



## Sense of virtual community: A follow up on its measurement

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### ABSTRACT

Understanding the dynamics of virtual communities has become an important issue for research. One concept that explains the participation in online communities is a sense of virtual community (SOVC), which is based on the offline equivalent sense of community (SOC) and describes a “spirit of belonging together”. Although these two concepts are similar, their measurement is problematic. Inspired by earlier studies, which investigated whether traditional SOC measures are appropriate for measuring SOVC, we adopted the SOC index 2 (SCI2) recently developed by Chavis et al. in a virtual setting. Our aim was to determine whether the refined SOC measurement is more suitable for virtual communities than their forerunners. We tested the SCI2 in a popular German community on 312 respondents. Our results showed that a thorough measure of SOVC still needs further refinement. We also discuss possibilities for improvement.

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### 1. Introduction: discussion on sense of virtual community

Community research has developed from studying offline settings, in which people interact with each other in face-to-face situations, to a virtual arena, where people communicate through information and communication technologies. An in depth understanding of the dynamics of these communities has been identified as an important issue for companies and research. Both offline and online communities have a range of characteristics in common, such as being based on “Gemeinschaft” (Tönnies, 1957) and sharing “social relations marked by mutuality and emotional bonds” (Bender, 1978, p. 145). Their members’ social interaction is directed to a well-understood focus, such as a common aim, shared identity, common belongings, or shared interests (Algesheimer, Dholakia, & Herrman, 2005; Mannarini & Fedi, 2009). Community life is determined by social interaction, geographical area, and common ties (Hillery, 1955). Thus, research on virtual online communities may benefit from existing knowledge about physical communities (Rothaermel & Sugiyama, 2001).

#### 1.1. Sense of community (SOC)

One important concept for understanding offline communities is a sense of community (SOC; see McMillan, 1996; McMillan &

Chavis, 1986; Sarason, 1974). SOC is “a feeling that members have of belonging, a feeling that members matter to one another and to the group, and a shared faith that members’ needs will be met through their commitment to be together” (McMillan & Chavis, 1986, p. 9). SOC consists of four structural and dynamically interacting elements:

- *Membership* includes the self-reinforcing aspects boundaries (i.e. knowledge about who is inside the community), emotional safety (i.e. boundaries that provide protection for intimacy), personal investment (i.e. investments for becoming a valuable member), sense of belonging, identification with other group members, and a common symbol system (Rosenbaum, Ostrom, & Kuntze, 2005).
- *Influence* refers to the members’ perception of impact on the community (which makes a community attractive for formative members), and the amount of influence the community has over the individual member (which fosters a community’s cohesiveness and conformity) (Bess, Fisher, Sonn, & Bishop, 2002; Chavis, Hogge, McMillan, & Wandersman, 1986; Obst, Zinkiewicz, & Smith, 2002; Royal & Rossi, 1996).
- Integration and fulfillment of needs is based on the idea that rewards, benefits, and a kind of reinforcement are necessary parts of being a member of a community and to maintain a positive sense of togetherness (McMillan & Chavis, 1986). The needs of community members can be fulfilled through status of membership, success of the community, and perceived competence of other members (Obst et al., 2002).

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- Shared emotional connection derives from a shared community history, shared events, positive interaction, and identification with the community. The more people interact, the more likely they form close relationships, which subsequently leads to a stronger bond (McMillan & Chavis, 1986).

Several studies have identified SOC as an important enabler for offline community success. SOC was found to increase participation and feelings of belonging (Felton & Shinn, 1992; Hunter & Rigers, 1986), hold community development efforts together (Chavis & Wandersman, 1990), lead to satisfaction with and commitment to the community (Burroughs & Eby, 1998), and enhance involvement and problem focused coping behavior (McMillan & Chavis, 1986).

### 1.2. Sense of virtual community (SOVC)

Understanding SOC as an enabler for offline community interaction has increased the value of the concept for virtual community research. Consequently, the concept of SOC has also been applied to the online context as the concept sense of virtual community (SOVC; see Blanchard, 2007, 2008b; Blanchard & Markus, 2004a; Forster, 2004; Koh & Kim, 2003; Lin, 2007; Welbourne, Blanchard, & Boughton, 2009), in order to explain membership in virtual communities. It is defined as the “members’ feelings of membership, identity, belonging, and attachment to a group that interacts primarily through electronic communication” (Blanchard, 2007, p. 827).

However, virtual communities face a different environment than offline communities; online communities overcome limitations such as synchronosness, physical proximity, or spatial cohesiveness needed for face-to-face interaction. They employ different means of communication to provide a media-rich and playful environment. In addition, they are characterized by anonymity (by means of nicknames or avatars) and the possibility of transgression of one’s boundaries if social sanctions are missing (Schroeder & Axelsson, 2006). These differences raise doubt whether the traditional SOC measures can be applied to virtual settings. Most studies on SOVC either established their own model by means of a qualitative approach (Blanchard & Markus, 2004b), measured the concept differently (Koh & Kim, 2001), adapted the original SCI by adding additional items (Blanchard, 2007, 2008a) or did not directly test the validity and reliability of the SCI in a virtual environment (Obst et al., 2002).

### 1.3. The sense of community index (SCI)

The most commonly used measure for SOC is the sense of community index (SCI) developed by Chavis et al. (1986), which has also been used to study SOVC (Blanchard, 2007; Forster, 2004; Obst et al., 2002). However, results have shown that based on the different environments, the SCI cannot be used for measuring SOVC without adjustments, because existing studies could not confirm the four-dimensional structure of SOVC (Blanchard, 2007) and the SCI cannot lack content validity (Blanchard, 2007). For instance, there is evidence that members of virtual communities feel less influence over other members, but experience a greater number of relationships than members of offline communities (Blanchard & Markus, 2004a). Recently, Chavis, Lee, and Acosta (2008) have refined their measure by developing the SCI2. The revised instrument showed greater reliability of the measures and is now better applicable to intercultural settings. The aim of our study was to contribute to the improvement of measuring SOVC by being the first to use the SCI2 in a virtual community. As the SCI2 better represents the original four-dimension structure of the concept by McMillan

and Chavis (1986), we wanted to determine whether the new version also provides a better measurement of SOVC.

## 2. Methods

### 2.1. Participants

Data collection took place among 312 members of the virtual community “Feierabend.de” (translated “quitting time”), which targets the elderly demographic and is Germany’s most popular and highly awarded virtual community. This specific target group currently represents one of the biggest and fastest growing user-segments of the World Wide Web (Eastman & Iyer, 2004), and will become even more crucial in the future. It has been argued that the Internet increases the well-being of seniors and their sense of community (Sum, Mathews, Pourghasem, & Hughes, 2009). The questionnaire was translated into German, and pretested among 24 selected people who possessed similar characteristics with the members of “Feierabend.de”. Table 1 summarizes the characteristics of the sample. More than two thirds of the respondents used the internet daily, and more than half of the sample has a very high internet usage experience of more than 10 years. Finally, the majority of the participants (81.9%) had at least one virtual friend, and 58.1% had one or more personally known virtual friends, which reflected the participants’ online social relations.

### 2.2. Measures

The sense of community index 2 (SCI2) is based on the first sense of community index (SCI from Chavis et al., 1986) which had been tested and further developed in different types of communities and has investigated different age groups and diverse cultures (Chavis & Pretty, 1999). The SCI2 consists of 24 closed-ended items and is measured using a Likert-like scale (not at all = 0, somewhat = 1, mostly = 2, and completely = 3) (Chavis et al., 2008).

## 3. Results

Given the comprehensive prior research on the construct and its four underlying dimensions, the assumed structure of the hypothesized SOC model is theory-based and specified *a priori* (Baumgartner & Homburg, 1996); therefore, a confirmatory factor analysis (CFA) using structural equation modeling with AMOS 17.0 and a reliability analysis were employed to empirically validate the SCI2 in a virtual context. To assess the global model fit, we drew on the chi-square test, the root mean square error of approximation (RMSEA), the non-normed fit index (NNFI), the comparative fit index (CFI), and the standardized root mean square residual (SRMR) (Baumgartner & Homburg, 1996; Browne & Cudeck, 1993; Hair, Black, Babin, & Anderson, 2010). Overall, the hypothesized model yielded a reasonable fit (see Table 2).

The high positive loadings of each first-order factor (ranging from .94 to .99,  $p < .00$ ) on the second-order factor SOVC indicated that the higher order model accounts for the data well. Additionally, a first-order CFA resulted in high and significant correlations between the four constructs (data not shown).

The local fit indices, including indicator reliability, Cronbach’s  $\alpha$ , and average variance extracted (AVE), were employed to evaluate each of the SOVC dimensions (Baumgartner & Homburg, 1996). Due to poor factor loadings and indicator reliability, nine items of the revised SCI appeared not to be qualified to measure SOVC and were eliminated (see Appendix A). However, the remaining 15 measures suggested a good fit of all four dimensions of the SOVC scale: membership, influence, integration and fulfillment of

**Table 1**  
Characteristics of the sample.

Characteristic		
Gender	Female	65.4%
	Male	34.6%
Age	In years on average	62.7 (sd = 7.5)
	Minimum in years	44
	Maximum in years	88
Internet usage	Daily	68.6%
	Weekly	23.7%
	Less often	7.6%
Internet usage experience	More than 10 years	50.3%
	3–10 Years	43.9%
	<2 Years	5.8%
Virtual friendships	At least one virtual friend in the Feierabend community	81.9%
	At least one personally known friend in the Feierabend community	58.1%

**Table 2**  
Goodness-of-fit statistics.

Statistics	
$\chi^2$	$\chi^2(df = 84) = 259.805, p < .001$
RMSEA	.08
CFI	.94
TLI	.92
SRMR	.04

needs, and shared emotional connection. In addition, the analysis for reliability presented satisfactory results ( $\alpha$  ranging from .69 to .86). Table 3 summarizes the psychometric properties of the remaining items that measured SOVC as well as the results of the CFA and reliability analyses.

#### 4. Contribution to the discussion on SOVC and its measurement

Here, we showed that the SCI2 can be used to measure SOVC, at least better than its predecessor. The results of the present study indicate that members of “Feierabend.de” perceive a SOVC; however not at a salient level. This finding is also represented by the importance of SOC in the virtual community for the participants, since 40% stated that SOVC was important or very important for them. As virtual communities are powerful and innovative forms

of organizations (Shapiro & Varian, 1999), it is important for managers of online communities to consider that online activities can also lead to the development of SOVC. This information can be valuable for the design of successful online communities in order to enhance SOVC and, as a result, increase the outcomes of activities. For example, the question of why some members choose not to participate (lurkers) can be understood and addressed using the SOVC construct. A strong SOVC positively influences the sustainability of a community (Blanchard, 2008b) and leads to higher satisfaction, participation, and commitment within social structures (Burroughs & Eby, 1998).

Examining the dimensions that underlie SOVC, the CFA revealed that the original four factor structure proposed by McMillan and Chavis (1986) can be validated in virtual communities. The four dimensions, including membership, influence, integration and fulfillment of needs, and shared emotional connection provide a good foundation for future SOVC research. This is contrary to the exploratory findings of Blanchard (2008b) who did not confirm the original structure of SOVC, but did report a three factor structure and finally combined 18 items to measure one overall factor. In addition, that study did not analyze the second-order factor structure of SOVC. In contrast, our study validated the four factor structure; however, our findings also suggest integrating the special characteristics of the virtual environment into the measurement instrument. We discuss improvements to the SCI2 below.

**Table 3**  
Psychometric properties and CFA results.

Dimensions items	Mean	SD	Factor loadings	Indicator reliability	Cronbach's $\alpha$	AVE
<i>Membership</i>						
MEM1: I get important needs of mine met because I am part of this community	1.48	0.77	.64	0.42	0.75	0.53
MEM5: When I have a problem, I can talk about it with members of this community	1.14	0.91	.70	0.49		
MEM6: People in this community have similar needs, priorities, and goals	0.83	0.89	.80	0.65		
<i>Influence</i>						
INFL1: I can trust people in this community	1.29	0.89	.78	0.61	0.70	0.53
INFL3: Most community members know me	1.02	0.87	.68	0.46		
<i>Integration and fulfillment of needs</i>						
IFN1: Fitting into this community is important to me	1.29	0.84	.73	0.54	0.86	0.56
IFN2: This community can influence other communities	1.47	0.78	.70	0.49		
IFN4: I have influence over what this community is like	1.56	0.89	.83	0.68		
IFN5: If there is a problem in this community, members can get it solved	1.50	0.91	.75	0.56		
IFN6: This community has good leaders	1.43	0.79	.70	0.49		
IFN7: I feel like I belong to this community	1.45	0.85	.75	0.52		
<i>Shared emotional connection</i>						
SEC1: It is very important to me to be a part of this community	1.05	0.84	.86	0.74	0.86	0.56
SEC2: I am with other community members a lot and enjoy being with them	1.44	0.85	.66	0.43		
SEC3: I expect to be a part of this community for a long time	1.79	0.83	.73	0.53		
SEC5: I feel hopeful about the future of this community	1.59	0.92	.79	0.62		
SEC6: Members of this community care about each other	1.40	0.81	.70	0.49		
SEC7: I feel like I belong to this community	1.45	0.85	.75	0.52		

Note: all factor loadings are significant at  $p < 0.001$ .

#### 4.1. Improvements to the sense of community index 2 (SCI2)

First, virtual communities, such as “Feierabend.de”, have a high number of members (163,220 as of May 2011), which leads to the participants having little knowledge about each other. These groups are often too large for measurements concerning the entire community to be applicable. Further, the majority of individuals participate quasi-anonymously in such virtual communities. In addition, the primary online activity of Feierabend.de members is searching for information, which does not require a strong SOVC. This social construct is based on boundaries that provide protection for intimacy and emotional safety. In particular, emotional safety is guided by the mutual trust that members act with integrity and common interests will be protected by the group leaders (Royal & Rossi, 1996). The observed virtual characteristics, such as anonymity, do not provide these conditions to the same extent as face-to-face communities do. Moreover, these characteristics and a high level of SOVC are not necessarily mutually exclusive, but they influence the assessment of SOVC as well as the requirements for an adequate measurement scale, which is reflected in the findings of this study.

With regards to the dimension membership, for example, it is not feasible for an individual to know whether all other community members value the same things (MEM2). Furthermore, the members’ needs in such a large community may differ tremendously and cannot be satisfied on an individual level. As a result, item MEM3 had to be dropped. Being part of such a vast crowd of anonymous members does not automatically lead to individual well-being. Therefore, item MEM4, which measured whether individuals feel good because of their virtual community membership, is not an appropriate SOVC measure.

The factor “influence” showed the highest discrepancy and was reduced to two items, trust and the perception to be recognized by others. All other items had to be dropped. First, measuring the recognition of most of the other 163,219 Feierabend.de members (INFL2) was not appropriate and had to be dropped. Instead, future studies that ask users how well they know a certain number of other members may be more appropriate. Next, the item INFL4 was supposed to measure the symbols and expressions of membership (e.g. clothes, signs, art, architecture, logos, landmarks, and flags). Expressing such symbols is hardly feasible in an online setting; however, a meeting in real life offers many possibilities for these types of exhibitions, which are mostly physical. Instead, asking the virtual community members for other shared symbols, rituals, and traditions (Muniz & O’Guinn, 2001) appears to be more adequate for the virtual setting. To become a member of the community under study, little time and effort is needed. Although such communities are often huge, it is mostly a much smaller group of active members or established subgroups who invest into the general functioning of the community. Most of these members have stronger bonds with the small group than with the larger community (Bagozzi & Dholakia, 2006). Hence, it is not surprising that item INFL5 did not measure SOVC and had to be dropped. Surprisingly, item INFL6, which measured the role of the community membership for one’s identity, did not present a reasonable measure of SOVC either. SOC and the theory of social identity (Tajfel & Turner, 1986) highlight the importance of the perceived membership in communities, since it states one part of the social self (Hogg, Terry, & White, 1995). We assume that the anonymity within virtual communities is the main reason for the relatively low significance of an identity perspective. As “the Internet is only a space for identity play as far as the boundaries between online and offline is sustained” (Hine, 2000, p. 120), participants can be expected to reveal a different, virtual identity in an online community, and disguise facets of their real-life identity while exposing others. The coexistence of both identities in item INFL6 could be a valuable construct enhancement. It is possible that the dimension influence is not as

important in the virtual online context as it is in real life communities, which have many face-to-face encounters. Further research into the interplay of influence and SOVC is therefore needed.

The characteristics of virtual communities might be the reason why item IFN3, which measured the dimension integration and fulfillment of needs, had to be dropped. This item measured how much the individual cares about what other community members think of him/her. However, in the case of virtual communities, the group of ‘other’ community members can be thousands of individuals or more. Therefore, we suggest adapting the item to “. . . what other community members I am in touch with regularly think of me” for measuring SOVC.

Finally, sharing important events together (e.g., holidays, celebrations, or disasters) is related to the dimension of shared emotional connection; however, it is difficult to create a shared emotional connection in a virtual context. Many decisive markers of experience, such as atmosphere, face-to-face interaction, or sensory perception of touch or smell, are absent in cyberspace. Rather, people spend and share such happenings with peers in real life, meet and interact with them, and try to be close to each other. Adapting item SEC4 slightly to “. . . have talked about/discussed experiences such as. . .” offers a more appropriate measurement.

In conclusion, the excluded items reveal special characteristics of communities in the virtual environment and should be further adapted to this context when measuring SOVC in future studies. The cross-sectional design of the study can be considered a limitation, but also a starting point for further research. We suggest additional item refinement by adopting qualitative research methods that assess what constitutes SOC in an offline context and compare it with SOVC in a large anonymous community, in an anonymous subgroup of a large community, and in non-anonymous social networks (such as Facebook or LinkedIn). Alternatively, it might be helpful to address subgroups within the community as well. Furthermore, the opportunity to enter virtual communities quasi-anonymously provides another starting point for the refinement of SOVC measures.

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#### Appendix A. Excluded SCI2-items

MEM2	Community members and I value the same things
MEM3	This community has been successful in getting the needs of its members met
MEM4	Being a member of this community makes me feel good
INFL2	I can recognize most of the members of this community
INFL4	This community has symbols and expressions of membership such as clothes, signs, art, architecture, logos, landmarks, and flags that people can recognize
INFL5	I put a lot of time and effort into being part of this community
INFL6	Being a member of this community is a part of my identity
IFN3	I care about what other community members think of me
SEC4	Members of this community have shared important events together, such as holidays, celebrations, or disasters

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