors). Here, the gap experienced between underlying tensions and ineffectiveness is much larger than at the individual level. For example, while the software architects do experience a collective lack of commitment to the community, they do not seem to be aware of the fact that the collective behaviors of boosting and supporting members are split along internal versus external architects, perpetuating the "blank spot" (information quality) problem. The fact that collective behaviors, unlike individual ones, cannot be directly observed (i.e., their invisibility) exacerbates the gap. Hindrances to the achievement of collective goals, which lie beyond the individual's control and direct observation are thus more difficult to detect.

6.4.3 Cross-Level Usage Ineffectiveness Generated by Activity Misrepresentation Tensions

The broader ecosystem (cf. Cranefield et al., 2015) in which the community is embedded plays a pivotal role in shaping both individual and collective behaviors, as well as the connection between them. Specifically, because alternate technologies and competing channels in the ecosystem are so readily accessible to individual architects, the prioritization of the community at the collective level is hindered:

In the beginning, there have been some people filtering the Technobabble and posting interesting articles in the community, but I think that has stopped now and we are having two parallel worlds. (Architect #9, internal)

Individual architects, who engage in one-to-one conversations and bypass the community, are also hindering the realization of collective benefits:

I think with the community it is not really about finding people and asking them personally, it is rather about posting the questions in the community, that would make more sense ... Although I have to admit I don't do it very often but yes ... otherwise if you do it only in one-to-one communication the other [architects] are not benefitting. (Architect #9, internal)

The architect recognizes that their individual behavior (utilizing Technobabble in place of engaging in oneto-one conversations) is linked to the failure to attain the desired collective outcome. Instead of a community of architects, there are two "parallel worlds" and not all architects benefit from the shared knowledge. In short, we find that individual behaviors can hinder the attainment of desired collective outcomes. "Weintention"-a collective intention rooted in a person's self-conception as a member of a particular group (Tsai & Bagozzi, 2014) is a known cross-level enabler of OC effectiveness. Our findings underscore the importance of this we-intention in guiding individual behaviors to support the attainment of desired collective outcomes. But, at the same time, the absence of we-intention cannot fully explain cross-level usage ineffectiveness. While architects recognize that certain individual behaviors are counterproductive for the achievement of collective goals, in many cases, they remain either unaware or mistakenly believe their behaviors are beneficial to the collective. For example, architects are unaware of one another's norms of behavior and how these norms create interdependencies among individuals. Whereas less experienced external architects are directed by functional needs (they are there for the content and not for the people) (Bateman et al., 2011), internal architects are guided by personal and/or emotional bonds (Bock et al., 2015; Ren et al., 2012) as well as a moral obligation to the company. Neither internal nor external architects seem to realize that these diverse commitments perpetuate a cycle that amplifies both individual problems with information quality and collective problems with commitment. In this sense, we posit activity misrepresentation tensions as the general mechanism underlying cross-level usage ineffectiveness (Table 7). These tensions relate to community members as individuals and as members of a collective being unable to coordinate their usage activities in ways that are helpful for attaining desired outcomes. Here, the gap between underlying tensions and experienced ineffectiveness is the largest. As a consequence, hindrances to the simultaneous achievement of individual and collective goals are the hardest to detect.

6.5 Ineffective Adaptation: Coping Behaviors

Our findings further reveal that, in many instances, architects try to circumvent or address the problems they are conscious of. These coping behaviors involve both escalation and/or reduction of participatory efforts within the community. Our case analysis indicates that select coping behaviors, regardless of how well-intended they might be, can exacerbate ineffectiveness within the community. This is because community members adapt their individual behaviors in response to experienced ineffectiveness, which is not always directly indicative of what caused the ineffectiveness (underlying tensions). Coping, therefore, does not always address the underlying tensions. Drawing on CR, we suggest that this happens because the experienced problem is only one of many problems generated by underlying tensions. In turn, users are inclined to concentrate their efforts on resolving known problems and adopt coping behaviors that may be either inappropriate or incomplete when dealing with an underlying tension (Table 8). It is important to point out that while architects experience usage ineffectiveness at individual and collective levels, as well as across levels (Table 7), the coping behaviors we observed were always individual. While it is possible for individual OC members to coordinate their coping behaviors, this often requires intricate orchestration, and we did not observe this happening in our study.

6.5.1 Improvising in Response to Individual Usage Ineffectiveness

Both novice and expert architects participate in the community to gain new knowledge. However, expertise, accumulated over time, is often hard to codify in the community, causing blank spots to materialize in shared knowledge. Novices also often experience difficulties in making sense of shared knowledge since they do not yet speak the jargon. For this reason, novices tend to feel doubtful and insecure about their capacity to contribute "meaningful" knowledge (cf. Ardichvili et al., 2003). This, in turn, compels them to engage in supporting behaviors and they tend to assume a "silent" role within the community, even when this is inconsistent with their proficiencies (i.e., the knowledge they produce could perhaps be more easily absorbed by other novices because of similar levels of proficiency) and introduces workload imbalances to the community, burdening the more experienced architects. To cope with issues of information quality (i.e., blank spots), external architects turn to competing channels to source knowledge that is unavailable within the community rather than considering disseminating knowledge within the community themselves:

If I try to find out a solution or hints in the community, sometimes I find something, but the explanation is very short and on a high level ... so only two or three sentences ... For me, this information is not enough. I need more explanation because I am not on a high level [of expertise]. For example, I tried to install [X, EntCorp's product] and I had problems ... and I cannot find any hint on the community as to why our installation doesn't work. Now I am also in contact with [EntCorp's employee]... and he is very busy and therefore he asked me to use the support system. (Architect #4, external)

I do not share on the community. Because I am still too uncertain ... I have little experience. (Architect #20, external)

This individual coping behavior (turning to external channels) is an *improvisation* (see Table 8) that can make it more effective for the individual to acquire new knowledge they need immediately but, over time, aggravates the "blank spot" problem. As such, the adaptation is ineffective in the long term.

6.5.2 Compromising in Response to Collective Usage Ineffectiveness

Lack of commitment to the community is the main hindrance to the achievement of collective goals, and overcoming the hindrance is beyond the control of a single individual. We found that architects coped with this by trying to juggle between their desire to solve their own individual problems as quickly as possible and their desire to document the process of solving the problem for the benefit of the whole community. In general terms, architects responded to collective usage ineffectiveness by compromising (Table 8). As individual pressures (e.g., deadlines and reputation) often took priority, this coping behavior was ineffective in adapting to collective-level usage ineffectiveness. For example, internal architects coped with corporate pressures by (1) leaving some of the seeds in the community unanswered (Ridings & Wasko, 2010), if not indefinitely, at least for a time period that is long enough to drive knowledge seekers to look elsewhere, and (2) (un)intentionally isolating (e.g., ignoring questions from) novices who do not have an established personal network in the community:

I do relatively little [information dissemination] because it is quite time consuming ... Mainly [I do it] when it's a friend from a known project ... What I want to avoid is that I give a wrong answer ... I actually give no answer, or I give a good answer. (Architect #5, internal)

These coping behaviors impact the attainment of the desired outcome of acquiring new knowledge. First, the coping behaviors can make the collective behavior of boosting (disseminating knowledge within the community, especially to known contacts; acquiring knowledge on Technobabble) more effective by balancing the time spent on dissemination and acquisition. However, the same behaviors can render the collective behavior of supporting (acquiring knowledge from the community) less effective by compromising the quality of information accessible to novices.

6.5.3 Conciliating in Response to Cross-Level Usage Ineffectiveness

When it comes to cross-level usage ineffectiveness, what is experienced constitutes only a small fraction of generated ineffectiveness (Table 7). For example, the architects were indeed aware that some of their individual behaviors (e.g., utilizing Technobabble) hinder the attainment of the collective outcome by creating parallel worlds. Yet, despite explicit recognition of how one's use behaviors as an individual and as a member of a collective fail to complement each other, we found that individual architects often had a misunderstanding of what their own activities and the activities of the collective contributed to the community.

Level / domain	Domain of the real tensions 	Domain of the empirical ineffectiveness generated by experienced tensions 	Domain of the empirical coping behaviors in response to experienced ineffectiveness
Individual	System misfit tensions	Individual usage ineffectiveness (e.g., missing information)	<i>Improvising</i> (individuals try to make the system fit to their needs or finds alternative systems)
Collective	Interest misalignment tensions	<i>Collective usage ineffectiveness</i> (e.g., lack of commitment to collective learning)	<i>Compromising</i> (individuals try to align their own different interests as well as the interests of the community; individual interests often win)
Cross-level	Activity misrepresentation tensions	<i>Cross-level usage ineffectiveness</i> (e.g., individual behaviors hinder collective learning)	<i>Conciliating</i> (individuals keep doing what they have been doing because they have a misunderstanding of their own activities and the activities of others in the collective)

Table 8. Coping Be	ehaviors in Res	sponse to Usage	Ineffectiveness
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This, in turn, led to the absence of coping behaviors aimed explicitly at alleviating cross-level usage ineffectiveness. Instead, OC members often kept doing what they had been doing before. We call these coping behaviors *conciliating* (see Table 8).

To summarize, our case analysis reveals that ineffectiveness within online communities cannot be adequately comprehended without: (1) taking into account individual-, collective- and cross-level usage ineffectiveness with the community, for which only a select few instances may be detected; and (2) realizing that coping behaviors aimed at tackling ineffectiveness may, at times, exacerbate the problem. In the next section, we advance a parsimonious yet holistic framework to explicate the persistence of ineffectiveness in OCs.

7 Discussion

We set out to solve the conundrum of why ineffectiveness persists in OCs despite members' awareness and best efforts at coping. The architects in our focal OC clearly recognize that deficiencies in system features and suboptimal utilization of the community hinder the attainment of desired outcomes, thereby leading to behavioral adjustments. Yet these adaptive behavioral responses have not eliminated ineffectiveness over an approximate seven-year time period from when the community was launched to when data collection was completed. Given these observations, and by applying the CR principle of retroduction (see Appendix B), we iterated back to theory to better clarify the underlying mechanisms underlying ineffectiveness and its persistence in OCs. Through iterative theory development, we settled on a three-step explanation: (1) underlying multilevel tensions in the community explain community usage ineffectiveness (i.e., members are unable to use the OC effectively); (2) coping behaviors explain ineffective adaptation (i.e., members are unable to cope with not being able to use the OC effectively); and (3) ineffectiveness persists because of the interaction between usage and adaptation ineffectiveness. While we have delineated Steps 1 and 2 of the explanation above, we consider the interaction between usage and adaptation ineffectiveness below, culminating in an overall framework for why ineffectiveness in OCs persists.

7.1 Theorizing Persistent Ineffectiveness

To answer our research question about how and why ineffectiveness in OCs persists, we submit that: (1) multilevel tensions generate usage ineffectiveness (some of which is experienced); (2) coping behaviors address only experienced problems, so that much of usage ineffectiveness remains unaddressed by the coping behaviors, which generates further adaptation ineffectiveness; and (3) usage ineffectiveness, if combined with adaptation ineffectiveness, generates persistent ineffectiveness. In other words, community members are unable to use the OC effectively because of multilevel tensions. If they are then also unable to cope with not being able to use the OC effectively, ineffectiveness persists. The presence of multilevel tensions or usage ineffectiveness alone is not sufficient for ineffectiveness to persist. Only when usage ineffectiveness is not addressed through coping (ineffective adaptation) does ineffectiveness become persistent. The abovementioned interdependencies between multilevel tensions and misguided coping behaviors in perpetuating ineffectiveness within OCs are reflected in our proposed multilevel, cyclical model of ineffectiveness (see Figure 4).

Findings from this study bear significant implications for advancing research on the long-term sustainability of professional OCs. First, we parsimoniously account for why past studies have yielded conflicting evidence pertaining to the causes of OCs becoming dormant or obsolete over time.



Figure 4. Usage + Adaptation Ineffectiveness = Persistent Ineffectiveness

Extending prior research, which has often alluded to the same factor as being both an enabler and inhibitor of effectiveness, we discover that these factors, be they enablers or simultaneous enablers and inhibitors (see Table 2), do not contribute independently to the effectiveness of OCs. Rather, many of these enablers and inhibitors coexist as contradictory poles of multilevel tensions within OCs. In some cases, these oppositional poles have been identified in past studies, such as technical features fostering bond- or identitybased attachment that push OC members into opposing behaviors (Ren et al., 2012). In other cases, prior research has only scrutinized the impact of one pole while ignoring the other (e.g., focusing on enablers only). For example, previous work on "we-intention" (Tsai & Bagozzi, 2014), which has been revealed to be critical in facilitating cross-level usage effectiveness, does not consider its opposite pole (i.e., "I-intention").

Consequently, our theorization of multilevel tensions as generative mechanisms underlying individual, collective, and cross-level usage ineffectiveness supplements the theoretical explanations proffered within extant literature on why ineffectiveness occurs in OCs. For instance, cross-level activity misrepresentation tensions, identified in this study, capture the oppositional pull generated by the conflict between "we-intention" and its opposite (i.e., "Iintention"). By drawing attention to the coexistence of collective and individual intentions, of which only the individual intentions are known to OC members, crosslevel activity misrepresentation tensions indicate that ineffectiveness in OCs can be attributed to members' misunderstanding of how their own activities and the activities of the collective contribute to the community. An in-depth appreciation of the long-term sustainability of OCs thus requires explicit acknowledgment of *multilevel enablers* and *inhibitors* as underlying causes of OC effectiveness overcoming either-or thinking within extant literature as well as opening up the possibility of a multitude of effects, of which only some may be observable.

Second, findings from this study reveal that coping behaviors, while individual in nature, are aimed at overcoming ineffectiveness on multiple levels (individual-, collective- and cross-levels). Even though improvising and compromising have been researched in the context of OCs (Ridings & Wasko, 2010), coping behaviors trying to address cross-level ineffectiveness (e.g., conciliating) have, until now, garnered little attention (cf. Benbya & McKelvey, 2006). Our findings suggest that individual coping behaviors in response to multilevel ineffectiveness appear to be satisficing (cf. Beaudry & Pinsonneault, 2005) at best. While compromising is typically deemed to be a proven method for accommodating conflicting demands and divergent interests (Ashforth et al., 2014), our case analysis testifies to the reality that satisficing responses (e.g., conciliating) may actually amplify and perpetuate ineffectiveness in multilevel phenomena due to unforeseen cross-level effects.

7.2 Implications for Practice

Our findings that much ineffectiveness is not experienced and that coping behaviors engaged by community members to deal with ineffectiveness do not always cater to the recognition of underlying tensions yield practical implications for managing multilevel ineffectiveness in OCs. First, it is vital to realize that because of how ineffectiveness is generated and experienced, the picture of the underlying generative mechanisms of ineffectiveness (tensions) that community members have is always incomplete and sometimes misleading. Consequently, experiences of ineffectiveness may be either constructive or destructive (cf. Vermunt & Verloop, 1999). Ineffectiveness experienced on a single level (e.g., the "blank spot" problem), the underlying cause of which is both individual- and cross-level (e.g., unreconciled individual and collective behavior structures), may induce a member to forsake a community when a more constructive avenue for action might be to cut down on unproductive activities while diverting resources to productive ones.

It is imperative for community owners and managers to be aware that insights gleaned from members' feedback (e.g., satisfaction surveys) represents just the tip of the iceberg. One promising avenue for deciphering the impact of coping behaviors is through increasingly sophisticated tracking, logging, and analytics possibilities (Chen et al., 2012). Such measures would enable us to not only monitor individual behaviors and their interdependencies in real time but to also correlate these behavioral patterns with the attainment (or not) of individual and collective desired outcomes. In addition to satisfaction surveys, these data sources could reveal much about experienced ineffectiveness and underlying tensions in order to guide community owners and managers in their efforts to introduce changes to the technical systems, the tasks, the context, or the members (e.g., enforce moderation or other forms of continuous community engagement by the owners, see Mamykina et al., 2011). For instance, in our case, we note usage ineffectiveness in the community where internal software architects often do not respond to the questions of novice external architects who are unknown to them. This exacerbates the missing information problem, which in turn forces the external architects to engage in the improvising coping behavior of seeking information elsewhere, which is an ineffective adaptation in terms of solving problems related to missing information. A cycle of persistent ineffectiveness is formed and sustained by the combination of usage and adaptation ineffectiveness. For architects who have only experienced missing information, it would be almost impossible to break this cycle. Furthermore, since OCs are, by definition, "persistent collections of people" (Phang et al., 2009; Preece, 2000; Ren et al., 2012), the continuous membership will sustain the cycle—even if there is considerable turnover in the periphery, the core of the community will continue the cycle unless they become aware of the underlying causes of ineffectiveness. With the help of behavioral analytics, the cycle could be rendered much more visible, and alternative courses of action could be undertaken to break the cycle (cf. Montealegre & Keil, 2000).

8 Conclusion, Limitations, and Future Work

In this study, we investigate how and why ineffectiveness persists in OCs. Consistent with extant literature, we observe that ineffectiveness in OCs stems from things like norms, interactions among the participants, etc., which mediate how community behaviors hinder or facilitate the attainment of desired outcomes (cf. Bock et al., 2015; Burton-Jones & Gallivan, 2007; Chen et al., 2011; Cranefield et al., 2015; Lin, 2008; Mamykina et al., 2011; Phang et al., 2009; Ridings & Wasko, 2010; Ren et al., 2012). But at the same time, we note that past studies have come up short in terms of offering a parsimonious yet holistic explanatory framework for our observations: (1) ineffectiveness may be individual-, collective- and/or cross-level, (2) ineffectiveness may be explicitly experienced by the architects or not, and (3) behaviors aimed at coping with ineffectiveness may themselves be ineffective.

Embracing the lens of critical realism (Wynn & Williams, 2012), we sought to make sense of these observations by differentiating between the empirical manifestations of ineffectiveness and their underlying generative mechanisms. To do so, we introduced the concept of tensions. Noticing tensions permitted us to trace the sources of ineffectiveness to contradictions that were built up in the structures and functions of multilevel community behaviors. If the community is characterized by multilevel behaviors, tensions are also multilevel in nature. By distinguishing among individual-, collective-, and cross-level tensions (i.e., system misfit, interest misalignment, and activity misrepresentation), we illustrate that these separate tensions generate ineffectiveness, some of which is experienced by users. However, we found that coping behaviors (i.e., improvising, compromising, and conciliating) that community members adopt to address experienced ineffectiveness are inadequate for addressing underlying tensions. In fact, it is this adaptation ineffective that allows usage ineffectiveness to persist.

8.1 Limitations

Since our line of research relies on a single case in the specific context of an online knowledge sharing community, caution should be exercised in the extrapolation of our empirical findings beyond the context in this study. While OCs (e.g., corporate social networking sites, collaborative wikis, innovation communities, Q&A forums, and the like) are increasingly pervasive and have become part and parcel of the digital landscape within organizations, investigating ineffectiveness in an OC poses a few challenges. OCs typically do not have strict hierarchies of members, with predefined roles and tasks and clear workflows. As a result, tracing interdependencies among individual members and the emergence of collective behavior patterns in the community can be quite tedious. At the same time, such communities often demand some form of collaboration and coordination among individuals in order to be successful. This means that the communities must cater to fluid individual, collective, and cross-level Furthermore, participation in needs. these communities is typically volitional; therefore, members cannot be compelled to adopt particular behaviors. Comprehending the challenges associated with the effective functioning of such communities is, accordingly, increasingly important and our study offers valuable insights in this regard.

Second, our findings do rely on a single case study, which has implications for generalizability. Case studies by design do not aim for statistical generalizability but rather aim to generalize from "data to description" and then from "description to theory," also known as analytical generalization (Lee & Baskerville, 2003). Through triangulating data collected from interviews and observations, we were able to generate thick descriptions of multilevel ineffectiveness in the community. By nature, this description is not generalizable "beyond the domain that the researcher has actually observed" (ibid.: p. 235). From these case-specific rich descriptions, we then further abstract concepts (i.e., multilevel tensions, usage ineffectiveness, coping behaviors, and ineffective adaptation) that are generalizable in constructing our theoretical model for explaining persistent ineffectiveness within OCs. By design, "a theory generalized from the empirical descriptions in a particular case study has no generalizability beyond the given case" (Lee & Baskerville, 2003, p. 236). However, in future research, the proposed theoretical model can be applied in other inquiries of professional OCs to validate its applicability and refine its generalizability.

Third, one could also question the ontological assumptions underpinning our application of critical realism. We set out to explore ineffectiveness in an OC with a defined ontological view of how collectives

work. The fundamental assumption corresponds to the idea of layered reality from CR (Wynn & Williams, 2012), where empirical manifestations of ineffectiveness represent only the visible surface aspects of reality, while the underlying mechanisms at play may be hidden from both the study participants and the researchers. This viewpoint is increasingly supported by extant literature on OCs (Bock et al., 2015; Johnson et al., 2014). We contend that distinguishing between the empirical manifestations underlying generative mechanisms and of ineffectiveness can be helpful in making sense of the conflicting evidence generated from prior research. Focusing purely on the empirical manifestations of ineffectiveness mentioned by case informants or behavioral observations within the community would have blinded us to why ineffectiveness persists in OCs.

8.2 Future Research Avenues

Our findings and the abovementioned limitations also point to interesting avenues for future research. Our proposed multilevel, cyclical model of ineffectiveness opens up multiple new lines of research into OCs. First, as highlighted above, further empirical studies to validate, refine, and/or extend our proposed model could be undertaken in other contexts. The nuances of context-specific coping behaviors (e.g., different forms of improvising, compromising, and conciliating), as well as their differential and joint influence on usage require further ineffectiveness. exploration. Furthermore, the emergence of coordinated, collective coping behaviors could also constitute an avenue for future research. As suggested above, this could pave the way for a new line of research in the IS field related to multilevel coping and its impact on OC effectiveness.

While our observational data were collected across two years (2012 and 2013), the interviews were collected at a single point in time, representing a snapshot of behaviors and desired outcomes within a given time period. Nevertheless, our findings demonstrate that it makes little sense to explore only the current manifestations of ineffectiveness. To decipher why ineffectiveness persists (or how to break a persistent cycle of ineffectiveness), longitudinal studies are necessary to assess the impact of individual, collective, and cross-level coping behaviors on the persistence, creation, or elimination of ineffectiveness within OCs.

8.3 Conclusion

In summary, our contribution to the extant literature on OCs is three-fold: conceptual, empirical, and explanatory. We contribute to both diagnostic and prescriptive research streams by illuminating three interrelated causes of persistent ineffectiveness within OCs: (1) underlying multilevel tensions in the community contribute to usage ineffectiveness (i.e.,

members are unable to use the OC effectively); (2) misguided coping behaviors contribute to ineffective adaptation (i.e., members are unable to cope with not being able to use the OC effectively); and (3) ineffectiveness persists because of the interaction between usage and adaptation ineffectiveness.

Our conceptual contribution lies in introducing a consistent vocabulary and set of concepts (i.e., tensions, usage ineffectiveness, coping behaviors, and ineffective adaptation) to make sense of and talk about OC ineffectiveness. This enables us and other researchers to explicitly account for and describe ineffectiveness from a multilevel perspective. Furthermore, distinguishing between experienced ineffectiveness and underlying multilevel tensions permits us to differentiate between empirical manifestations of ineffectiveness (e.g., lack of information sharing) and the underlying causes (which are not always identified by the community members themselves), which in turn contributes to a better understanding of previous and often contradictory empirical results. Third, we offer an explanatory framework for how and why ineffectiveness in OCs continues to persist. The proposed multilevel model of persistent ineffectiveness enables us to explain how tensions at multiple levels generate usage ineffectiveness, some of which is experienced by community members. In turn, the coping behaviors that community members adopt to deal with experienced ineffectiveness often do not address underlying tensions—it is this ineffective adaptation in response to multilevel tensions that allows ineffectiveness to persist within OCs.

References

- Ardichvili, A., Page, V., & Wentling, T. (2003). Motivation and barriers to participation in virtual knowledge-sharing communities of practice. *Journal of Knowledge Management*, 7(1), 64-77.
- Ashforth, B. E., Rogers, K. M., Pratt, M. G., & Pradies, C. (2014). Ambivalence in organizations: A multilevel approach. *Organization Science*, 25(5), 1453-1478.
- Bateman, P. J., Gray, P. H., & Butler, B. S. (2011). The Impact of community commitment on participation in online communities. *Information Systems Research*, 22(4), 841-854.
- Beaudry, A., & Pinsonneault, A. (2005). Understanding user responses to information technology: A coping model of user adaptation. *MIS Quarterly*, 29(3), 493-524.
- Benson, J. K. (1977). Organizations: A dialectical view. Administrative Science Quarterly, 22(1), 1-21.
- Benbya, H., & McKelvey, B. (2006). Using coevolutionary and complexity theories to improve IS alignment: a multi-level approach. *Journal of Information Technology*, 21(4), 284-298.
- Bock, G., Ahuja, M. K., Suh, A., & Yap, L. X. (2015). Sustainability of a virtual community: Integrating individual and structural dynamics. Journal of the Association for Information, Systems, 16(6), 418-447.
- Burton-Jones, A., & Gallivan, M. J. (2007). Toward a deeper understanding of system usage in organizations: A multilevel perspective. *MIS Quarterly*, 31(4), 657-679.
- Carlo, J. L., Lyytinen, K., & Boland Jr, R. J. (2012). Dialectics of collective minding: contradictory appropriations of information technology in a high-risk project. *MIS Quarterly*, 36(4), 1081-1108.
- Chen, C. J., & Hung, S. W. (2010). To give or to receive? Factors influencing members' knowledge sharing and community promotion in professional virtual communities. *Information & Management*, 47(4), 226-236.
- Chen, H., Chiang, R. H., & Storey, V. C. (2012). Business intelligence and analytics: From big data to big impact. *MIS Quarterly*, *36*(4), 1165-1188.
- Chen, J., Xu, H., & Whinston, A. B. (2011). Moderated online communities and quality of user-

generated content. *Journal of Management Information Systems*, 28(2), 237-268.

- Chiu, C., Fang, Y.-H., & Wang, E. T. G. (2015). Building community citizenship behaviors: The relative role of attachment and satisfaction. *Journal of the Association for Information Systems*, 16(11), 947-979.
- Cranefield, J., Yoong, P., & Huff, S. L. (2015). Rethinking lurking: Invisible leading and following in a knowledge transfer ecosystem. *Journal of the Association for Information Systems*, 16(4), 213-247.
- Dubé, L., Bourhis, A., & Jacob, R. (2006). Towards a typology of virtual communities of practice. *Interdisciplinary Journal of Information*, *Knowledge, and Management*, 1(1), 69-93.
- Faraj, S., von Krogh, G., Lakhani, K., & Monteiro, E. (2014). CFP: Special issue on collaboration and value creation in online communities, *Information Systems Research*.
- Faraj, S., Kudaravalli, S., & Wasko, M. (2015). Leading collaboration in online communities. *MIS Quarterly*, 39(2), 393-412.
- Fayard, A. L., & DeSanctis, G. (2010). Enacting language games: The development of a sense of "we-ness" in online forums. *Information Systems Journal*, 20(4), 383-416.
- Johnson, S. L., Faraj, S., & Kudaravalli, S. (2014). Emergence of power laws in online communities: The role of social mechanisms and preferential attachment. *MIS Quarterly*, *38*(3), 795-808.
- Lee, A. S., & Baskerville, R. L. (2003). Generalizing generalizability in information systems research. *Information Systems Research*, 14(3), 221-243.
- Lin, H. F., & Lee, G. G. (2006). Determinants of success for online communities: An empirical study. *Behaviour & Information Technology*, 25(6), 479-488.
- Lin, H. F. (2008). Determinants of successful virtual communities: Contributions from system characteristics and social factors. *Information and Management*, 45(8), 522-527.
- Lin, M. J. J., Hung, S. W., & Chen, C. J. (2009). Fostering the determinants of knowledge sharing in professional virtual communities. *Computers in Human Behavior*, 25(4), 929-939.
- Mamykina, L., Manoim, B., Mittal, M., Hripcsak, G.,
 & Hartmann, B. (2011). Design lessons from the fastest Q & A site in the West. *Proceedings*

of the SIGCHI Conference on Human Factors in Computing Systems (pp. 2857-2866).

- Ma, M., & Agarwal, R. (2007). Through a glass darkly: Information technology design, identity verification, and knowledge contribution in online communities. *Information Systems Research*, 18(1), 42-67.
- Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook.* (2nd ed). SAGE.
- Mingers, J., Mutch, A. & Willcocks, L. (2013). Critical realism in information systems research. *MIS Quarterly*, 37(3), 795-802.
- Montealegre, R., & Keil, M. (2000). De-escalating information technology projects: Lessons from the Denver International Airport. *MIS Quarterly*, 24(3), 417-447.
- Moser, C., Ganley, D., & Groenewegen, P. (2013). Communicative genres as organising structures in online communities of team players and storytellers. *Information Systems Journal*, 23(6), 551-567.
- Phang, C. W., Kankanhalli, A., & Sabherwal, R. (2009). Usability and sociability in online communities: A comparative study of knowledge seeking and contribution. *Journal of the Association for Information Systems*, 10(10), 721-747.
- Pike, J. C., Bateman, P. J., & Butler, B. (2013). Dialectic tensions of information quality: Social-networking sites and hiring. *Journal of Computer-Mediated Communication*, 19(1), 56-77.
- Preece, J. (2000). Online communities: Designing usability and supporting sociability. Wiley.
- Ransbotham, S., & Kane, G. C. (2011). Membership turnover and collaboration success in online communities: Explaining rises and falls from grace in Wikipedia. *MIS Quarterly*, 35(3), 613-627.
- Ray, S., Kim, S. S., & Morris, J. G. (2014). The central role of engagement in online communities. *Information Systems Research*, 25(3), 528-546.
- Ren, Y., Harper, M., Drenner, S., Kiesler, S., Terveen, L., Riedl, J., & Kraut, R. (2012). Building member attachment in online communities: applying theories of group identity and interpersonal bonds. *MIS Quarterly*, 36(3), 841-864.
- Rheingold, H. (1993). *The virtual community: Finding connection in a computerized world*. Addison-Wesley Longman.

- Ribes, D., & Finholt, T. A. (2009). The long now of technology infrastructure: Articulating tensions in development. *Journal of the Association for Information Systems*, 10(5), 375-398.
- Ridings, C., & Wasko, M. (2010). Online discussion group sustainability: Investigating the interplay between structural dynamics and social dynamics over time. *Journal of the Association for Information Systems*, *11*(2), 95-121.
- Saldana, J. (2013). *The coding manual for qualitative researchers*. SAGE.
- Sutanto, J., Palme, E., Tan, C. H., & Phang, C. W. (2013). Addressing the personalization-privacy paradox: An empirical assessment from a field experiment on smartphone users. *MIS Quarterly*, *37*(4), 1141-1164.
- Trier, M., & Richter, A. (2015). The deep structure of organizational online networking - An actororiented case study. *Information Systems Journal*, 25(5), 465-488.
- Tsai, H. T., & Bagozzi, R. P. (2014). Contribution behavior in virtual communities: Cognitive, emotional, and social influences. *MIS Quarterly*, 38(1), 143-163.
- Vermunt, J. D., & Verloop, N. (1999). Congruence and friction between learning and teaching. *Learning and Instruction*, 9(3), 257-280.
- Volkoff, O., & Strong, D. M. (2013). Critical realism and affordances: Theorizing IT-associated organizational change processes. *MIS Quarterly*, 37(3), 819-834.
- Wasko, M., & Faraj, S. (2005). Why should I share? Examining social and knowledge capital contribution in electronic networks of practice. *MIS Quarterly*, 29(1), 35-57.
- Wasko, M., Faraj, S., & Teigland, R. (2004). Collective action and knowledge contribution in electronic networks of practice. *Journal of the Association for Information Systems*, 5(11), 493-513.
- Wynn, D., & Williams, C. K. (2012). Principles for conducting critical realist case study research in information systems. *MIS Quarterly*, 36(3), 787-810.
- Zhang, C., Hahn, J., & De, P. (2013). Continued participation in online innovation communities: Does community response matter equally for everyone? *Information Systems Research*, 24(4), 1112-1130.
- Zhou, T. (2011). Understanding online community user participation: a social influence perspective. *Internet Research*, 21(1), 67-81.

Characteristic	Description	Characteristics of professional online communities
Purpose	Shared objective, identity, or interest among members (e.g., bond-, community- and identity-based attachment)	Professional online communities are often sponsored by an organization. For individuals, the motivation for participating in online communities typically stems from desires to enhance their professional capabilities, absorb advanced insights, and/or resolve problems at work. For the organization, the purpose of sponsoring online communities is usually to support a business objective (e.g., improve the implementation of EntCorp's products in our case) (cf. Ardichvili et al., 2003; Lin et al., 2009).
Membership composition	Member characteristics and geographical dispersion	Members are geographically dispersed, working professionals who possess "common interests in specialized fields or subjects for knowledge sharing" (Chen & Hung, 2010, p. 227) (e.g., software architects from all over the world, in our case)
Communication channels	Computer-mediated communication technologies and their affordances	Interactions among members of professional online communities are often facilitated through tools for information and knowledge sharing (e.g., bulletin boards, forums, news groups, and wikis) whereas tools for purely social networking tend to be less emphasized (cf. Chen & Hung, 2010).
Relational mechanisms	Degree of reciprocity; formal/informal leadership; nature of exchanges within the community (e.g., citizenship behaviors); strength of ties among members	Participation in professional online communities is typically voluntary (Wasko & Faraj, 2005), but the sponsoring organization may influence the behavior of participating employees. Furthermore, participants often start out as strangers (weak ties) (Chiu et al., 2015; Wasko & Faraj, 2005), but depending on the size of the professional field and the tenure of the community, it is likely for core members to get to know one another outside the community. Reputation, reciprocity, trust, knowledge self-efficacy, and commitment have thus been shown to be salient relational mechanisms shaping participation within professional online communities (Chen & Hung, 2010; Lin et al., 2009; Wasko & Faraj, 2005).
Governance mechanisms	Institutionally guided and formalized or emergent norms; degree and form of moderation; absence/presence and formality of reward systems	Professional online communities do not depend on formal reward systems (Chiu et al., 2015); rather, they count on members' interest and commitment. For employees belonging to the sponsoring organization, there is also some form of "moral" obligation involved (Ardichvili et al., 2003). In this regard, moderation is not commonly practiced within professional online communities because they are less likely to be filled with redundant content or subjected to trolling as compared to communities that are purely interest based (e.g., music production forums).

Appendix A: Defining Characteristics of Professional Online Communities

Appendix B: Methodological Principles of Critical Realism as Applied in Empirical Study

CR Principle & Evaluation Criteria (based on Wynn & Williams, 2012)	How is it applied in our empirical study?		
<i>Triangulation:</i> Employ multiple approaches to support causal analysis based on a variety of data types and sources, analytical methods, investigators, and theories.	We combine data from primary and secondary sources (interviews & direct observations online). We employ theories on online communities and multilevel IT use. Data analysis conducted by three investigators.		
<i>Explication of structure and context:</i> Identify components of social and physical structure, context: Description of the structural entities, constituent parts, and contextual conditions existing in the case Identification of the relationships among the entities	We describe the key structural entities (e.g., structures and functions of multilevel behavior) and contextual conditions as well as the relationships among these in the research setting and case findings sections.		
<i>Explication of events:</i> Identify and abstract the events being studied, usually from experiences: Thick description of case "story" including actions and outcomes; abstracted sequence of events	We provide a thick description of the empirics or the case "story" (multilevel behaviors on the online community), including the key actions (behavior structure) and outcomes (attained or not attained functions) in the case findings section.		
Retroduction: Identify and elaborate on powers/ tendencies of structure that may have interacted to generate explicated events: Identification of a set of plausible candidate causal mechanisms	We identify a set of plausible candidate mechanisms (tensions). We consider these mechanisms as part of the explanation of observed outcomes (various manifestations of ineffectiveness) in our setting.		
<i>Empirical corroboration:</i> Ensure that proposed mechanisms have causal power and that they have better explanatory power than alternatives: Analytical validation of proposed mechanism based on case data Assessment of explanatory power of each mechanism relative to alternative explanations	We consider alternative explanations by examining our findings in light of existing theories and past findings. As such, we extend particularly the explanatory power of multilevel factors (e.g., multilevel tensions) in generating ineffectiveness in online communities.		

Appendix C: Secondary Data Collection via Visible Traces of Architects' Behaviors in the Community

#	Internal / external	# of visible activities in total in community in 2012	# of visible activities in total in community in 2013	Questions asked on the forum	Comments / answers to questions asked by others on the forum	Document or topic posts (including edits and comments about them)	Other (profile change)
1	Internal	11	3	1	1	11	1
2	Internal	3	1	0	0	3	1
3	Internal	4	1	0	0	5	0
4	External	2	1	2	0	0	1
5	Internal	15	21	0	0	35	1
6	External	N/A	N/A	N/A	N/A	N/A	N/A
7	External	0	8	0	0	8	0
8	External	4	8	8	2	0	2
9	Internal	0	0	0	0	0	0
10	External	0	0	0	0	0	0
11	External	3	0	2	0	0	1
12	External	0	0	0	0	0	0
13	Internal	1	0	1	0	0	0
14	External	7	1	6	1	0	1
15	External	0	0	0	0	0	0
16	External	6	0	5	0	1	0
16	External	6	0	5	0	1	0
17	External	0	0	0	0	0	0
18	External	0	0	0	0	0	0
19	External	1	0	1	0	0	0
20	External	1	6	6	0	0	1

Appendix D: Individual Architect Profiles (Based on Primary and Secondary Data)

Architect #	Behavior profile
1	Internal. Over 10 years of experience with EntCorp's products. Uses many different tools for finding information relevant for projects (community is secondary in this). Secondary data confirms this (only one question posted on the forum), but also shows the member is quite active in disseminating information about EntCorp's products / promoting EntCorp (11 document or topic posts, including edits/comments to these).
2	Internal. Over 15 years of experience at EntCorp's, but less experience as an architect. Uses community to search for information and to build a network. Similar to #1, uses many tools to do this. Is also active in terms of responding to questions, but not within the community (rather on internal mailing lists like technobabble). Secondary data confirm this.
3	Internal. Over 7 years of experience at EntCorp's. 4 years as an architect. Uses community to do information search + dissemination (individually), as well as to promote EntCorp's products and build a collective community of experts. Similar to #1 and 2, many tools used for task achievement. Secondary data confirms information dissemination / promotion of EntCorp functions (most of activity is about document/topic posts).
4	External. About 1 year of experience with EntCorp as an architect. Uses community for individual information search. Secondary data confirms this (no posts or comments, only questions on the forum).
5	Internal. Over 6 years of experience at EntCorp's as an architect. Uses community to only answer questions from people he already knows (often over the phone or e-mail). Any information needs he has, he fills internally (technobabble). In terms of disseminating information / promoting EntCorp, he does post things. Secondary data confirm this (member is very active in posting documents/topics and commenting on these but is not active on the forum).
6	External. Over 5 years of experience with EntCorp's as an architect. Uses community for individual information search in a limited way. However, in interview, also mentions desire to have a "real" community for competence building, and the current community not meeting these needs. We actually could not locate this architect as a member of the community, so no secondary data were collected.
7	External. Over 4 years of experience with EntCorp's as an architect. Uses community for individual information search for problem solving. Uses many other systems to do the task as well. Does not consider the community a "real" community. Secondary data confirm this—member not active in asking questions on the forum (seems to use other systems) but secondary data suggest member has also posted some documents/topics.
8	External. About 1 year of experience with EntCorp's as an architect. Goes to community when he requires it. However, feels that it would be nice if other community members were more available to answer questions, etc. Secondary data confirm this (member asks lots of questions on the forum).
9	Internal. Over 6 years of experience at EntCorp's as an architect. Uses community for individual information search and to promote EntCorp's products and build a collective community of experts. Uses technobabble to find information though, so limited time left for community, which has no clear collective function in this member's eyes. Secondary data confirm this (member has NO visible activities in the community).
10	External. Less than half a year of experience with EntCorp's as an architect (but over 10 years of experience in software development). Uses community for individual information search and learning. Wishes for more social interaction within the community. Secondary data confirm this (member has NO visible activities in the community).
11	External. About 8 years of experience with EntCorp (first as an employee, now as an architect at a partner). 3 years of architect experience. Uses community for individual information search for technical problem solving. Wishes for more community orientation from the individual members, in particular more availability. Secondary data confirm this (member asks questions on the forum).
12	External. About 1 year of experience with EntCorp's as an architect (20 years of experience as developer, etc.). Uses community for individual learning. Only contacts his "buddy" (a more experienced EntCorp's architect) personally with specific questions. However, sees the community as fulfilling a broader function of networking and getting to know other architects. Secondary data confirm this (member has NO visible activities in the community, suggesting he gets his information from the "buddy").

13	Internal. About 1 year of experience at EntCorp's as an architect. Uses community for individual learning and information search. Uses email and telephone a lot on the side. Does not post questions on the forum, just searches for existing information. Says his lack of experience means he does not speak the "jargon" of the community yet. Secondary data largely confirm this (little visible activity, one question on the forum).
14	External. About 4 years of experience with EntCorp's as an architect. Uses community for individual information search. Desire for more sharing of lessons learned and more community feel. Secondary data confirm this (member asks quite a lot of questions on the forum).
15	External. Former EntCorp's employee. Relatively experienced as an architect (exact number of years difficult to estimate). Uses community for individual information search. Often goes through documentation of the community, then searches for existing information, then posts questions on the forum, then contacts someone personally. Secondary data largely confirm that asking questions on the forum is not the first option for this member (NO visible activities).
16	External. Over 4 years of experience with EntCorp, but only 1 year of experience as an architect. Thinks that open communication, building a community, and building a community of experts in EntCorp's products are particularly important. Secondary data confirm this (member is active on the forum, but also a little bit of activity in posting in topics).
17	External. About 2 years of experience with EntCorp as an architect. Currently NOT involved with anything EntCorp related, so not an active member of the community.
18	External. Relatively experienced as an architect (exact number of years difficult to estimate). Uses community for individual information search and learning. Expects the community to provide information about EntCorp's products, which he should have individual expertise to apply. Secondary data largely confirm this, but suggest the member is not active in asking questions on the forum as part of information search (NO visible activities).
19	External. Over 12 years of experience with EntCorp (first 10 years as an employee, now an architect at a partner's). Uses community for individual information search. Only searches for information but sees the importance of broadcasting experiences (unclear why not doing this). Secondary data confirm this (member has asked a question on the forum).
20	External. Over 6 years of experience with EntCorp as an architect. Not a frequent participant. Only engages in information search, no dissemination. Would like to see the community have both an individual and collective function. Secondary data confirm this (member is active on the forum—asks questions, but not active in posting).

About the Authors

Mari-Klara Stein is an associate professor in the Department of Digitalization, Copenhagen Business School. Mari holds a PhD in Business from Bentley University (USA). Mari's research is focused on the digital transformation of work, including emerging forms of digital work, such as platform work and crowdwork, implications of work digitalization on emotional well-being and work meaningfulness, and the consequences of datafication and algorithmic management in the workplace. Mari is a founding member of the AIS Special Interest Group on the Changing Nature of Work. She has published her work in top management and IS journals (e.g., *MIS Quarterly, Journal of Management Studies, Journal of Information Technology, Information & Organization*). Mari's *MIS Quarterly* paper (co-authored with three colleagues) received the European Research Paper of the Year award from CIONET—a leading community of IT executives in Europe, with over 5,000 members. Mari is also the recipient of the prestigious Association for Information Systems (AIS) Early Career Award. Mari currently serves as an associate editor at *MIS Quarterly* and senior editor at *Information & Organization*.

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