

# Socialization in Open Source Software Communities: A Symbolic Interactionist Perspective

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## Abstract

*Recent reviews of virtual teams literature recognizes a gap in our understanding of how members socialize into virtual communities. Motivated by this shortcoming, we seek to understand how members socialize into OSS communities, which are both virtual and normative in nature. Using the symbolic interactionist perspective, we define socialization and explain the process through which personal meanings come to correspond the shared meanings of the community. We define socialization as the degree of correspondence between the personal meanings of individual members and the shared meanings of the community emerging from negotiated experiences members share.*

## 1. Introduction

Research on virtual teams has grown greatly with many theoretical (Gibson and Cohen 2003), empirical (Jarvenpaa et al. 1998), and field studies (Maznevski and Chudoba 2000). However, recent reviews highlight existing gaps in the literature (Bell and Kozlowski 2002; Martins et al. 2004; Powell et al. 2004); one such gap is the lack of theoretical and empirical work on member socialization in virtual teams, groups, and communities (Ahuja and Galvin 2003; Bell and Kozlowski 2002; Martins et al. 2004). Interestingly, there has been a similar call from Lois (1999) for more research about socialization in normative organizations, such as volunteer groups and communities. Recognizing the above noted calls for research, in this paper, we investigate socialization of members into volunteer and virtual software development communities, popularly known as Open Source Software (OSS) communities. The research question that motivates this paper is: how do individuals socialize into given OSS communities? In this paper, we conceptualize OSS communities as virtual, normative, knowledge-creating communities and explicate member socialization using the social interactionist approach (Blumer 1969). In drawing on the symbolic interactionist perspective, we define socialization as the degree of correspondence, resulting from shared and negotiated experience, between the personal meanings of individual members and the shared meanings of the community. Our main thesis is that the higher the correspondence between personal and shared meanings, the more socialized will be the individual within that community.

Extant OSS research has identified the pattern of activity members undertake while participating in open source software development (e.g. von Krogh et al. (2003)). However, these studies fall short because they treat action and meaning making discretely as though both are separate (Ducheneaut 2005). One solution to overcome

this limitation is to conceptualize socialization in OSS communities using the symbolic interaction perspective. The use of this perspective offers an opportunity to study socialization as an outcome of action and managing making, both occurring concurrently.

The remainder of this paper is organized as follows. The next section provides a summary of the results of recent reviews of virtual teams research. A review of OSS in general and research on OSS member socialization in particular comes next. This is followed by a discussion of symbolic interactionism as a methodological perspective that we apply to explicate member socialization in OSS communities. Based on the key tenets of symbolic interactionism, we then offer our conceptualization of socialization using this approach. Concluding thoughts are provided last.

## **2. Virtual Teams & Communities**

Virtual teams that rely on information communication technologies (ICT) as a primary tool to accomplish their work are increasingly pervasive in organizations, thus making research about them ever more pertinent (Ahuja and Galvin 2003; Bell and Kozlowski 2002). Recent reviews of this extensive literature suggest that research on socialization in virtual teams is limited (Ahuja and Galvin 2003) and therefore, more work is needed to enhance our understanding of how individuals socialize in to virtual groups (Ahuja and Galvin 2003; Bell and Kozlowski 2002; Martins et al. 2004). Consequently, in this paper we seek to explain socialization within a virtual and volunteer (normative) knowledge creating community, the OSS community, using the social interactionist perspective.

Drawing on the work of McAlexdander et al. (2002) and Muniz and O'Guinn (2001) we define a community as a fabric of relationships held together by shared interests. These relationships include those between individual members, and other entities, such as, brands, ideologies, and products. Extant research suggests that loyalty in traditional communities is a function of relationship between members (Muniz and Guinn 2001; Schouten and McAlexander 1995). Moreover, overall integration of members into a community is a consequence of their participation in the rituals of the community, relationship with the community through other members (McAlexander et al. 2002).

We extrapolate from the extant research on traditional communities to virtual OSS communities. In doing so we acknowledge and include the political and social maneuvering by members as part of the rituals that they undertake to become part of OSS communities (Divitini et al. 2003). This is particularly salient in an OSS context where, although the source code is open to anyone, there is a notion of ownership of the development process and an inclination to control access to the code. Also, the fact that, the email distribution list, databases, and source code consist of both the end (product) knowledge created and the medium through which individuals share experiences and

socialize makes socialization in OSS communities a ripe context to apply the social interactionist perspective.

The next section provides a brief overview of the open source software movement, with a specific focus on socialization in OSS communities.

### **3. Open Source Software and Socialization**

In this section, we briefly present the state of the OSS movement and subsequently cover research on the stages of membership individuals transition through in an OSS community, as this stream of research comes closest to issues of socialization in OSS communities. We undertake this review in order to provide the reader with a clear understanding of prior research in the area in order to set the stage for our conceptualization of member socialization using the symbolic interactionist perspective in Section 5.

Open source software and the open source movement have caught the attention of business, researchers, and policy makers (Niederman et al. 2006a; Niederman et al. 2006b). The main tenet of OSS is unrestricted freedom with regard to the software, allowed under licenses such as the General Public Licence (GPL) and the Apache License to the source code (Fitzgerald and Feller 2002). OSS communities are mostly comprised of volunteers working together without a central and formal control authority produce OSS (von Hippel and von Krogh 2003). There are many open source software applications that are extremely successful, like for example the Mozilla Firefox web browser, the Linux operating system, and the Apache web server. However, while the open, collaborative, and interactive characteristics of the open source production model have largely proven their worth, there is much that is still not known about how these communities function. Moreover, the fact that many open source projects often struggle with shortages in skilled contributors or high developer turnover rates (von Krogh et al. 2003) makes it crucial to understand how members socialize and become an integral and reliable part of the community.

Research has identified the pattern of activity members follow to become part of OSS communities. At first, we offer a brief description of the various stages individuals go through in the process of becoming members based on extant research (see Table 1). Subsequently, we offer an elaborate description of the activities members undertake, as they transition through these stages, from lurkers to core members of the development team. This review offers an overview of the current work in the field of open source software development that most closely relates to member socialization.

<b>Table 1. Stages of Membership in OSS Communities</b>				
<b>Von Krogh et al. (2003)</b>	<b>Mechanism</b>	<b>Ducheneaut (2005)</b>	<b>Mechanism</b>	<b>Adopted Typology</b>
<b>Lurker:</b> subscribes to the mailing lists and undertakes knowledge seeking activity by reading messages.	Opening script	<b>Peripheral participant:</b> subscribe to mailing lists and seek knowledge by reading messages.	Opening script	<b>Lurker</b>
<b>Participant:</b> participates in ongoing discussions, undertakes knowledge seeking and providing	Joining script. They usually begin as debuggers and patchers.	<b>Debugger and Patcher:</b> participates in ongoing discussions	Joining script. They usually begin as debuggers and patchers.	<b>Participant</b>
<b>Joiner:</b> has access to the developer community.	The level and type of activity gets them access to developer community.		The level and type of activity gets them access to developer community.	<b>Joiner</b>
<b>Newcomer:</b> has access to other developers and source code.	Specialization and contribution.	<b>Developer:</b> with CVS access	Specialization, contribution, social interaction, allies,	<b>Developer</b>
<b>Developer:</b> Is contributing code to the project	Specialization, contribution, ability to garner allies, and maintain social interaction.			
<b>Core developers/ Administrator</b>		<b>Core developers/ Administrators</b>		<b>Core developers/ Administrators</b>

Extant research (Ducheneaut 2005; von Krogh et al. 2003) on OSS communities demonstrates that new members start as *lurkers*, by simply subscribing and reading from the project mailing lists for a certain period of time before posting to the mailing lists. A lurker is someone who has subscribed to the mailing list but is only observing the activity in the community. The first act of posting, called the opening post, signals the transition of the lurker to that of a *participant* (von Krogh et al. 2003). The participant members undertake various activities including debugging, testing, code review, but when they make a joining post, what Von Krogh et al (2003) refer to as the “joining script”, they transition to the *joiner* stage. A joiner is a subscriber of the mailing list who unlike the lurker is involved in various discussions with other members of the community. When joiners transition to become *newcomers*, they get access to the CVS or the Concurrent Version System. CVS is a popular configuration management tool for maintaining the source code of the software application. This privilege allows them access to the source code, but they cannot commit changes to the final code. A newcomer becomes a *core developer* when the project administrator(s) gives him/her the responsibility of a full software module and the ability to commit (save) changes to source code. The transition from a newcomer to a developer is a testimony to the ability of the member to be not just a software coder, but a craftsman of relationships (Orr 1990). The desired objective of all serious participants in OSS projects, according to research, is to progress and evolve through the ranks discussed above (Von Krogh et al 2003 and Ducheneaut 2005).

The progress from lurker to a developer is contingent on the ability of members to internalize the tacit knowledge (Nonaka 1994) of the community by sharing experience with the existing community members. As one may conjecture, the ability to share experience beyond the lurker stage is contingent on the support and guidance provided by the existing community members through their knowledge providing activities.

Although the above research has implied that progressing through these different membership stages consists of member socialization into OSS communities, we contend that member socialization is instead the degree of correspondence, resulting from shared and negotiated experience, between the personal meanings of individual members and the shared meanings of the community, a conceptualization best understood using the symbolic Interactionist perspective. Our main thesis is that the higher the correspondence between personal and shared meanings, the more socialized will be the individual within that community. Using our conceptualization of socialization, we suggest that the various stages a member transitions through is associated with a varying degree of socialization. Therefore, we attempt to explicate how individuals progress through these various stages of membership identified above through a view of socialization derived from a symbolic interactionist perspective. In the next section, we describe the key tenets of symbolic interactionism and then lay the foundation for our view of socialization.

#### **4. Symbolic Interactionism as a Methodological Perspective**

In drawing from the symbolic interactionist perspective, one must conform to a number of principles that guide the research, the data collection process, and the presentation of the research findings. As such, in designing this particular research project, we adopted the specific criteria suggested by Gopal and Prasad (2000) in developing a sound symbolic interactionist study (see Table 2, adapted from Gopal and Prasad, 2000).

<b>Table 2. Criteria Used to Evaluate the Research Design of Symbolic Interactionist Research</b>		
<b>Guiding Principle</b>	<b>Description of Principle</b>	<b>Application</b>
Compatibility of research questions with symbolic interactionist assumptions and orientations	Questions need to focus primarily on the symbolic and emergent aspects of phenomena being studied with emphasis on multiplicity of meaning and the role of self and identity in mediating local interpretations	Our focus is on the symbolic and emergent meanings, both personal and shared, that OSS communities are comprised of.
Selection of appropriate field setting and methods	Research conducted only in a naturalistic field setting that permits researcher access to multiple standpoints in the situation. Choice of methods that permit access to everyday lifeworlds and experiences.	Research conducted in the context of OSS communities, a naturalistic field setting which allows for an investigation of multiple perspectives.

We believe symbolic interactionism is particularly appropriate to gain understanding on socialization, especially as conceptualized in this paper, because of its emphasis on the construction of meaning in social situations. For our purposes, the importance of applying symbolic interactionism is its distinct emphasis on the importance of symbols and the interpretive (meaning making) process that underlies interactions as fundamental to understanding human behavior. Therefore, we employ this perspective to understand the socialization process in open source software communities.

One of the underlying premises of symbolic interactionism is the symbolic nature of human interactions. This approach draws from the social constructionist position that views all social interaction as based on the meanings that individuals, groups, or communities attribute to objects and events in the course of everyday life. By interacting with one another, people negotiate and assign meanings to different things, and these two processes of action and meaning making, what we refer to as interactions, collectively shape the community's values, norms, and beliefs or the shared symbolic meanings that emerge. Colton (1987, p. 346) provides a succinct, yet thorough definition

of symbolic interactionism: “symbolic interactionism is based on the premise that human society is characterized by the use of symbols and meanings, and that the meanings of various social and nonsocial objects or symbols are derived through the interaction process.” Therefore, one of the main focuses of applying this perspective here is to understand how people interpret or make sense of their shared experience.

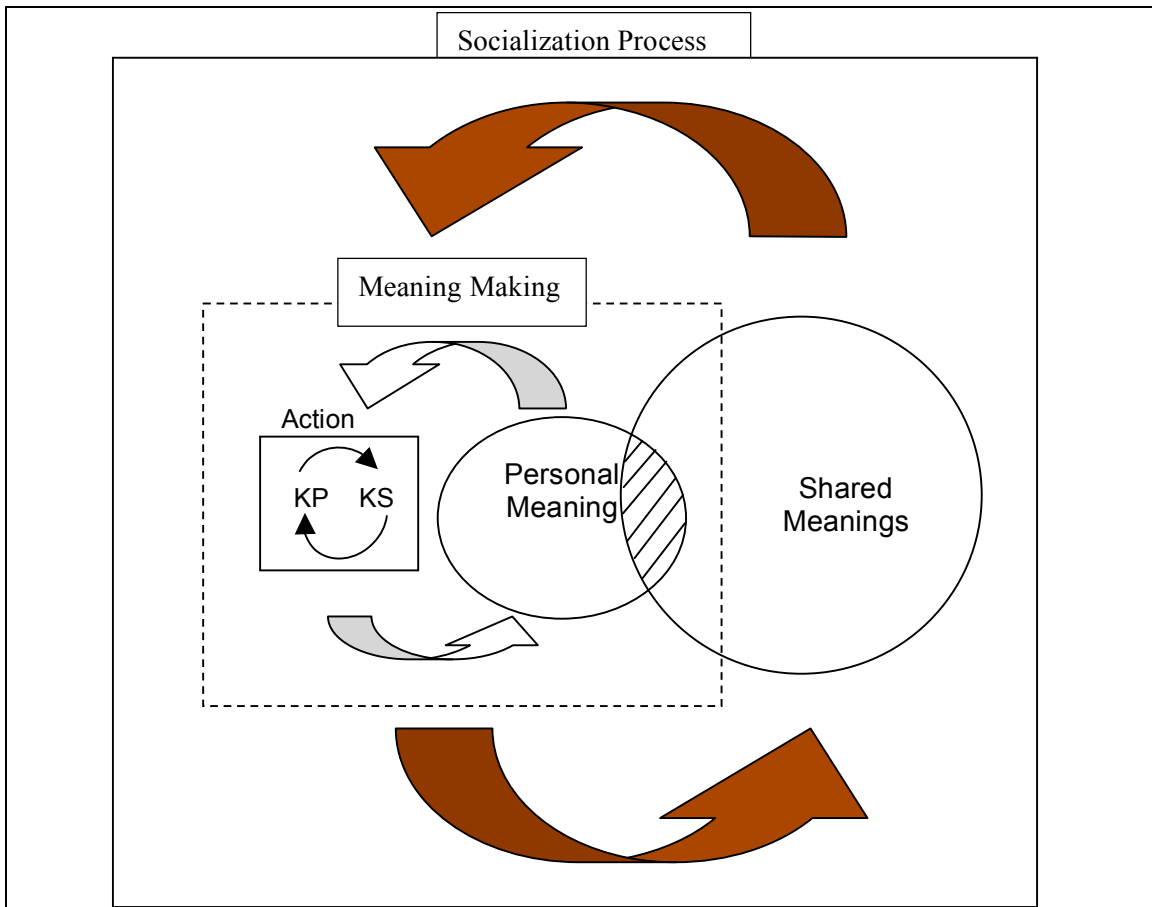
One of the strengths of the symbolic interactionism approach is its recognition that multiple meanings and realities pervade social life and its objective to search for and explicate these diverse interpretations rather than identify single shared ones. The importance of local meanings is also addressed. Indeed, as underscored by Prasad(1993, p. 1404): “symbolic interactionists recognize that people may symbolically sustain certain notions such as freedom, justice, and leadership at a broad societal level, but that these notions contain very different images and meanings for people within particular institutional contexts.” Therefore, pervasive concepts such as socialization can carry very different connotation in different contexts and thus need to be understood as such.

The process of socialization in open source software communities, conceptualized here as knowledge communities, is explored using the symbolic interactionist approach. Indeed, the foundation for interaction among open source community members is a shared system of meaning, comprised of symbols that, over time, evolve and take on meaning. Throughout this process, negotiation and feedback are present as community members together create symbols and new communal meanings. The entire communication process in open source communities is based on perceptions, the use of text-based language and symbols, and the creation and development of shared meaning. In the next section we build on the existing OSS literature and apply the symbolic interactionist perspective to explicate OSS community member socialization.

## **6. Symbolic Interactionism Approach to OSS Socialization**

The preceding section informed our view of symbolic interactionism. Based on this we present and describe our conceptualization of member socialization in OSS communities (see Figure 1).

The dynamic and emergent nature of social meanings is derived from the interaction process. Action and meaning are inextricably intertwined, each producing and being produced by the other. This inseparable coupling between action and meaning is itself implied in the term symbolic interaction (Gopal and Prasad, 2000). Indeed, as indicated by Gopal and Prasad (2000, p. 515), “A well-done symbolic interactionist study would not seek to understand either meanings or action in isolation, but as a jointly produced dynamic reality.”



**Figure 1. A Symbolic Interactionist Perspective of OSS Socialization**

**Legend:** Degree of socialization is represented by hatched area, KP=knowledge providing, KS= knowledge sharing.

This section seeks to explicate the black box of socialization in open source software communities through the lens of the symbolic interactionist approach. Specifically, we argue that the socialization process community members go through in open source communities can be best understood as the interdependent interplay between action – comprised of both knowledge seeking and knowledge providing activities – and meaning-making – consisting of both the individual meaning-making activities and the shared meanings that evolve in the community (see Figure 1). It is important to note that given the interdependent nature of these concepts, the figure must not be interpreted as a defined sequence of unique events. Rather, the concepts are enmeshed with one another and take place simultaneously. Our central thesis is that

action and meaning-making feedback into one another, with action shaping the meanings that individuals attribute to symbolic artifacts, and meanings influencing future actions undertaken. This entangled process between action and meaning-making gives rise to the personal meanings that individuals derive from the community. Furthermore, this personal meaning does not develop in isolation, but instead is constantly influenced and shaped by one's interactions with other community members. The meanings that emerge within the community tend to be negotiated and mutually agreed upon – what we term here as “shared meanings.” Therefore, we further contend that these shared meanings affect the personal meanings the each community member is constantly deriving from the community. In short, the process of socialization is the integrated result of interaction of individuals, consisting of action and personal meaning making, leading to the emergence of shared meanings with the community. The above described interplay of action and personal meaning making through a negotiation process with other individuals and the community allows members to form shared meanings from these shared experiences (Nonaka 1994). Socialization of a member is indicated by the extent of overlap between an individual member's personal meaning and the shared meanings of the community.

The next section covers the main components of the model. First, an explication of the two actions, knowledge seeking and knowledge providing, is offered. Each component of knowledge seeking and knowledge providing is separately addressed, followed by an explanation of how their interplay creates shared action and experience. Second, the interplay between action and personal meaning is explored, followed by the interaction between the shared meanings of the community and the individual meanings of its members. All of these interdependent components, taken together, form the socialization process of individuals into open source software communities.

### **6.1 Knowledge Seeking**

Knowledge seeking is the first side of the action coin. It involves the various activities undertaken by community members to acquire knowledge of the community. When considering whether or not to join an open source software community, one can do so through a variety of means. Since open source projects have publicly accessible project web sites, potential community members can easily access and learn about them. Indeed, OSS project web sites contain a plethora of information on their respective projects, including the identity of project administrators, the project's development stage, its level of activity, and the number of software downloads, among others (e.g. see [www.sourceforge.net](http://www.sourceforge.net)). In addition, the project's mailing lists are also accessible for those who wish to familiarize themselves with the community. These lists include most, if not all, of the communications that are exchanged between members of OSS communities.

Research suggests that lurkers appear to follow a set of activities, commonly referred to as the “opening script” (von Hippel et al., 2003) in order to participate in the community after lurking for a certain length of time on the mailing list. These types of

activities include seeking information about the group and its norms (Miller and Jablin 1991). A number of studies of open source projects indicate that opening activities have many dimensions, some of which include time spent lurking on the project's web site, frequency of emails submitted to the site, and quality of communications posted (Hertel et al. 2003; Mockus et al. 2002; Pitt et al. 2006). As described earlier, OSS members communicate using forums, emails, chat, and code. Many opening posts by lurkers consist of introducing themselves to the community, or submitting questions about the project in order to start learning about the community, or both (von Hippel et al., 2003). Previous work in communication and organizational entry has noted the proclivity of newcomers to a group to seek out regulative and normative knowledge about the group (Mignerey et al. 1995; Scott 2001). Opening posts that take the form of questions about the community are an example of this. On the other hand, posts indicating one's abilities to others consist of a way of providing them knowledge about oneself. This can also take place after one has read through a number of posts from the mailing lists. In addition, some may very well do both in a single post by asking questions while also communicating their skills and experience. All of these actions are influenced and shaped by the meanings that one derives from his interactions with the community, while also consisting of the source through which meaning emerges. This underscores the interdependence between action and the emergence of personal meaning in this context. Also, in addition to seeking information on the symbolic meanings of the community's activities, technical knowledge can also be acquired by familiarizing oneself with the source code of the project's software product. This can not only provide newcomers with technical insights with regard to the developed software, but also provide them with indications of the expected contributions and level of expertise required of the contributor.

All of this suggests that new members of OSS communities undertake knowledge seeking activities to make sense of the OSS community they are joining. However, as we have implied throughout, knowledge seeking does not take place in isolation, but rather hand-in-hand with knowledge providing activities. Indeed, the developer mentioned above referred to "absorbing the culture" of the community while signaling his desire to accomplish certain tasks. Therefore we argue that individual members who undertake knowledge seeking and knowledge providing activities will develop an understanding or a personal meaning of the negotiated and shared meanings of the community, and thus begin to find their place within the community.

The next section focuses on the knowledge providing activities of community members. Again, for description and clarity purposes, we decided to treat these concepts separately, but ask the reader to keep in mind that the entire socialization process is conceptualized as a dynamic interplay between all of these interdependent components, as illustrated in Figure 1.

## **6.2 Knowledge Providing**

Knowledge providing is the second side of the action coin. It is through knowledge providing activities that community members interact with their peers. Indeed, the act of posting messages by members of the OSS community consists of the knowledge providing activity. In this section we will elaborate to show that the knowledge providing activity is an integral part of the mechanism that existing OSS community members undertake to negotiate and create meanings about the community with the newer members – lurkers and participants.

As noted above newcomers start by “lurking” at the periphery (Preece et al. 2004), observing activities on the mailing list. As suggested by recent findings, it appears that during the lurking period, potential participants interact with posted messages and form personal meanings about the community (von Krogh et al. 2003). This process can be understood from the symbolic interactionist perspective, which suggests that social interactions are guided by the meanings we create through our interpretations of the symbolic artifacts we interact with. According to some (Nonaka 1994; von Krogh et al. 2003), explicit knowledge is created from tacit knowledge through the process of externalization. If we interpret the externalization process as a transfer of meaning, symbolically, from a member’s mind to the mailing list, then we can assume that participants are interacting and negotiating with the symbolic meanings of existing members. Because this explicit knowledge is a reflection of the tacit knowledge of current members – joiners, developers, and core developers, it seems that, during the lurking period, lurkers are internalizing the explicit knowledge and deriving from it tacit knowledge – the norms, values, and beliefs – of the community. Therefore, the message postings or knowledge providing activities by the existing members influence the participants’ tacit knowledge.

The lurking period also offers lurkers a chance to become familiar with the ongoing discussions in the project mailing lists. This prepares them to make a meaningful knowledge providing activity, an opening post, which usually consists of one of the following types: a self introduction, a suggestion pertinent to an ongoing problem, a bug report and fix, or a feature gift which is a suggestion and/or a contribution of new code for feature enhancements. (Ducheneaut 2005) The replies from the core group to newcomers’ opening posts offer them many cues about the expectations of the community. Thus, the knowledge providing activity begins to influence the personal meaning joiners attribute to their actions.

Although prominent personalities of the OSS movement suggest that core members – developers & core developers – of projects identify attractive and low (learning) barrier entry points in the project and lead newcomers to it (Roberts et al. 2006); research shows that this happens less often than expected. For example, Von Krogh et al (2003) and Ducheneaute (2005) both observe that only in few cases did existing members encourage participants to join and give them specific (low entry

barrier) technical tasks to work. In many cases members of the community encouraged the participant to find some part of the software architecture to work on that would match with their specialized knowledge. The problem, therefore, is for the community, as well as for the participant, to understand where and whether the contributions of participants are essential to the project. The kind of feedback existing developers and members give to a joiner helps the individual develop knowledge about the project, and the project team. The above discussion implies the significant role of knowledge providing activities in developing shared meanings between members of OSS communities.

Furthermore, the evolution of a joiner to a developer involves creating a persona that the community identifies with and recognizes (Ducheneate 2005). When a joiner begins to make specialized contributions to the code, initiates active dialogue through mailing lists, and builds a support base among the team members, all to the satisfaction of the core members, then he can be seen to transition to a developer. The next stage, of becoming a core developer comes with the privilege of creating and adding modules to the source code.

Core members of the team act as gatekeepers asserting that developers show the merit of their suggestions – usually for new modules – by garnering support from the team or the community. As developers attempt to build support for their module using separate mailing lists, they become more active, engaging in, and initiating new discussions, developing greater shared meaning with the community. This implies that developers are given the privilege of transitioning to core developers when they engage actively beyond coding; they have to build allies in the community. This implies that in the process of becoming a core member, developers not only learn to just create code but also to craft social relations (Orr, 1990).

To summarize, knowledge providing is one of the two categories of action, the other being knowledge seeking. When members post to the community's shared knowledge space (the mailing list) they are "externalizing" their mental schemas (knowledge) and contributing to the process of creating shared meaning for the community. Similarly, when members undertake knowledge seeking activities they could be either "internalizing" or "externalizing" knowledge. During the internalization, members are actively deciphering the explicit knowledge of the community and this influences their own personal meanings about the community. The act of continuously engaging with the community through knowledge seeking and knowledge providing allows individual members to actively negotiate and develop a shared meaning system with the community.

### **6.3 Action**

The symbolic interactionist perspective views action and meaning making as two sides of the negotiated coin of socialization.

Based on the symbolic interactionist perspective, we had mentioned earlier that the basic building blocks of socialization are action and personal meaning making as depicted in Figure 1. We had further suggested grouping all actions by individual members in OSS communities into two categories: knowledge seeking and knowledge providing. Knowledge seeking actions consist of activities in which the individual member is soliciting knowledge from others to inform his personal understanding of the social situation, here the OSS community. Similarly, we grouped all of those activities by which other members supply knowledge to those seeking it as knowledge providing activities. Needless to say that knowledge seeking and knowledge providing cannot take place in isolation. Moreover, our categorization of actions into knowledge seeking and knowledge providing is not based on the physical act, but on the purpose of the action. To make this clear, take the example of message posting.

Posting to the mailing list can be both a knowledge seeking post and a knowledge providing post. An example of a knowledge providing post is quoted from the work of Duchenaut (2005, p. 346): “No immediate objection [to adding your module to the php library], although there are some other fancy packages around, and IMO you have to explain why it [your module] is better. “ (Guido, February 11, 2002) In this post the community members are clearly providing knowledge to a developer that it is important to justify to the community why his module is better than other competing modules. This post is in contrast to knowledge seeking posts where members ask advice, for instance, on fixing technical snags.

#### **6.4 Meaning Making**

The above discussion suggests that the knowledge providing and knowledge seeking categories of action are mutually interdependent and do not exist in isolation. Moreover, these two categories of action are inextricably intertwined to the shaping of personal meaning. This inseparable coupling between action and personal meaning is itself implied in the term symbolic interaction (Gopal and Prasad 2000). Indeed, in the course of one’s interaction with an open source community, personal meanings are assigned to objects and events based on actions that are undertaken by the individual. Personal meanings with regard to the community’s objects and events emerge out of the action that community members undertake through their interactions with the community they are a part of. These actions, conceptualized here as both knowledge seeking and knowledge providing activities shape the personal meaning community members develop with respect to the community. These interpretations of community events, situations, and objects also in turn influence the future actions of individuals – actions that depend on one’s interpretation of the community at a given point in time. Symbolic interactionism scholars have always supported the notion that the relationship between meaning and action is dialectical and dynamic (Prasad, 1993). This interdependent and continuous interplay between action and personal meaning explicates the meaning making process of individual community members as illustrated in Figure 1.

## **6.5 The Socialization Process**

As previously indicated, we define socialization as the degree of correspondence between the personal meanings of individual members and the shared meanings of the community, resulting from shared and negotiated experience. We posit that higher levels of correspondence between personal and shared meanings reveal greater degrees of socialization for individuals within that community.

While personal meaning making is certainly an important component of the socialization process in open source software communities, it is important to recognize that the meanings and symbols that emerge from this process are not static objects or artifacts, but instead are constantly produced and reproduced through social interactions between community members. In fact, the process whereby symbolism influences and shapes everyday practices is a key notion to the symbolic interactionist position (Prasad, 1993). This notion of enactment refers to the process through which symbolism influences the actions of individuals in given contexts.

The meanings that emerge within the community tend to be negotiated and mutually agreed upon – what we term here as “shared meanings”. These shared meanings affect the personal meaning-making process that each community member experiences. Therefore, the process of socialization is the integrated result of the interplay between individuals’ meaning making process, consisting of action and personal meaning, and the negotiated shared meanings within the community. The above described interplay between action and personal meaning through a negotiation process with other individuals within the community allows members to form shared meanings. The level of socialization of a member is indicated by the extent of overlap between an individual member’s personal meaning derived from the community and the shared meanings that are negotiated and established between its members, which ties back to our initial definition provided in Section 1. The greater the amount of overlap between a community member’s personal meaning and the shared meanings of the community, the greater the level of socialization for that individual. This is illustrated by the overlapping (hatched) area between personal meaning and shared meanings in Figure 1.

## **7. Conclusion**

We started this paper by recognizing the lack of theoretical and empirical work on member socialization in virtual teams, groups, and communities (Ahuja et al. 2003; Bell et al. 2002; Martins et al. 2004). Consequently, we attempted to describe socialization in virtual, normative, and knowledge-creating communities, commonly known as open source software communities, using the social interactionist approach.

We defined socialization as the degree of correspondence, resulting from a shared and negotiated experience, between the personal meanings of individual

members and the shared meanings of the community. A community was defined as an entity consisting of relationships held together by shared interests. Based on our conceptualization of socialization, we posited that higher degrees of correspondence between personal and shared meanings entail greater socialization of members into OSS communities. We believe symbolic interactionism is a particularly appropriate theoretical lens to gain an understanding and explication of socialization, especially as conceptualized in this paper, because of its emphasis on the construction of reality as an interplay between action and meaning in social situations. Indeed, although prior research has begun to identify the various stages of membership that individuals experience in taking part in OSS communities, there remains a lack of theorizing when it come to the specific socialization process at work – a lack that we believe can begin to be addressed in drawing on the symbolic interactionist perspective as accomplished in this paper.

Specifically, we suggest that the socialization process community members experience in open source communities can be best understood as the interdependent interplay between action – comprised of both knowledge seeking and knowledge providing behaviors – and meaning-making – consisting of both the individual meaning-making activities and the shared meanings that evolve from these activities (see Figure 1). In this process we suggests that members undertake knowledge seeking activities to make sense of the OSS communities they are part of. However, as we have implied throughout, knowledge seeking does not take place in isolation, but rather hand-in-hand with knowledge providing. Indeed we argue that individual members who undertake knowledge seeking and knowledge providing activities will develop a shared experience with the community and therefore, their personal meanings and the negotiated meanings of the community are likely to increasingly overlap, indicating member socialization into the community.

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