

December 2007

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Recommended Citation

Rosenkranz, Christoph and Feddersen, Christoph, "Managing Virtual Communities - A Case Study of a Viable System" (2007).
AMCIS 2007 Proceedings. 34.
<http://aisel.aisnet.org/amcis2007/34>

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Managing virtual communities - a case study of a viable system

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Abstract

Virtual communities play an important part in enabling people with common interests to interact with each other. Current research mostly focuses on the aspects of social interaction, usability and success factors for virtual communities. In this paper, we focus on the management of virtual communities. Within a case study, we examine the development of a management team of a non-commercial virtual community of interest. We match our findings with the Viable System Model, generate and test hypotheses based on this model and draw conclusions. Data from the case study are used to illustrate the theories and to demonstrate principles for community management derived from the application of the Viable System Model.

Keywords

Online communities, virtual communities, Viable System Model, virtual community management.

Introduction

Although virtual communities allow people of like interests to come together with little cost, help them exchange ideas and coordinate their activities, and provide the kind of identification and feeling of membership found in face-to-face interaction, the relative novelty of the Internet as a medium means that the rules and practices that lead to a successful virtual community are not yet well known or set fast in a codified formal system (Sharp 1997).

This paper focuses on the role of *management* of virtual communities for their success. The research question posed is: "What factors contribute to the successful management of virtual communities?" Our contribution especially considers non-commercial communities of interest or leisure time communities (Hagel and Armstrong 1997; Schubert and Ginsburg 2000). These communities are extremely popular on the Internet where the number of bulletin boards, discussion groups, and other chat-boxes is enormous (Rheingold 1993). To address this, we first focus on what virtual communities and community management are and then proceed to analyze our case study findings of a non-commercial virtual community of interest.

The structure of this paper is as follows. The theoretical base for the research is discussed in the second section covering literature contribution, with hypotheses derived from this discussion. Within the third section of the paper, a longitudinal case study is introduced with information acquired by participant observation and interviewing the community management team. The fourth section of the paper analyzes the case study in terms of the Viable System Model, based on stakeholders that exist within the task-environment. Using case study findings, design principles for virtual community management are discussed. The final section summarizes the findings of the paper and draws conclusions for the research.

Literature Review

Virtual Communities

The literature offers several different definitions of virtual or online communities (Preece 2000; Rheingold 1993). Communities are groups of people who share a concern, a set of problems, or a passion about a topic and who deepen their knowledge and expertise in this area by interacting and communicating on an ongoing basis (Cohendet et al. 2004, p. 30; Lee et al. 2003; Li 2004; Wenger et al. 2002, p. 4). Along with (Preece 2001, pp. 347-350), we use the terms online community and virtual community as synonyms which mean "any virtual social space where people come together to get and give information or support, to learn, or to find company." In this paper, we especially consider non-commercial virtual communities of interest that act as a mechanism for supporting conversation and communication about a topic or a passion.

Most research on virtual communities focuses on the role of information technology in enabling people to interact with each other (Burnett 2000; Preece 2001), factors of usability and sociability (Preece 2001), facilitation tasks for communities (Tarmizi and Vreede 2005), and what principles make communities successful (Bourhis et al. 2005; Kollock 1996). For example, (Porra and Parks 2006) suggest that virtual community sustainability requires persistent people, continuous support by an online space, and flexibility for alternative sub-communities to emerge. (Ginsburg and Weisband 2002) conclude from their survey that volunteerism is an important aspect for a virtual community's success. Based on research literature in sociology, psychology and political science, (Kollock 1996) proposes several design principles for virtual communities. Using work by (Ostrom 1990) and (Godwin 1994), he concludes that features of physical communities should be incorporated into virtual communities. For example, design principles related to the management of successful communities are that most individuals affected by community rules can participate in modifying the rules, a system for monitoring members' behavior exists, this monitoring is undertaken by the community members themselves, and a graduated system of sanctions is used. (Bourhis et al. 2005) argue that virtual communities vary in terms of their basic characteristics, that "one-fits-all" advice on how to manage and sustain virtual communities is not appropriate, and that management practices should be put into place to counter the challenges due to a specific combination of structuring characteristics.

However, little research has focused on these management practices, the controlling and coordination of virtual communities and their community management team, and the observable information channels and possible design principles for community management teams (Fontaine 2001; Wenger et al. 2002, p. 80). In this role, a community management team organizes all administrative tasks in the virtual community and supplies a framework for interaction. The framework is controlled by the community management team and focuses on supporting the community, e. g. by providing an adequate infrastructure for interaction and communication.

The Viable System Model

(Ghant and Ashby 1970) made the point that in order to regulate (control) a system well, the regulator must work through a model of that system. And a model of a system must model every salient aspect or interesting feature of that system. In fact, this is a restatement of Ashby's Law of Requisite Variety: only variety destroys variety (Ashby 1964, p. 207). Variety is the number of possible states of a system and therefore a subjective measure for complexity. Following the Conant-Ashby-Theorem and the Law of Requisite Variety, for a system to remain regulated (controlled), it is vital that the controlling element (the management) has as much variety as the element it is to control. Consequently, from a systemic point of view, the evaluation of management practices, information systems, and information channels respectively becomes of great importance for management to adjust variety accordingly.

In order to model and analyze the information channels of a virtual community management team and to provide a rigorous theory for backup, we propose to apply the Viable System Model (VSM) (Beer 1979; Beer 1981; Beer 1985). According to (Beer 1985, pp. 1-16), the VSM specifies the minimum functional criteria by which a given organization (e. g. a company, an institution, or a community) can be said to be capable of independent existence. The VSM has its roots in cybernetics and describes the necessary organizational structure that is needed for a system to survive in a constantly changing environment. The VSM consist of five main components (cf. Table 1), or sub-systems, and information channels between the sub-systems which need to be designed with respect to Ashby's Law of Requisite Variety. The essential principle for structuring within the VSM is based on recursion: each sub-system needs the same structure as the whole system, each level of organization is a recursion of its super-system (Beer 1979, p. 68). A system is viable if it is able to maintain its configuration over some time.

The VSM has been previously applied in various research approaches in management science (Espejo and Harnden 1989; Flood and Carson 1993; Jackson 2000). In information systems research, the VSM has been used especially in the context of information systems development (Kawalek and Wastell 1999; Mumford 2003; Vidgen 1998). From our point of view, the VSM serves as an underlying theory in order to map the necessary information channels within a virtual community management team, and therefore helps in the process of building a model for controlling and managing the framework of interaction. By applying the VSM in our case study, we demonstrate why the VSM is appropriate for modeling information channels and communication within virtual community management teams. We show that it allows us to identify factors that contribute to the successful management of virtual communities and helps us to formalize and propose general design principles for community management teams.

Although other theories for explaining organizational behavior exist (e. g. Agency Theory, cf. (Hatch 1997) for an overview of several organization theories), we choose the VSM due to its simplicity and its focus on control and information flows (Mintzberg 1979, p. 37). While setting up the case study the following hypotheses about factors and design principles for successful virtual community management were generated based on the research question as well as on considerations from the VSM.

- (H1) Successful virtual community management teams employ empowerment and grant authority for decision-making on different levels of recursion (System Three and System One) within the management team.
- (H2) Successful virtual community management teams ensure that most of the community members that are affected by community rules are able to participate in modifying these rules by contributing to System Five of the virtual community management team.
- (H3) Successful virtual community management teams manage to cope with organizational complexity by introducing the functionality of System Two for the coordination of the management team.
- (H4) Successful virtual community management teams monitor members' behavior through the community members themselves and a graduated system of sanctions is used.

In the following, we will use the case study and exemplarily sketch the management of a German non-commercial virtual community over a longer period of time to describe the development of a virtual community management team in detail.

Table 1. Components of a Viable System Model

<i>System</i>	<i>Description</i>
System One	On each recursive level, operational units are responsible for parts of an organization's activities and have contact to the outside environment. The operational units are each managed by a divisional management unit. All operational units and divisional management units on one level of recursion together form System One.
System Two	Each System Two conducts a kind of service function for System One and serves to damp oscillation and other disruptions that occur between the operational units on an operational level.
System Three	System Three supervises all internal operational activities of all operational units from a higher point of view of the total system. It optimizes the allocation of resources, assigns them to the operational units and regularly checks the use of these resources.
System Three*	System Three* is the audit channel, which gives System Three direct access to the state of affairs in the operational activities. System Three can obtain immediate information by using System Three*, instead of relying on information passed to it by divisional management.
System Four	System Four deals with the diagnosis of the long-term connection of a viable system to its outside environment and its adaptation to future trends.
System Five	The ethos of the whole viable system is formed by System Five. It embodies supreme values, rules and norms for the stabilization of the whole system.

A Case of Successful Virtual Community Management

Research Approach and Methodology

We focus on how the sub-systems and information channels of an exemplary virtual community management team actually work in practice. Since one of the researchers was part of such a team, we had full access to the operational processes and information systems. Job descriptions, print-outs of team meeting protocols, discussion threads, log-files, interview protocols of team member interviews, and field notes of the researchers were collected in a project diary. In addition, we reinterpreted an existing survey among community members and the community management team (Panhoff 2003). The diary served as the main source of data. Our interpretive understanding was refined by insights gained from operational experience and observation of actual activities. We applied the VSM as a theory for matching our interpreted data and analyzing the case study with regard to the generated hypotheses.

Following this, our research approach is characterized by three roles that the researcher adopts: construction of data, interpretation of data and matching to theory (Rosenkranz and Holten 2007). After having created a subjective understanding of everyday meanings and common sense within the observed organization, which provides the basis for the interpretive understanding, we create a positivist understanding in order to explain the empirical reality – the explanation being a scientific theory which can be tested against the subjective meaning as recorded in the interpretive understanding (Lee 1991).

HDRF – An Overview

HDRF (<http://www.herr-der-ringe-film.de>) is the largest German web site and community concerned with the movies of Peter Jackson based on J.R.R. Tolkien's book 'The Lord of the Rings'. The community of HDRF can be characterized as a community of interest or leisure time community. HDRF binds together a group of people who share an expertise and a passion about Tolkien's books and the movies. HDRF offers its members the possibility to communicate with one another and to use various participatory mechanisms to provide information and feedback. Today, HDRF includes an edited news site, a bulletin board system, chat rooms, a wiki-based encyclopedia edited by community members, and an image gallery for user-uploaded images. In January 2007, over 18,000 users have registered a nickname at HDRF, with ~1,000 active users at the bulletin board and ~100 regular users in the chat rooms. The website is non-commercial, although some advertisement and sponsorship contracts exist to cover the costs for the technical infrastructure and traffic. Table 2 summarizes the development of HDRF's community management team in terms of the VSM.

Generation 1: 1997-2000

In 1997, a student of journalism (Admin A) was fascinated by the rumors about the upcoming movies. Consequently, he founded his own web site and started to post news concerning the movies. Admin A used free web space providers and pages in standard Hypertext Markup Language. He also included a newsletter, a bulletin board and a chat room. The bulletin board and the chat room were not moderated. The chat rooms provided an option to register a nickname and soon regular visitors to the chat rooms began to form a first small community. No terms of use besides general netiquette existed.

The maintenance of the news site consumed a lot of time for Admin A. During spring of 2000, he was joined by a reader of his news site (Admin B). Since he was only interested in the news, Admin B originally did not participate in the community. Admin B programmed a small content management system with dynamic content generation. This allowed Admin A to focus completely on content and to largely ignore technical issues. Around the same time, a member of the chat community (Admin C) joined the team. This indicated a significant change for the community aspect of HDRF. Before, Admin A and B were mainly focusing on the news site. Now Admin C provided technical expertise paired with an interest in community aspects.

Generation 2: 2000-2001

This partnership resulted in a complete redesign of HDRF. First, the team moved chat rooms and news site to a dedicated server. A deal with the provider ensured that traffic costs were being paid in exchange for advertising. Second, Admin A and C asked some regularly visiting community members to act as chat operators. As terms of use for the chat rooms, the operators discussed and designed rules for appropriate behavior which they monitored. Furthermore, the bulletin board became a subgroup of an existing bulletin board community. Admin A, B and C became moderators of this subgroup. All users had to accept the terms of use of this bulletin board in order to register a nickname and to post messages. During this period, communication and coordination between the team members relied mainly on email, instant messaging and chat.

As the release of the first movie in December 2000 got nearer, page views for the news site went up to around four million per month, with traffic costs around 3,000 EUR per month. At this time, ~5,000 users were registered at the bulletin board, with the majority visiting the HDRF subgroup. This dramatic increase in traffic, visitors and registered users started to generate problems for the technical infrastructure of HDRF and the workload of the community management team. Regularly, the web server crashed due to the dynamic generation of the news site's content which was not designed with scalability in mind. The bulletin board slowed down due to the massive increase in users and new messages in the HDRF subgroup. In addition, it became clear that a single subgroup focusing on the upcoming movies did not suit the community's need to discuss several related topics. Furthermore, Admin B and C were constantly working on technical problems with the news site and at the same time trying to moderate the subgroup. With rising numbers of community members came rising problems of unwanted behavior, copyright violations and breaches of the terms of use.

At the same time, Admin C started to work at a small software firm that specialized in content management systems. As a result, HDRF was able to use a professional and scalable content management system for free. This resulted in the decision of the team to migrate to the new content management system and to undertake a second complete redesign of the technical infrastructure.

Generation 3: 2001-2004

At the beginning of 2001, the bankruptcy of their provider triggered the final decision to implement the new infrastructure. First, the management team asked the community members to donate money for the purchase of a new server. The money

that was needed was gathered in a short period of time. The new server hosted the news site using the new content management system, a new bulletin board system which supported multiple subgroups and the chat rooms. Nonetheless, traffic costs were still rising. This required the management team to think about possible revenues and marketing, which became the responsibility of Admin C. Since the team was not interested in becoming a commercial website, an exclusive contract was signed with a fantasy online shop. In exchange for premium advertising, HDRF participates in the sales and the online shop shop pays the traffic costs.

Based on personal relationships and experience, five community members were asked by the management team if they would like to act as moderators for the new bulletin board. Some chat operators also became bulletin board moderators. The tasks of the moderators resemble the tasks of the chat operators: to secure appropriate behavior and compliance with board rules, to delete unwanted messages that collide with the board rules, to moderate discussions, to help new community members and to carry out sanctions and actions such as first warning messages and temporary or permanent banning of community members who constantly violate the rules. In order to ensure legal requirements and appropriate user behavior, terms of use for HDRF, board rules and chat rules were jointly designed by the operators and moderators. Since they were not responsible for moderation anymore, Admin A, B and C labeled themselves as administrators. Admin A focused on the news site and Admin B and C on technical issues and team management.

With a growing management team (~14 team members in February 2001), coordination and communication became important. As a consequence, Admin B and C created three subgroups with restricted access within the bulletin board: one for moderators, one for operators and one for the complete community management team. Within these subgroups, team members are able to discuss topics regarding their operational tasks and community management in general. Furthermore, in order to facilitate operational coordination among moderators a forum management system was implemented. This allowed moderators to let the other moderators know which subgroup has been moderated by whom at which time. Standard operating procedures, guidelines for a graduating system of sanctions and the active encouragement of junior team members to independently make decisions helped to facilitate an empowerment process. Today, decisions are made autonomously by the moderators for the bulletin board and by the operators for the chat rooms, with the administrators having power of veto in all areas.

In December 2002, shortly before the release of the second part of the movie, HDRF had over 40 million page requests. In January 2003, over 8,200 users were registered at the bulletin board, which now offered 17 subgroups in total. With moderators and chat operators spending more and more time dealing with unwanted behavior, the positions of co-moderator and channel operator were introduced in order to help new community members and to moderate the discussions as regards content. Again based on personal relationships and experience, the moderators and chat operators jointly chose community members whom they trusted and asked them to moderate a subgroup or channel. Thus, the moderators and chat operators stayed responsible for the bulletin board and the chat rooms respectively as a whole, whereas the co-moderators and channel operators became responsible for specific subgroups and channels. Furthermore, Admin C and three other volunteers formed a technical support team for both the management team and the community members. Besides planning and maintaining the technical infrastructure and the development of features for the community, the technical support team maintains an incident management system for tracking technical problems.

In order to inform the management team of upcoming events and projects and to discuss important problems, weekly team chats were introduced in 2003. Furthermore, out of a desire to meet in person, but also to discuss coordinatory problems and to work together on the future of the community, a first face-to-face team meeting took place in 2002 for one week-end, which subsequently became a yearly institution. At these meetings, issues of all kinds are discussed and workshops address special issues (e. g. convention events, or results of user surveys). Results of the team meetings helped to add new interaction features. For example, subgroups for the coordination of regular local get-togethers of community members (2002), the image gallery (2003), or the wiki-based encyclopedia (2004) were added due to results of the team meetings. In addition, two volunteers joined the team in order to support the organization of the management team (e. g. maintenance of job descriptions, coordination of team meetings, or project management).

Generation 4: since 2005

Although some members have left the management team, HDRF is still an active community. In 2007, the management team consists of administrators, moderators and co-moderators, operators and channel operators, image gallery moderators, technical support staff, and wiki administrators (~30 team members). Coordination is mostly carried out within the organizational subgroups, the team chats, and through bilateral communication, e. g. by email. Formal definitions of standard operating procedures and job descriptions exist and are refined. Plans for the future of the community include personal blogs for community members and other user-generated content.

Table 2. Development of HDRF's management team in terms of the VSM

<i>System</i>	<i>Generation 1 (1997-2000)</i>	<i>Generation 2 (2000-2001)</i>	<i>Generation 3 (2001-2004)</i>	<i>Generation 4 (since 2005)</i>
System One	A: news site, B: bulletin board, C: chat rooms	A: news site, B: bulletin board, C: chat rooms	A: news site, B: bulletin board, C: chat rooms, D: wiki, E: image gallery	A: news site, B: bulletin board, C: chat rooms, D: wiki, E: image gallery
System Two	-	TWO: non-scheduled information exchange via email, chat, telephone, instant messaging, private messages 2: C - rules for chat operators	TWO: team meetings, team chats, subgroup for team discussions, technical support team, email, instant messaging, private messages, job descriptions, standard operating procedures 2: C - subgroup for operator discussions, rules for chat operators; B - subgroup for moderator discussions, rules for moderators, forum management system	TWO: team meetings, team chats, subgroup for team discussions, technical support team, email, instant messaging, private messages, job descriptions, standard operating procedures, incident management system, team organizers 2: C - subgroup for operator discussions, rules for chat operators; B - subgroup for moderator discussions, rules for moderators, forum management system
System Three	THREE: Admin A	THREE: administrators 3: A - Admin A; B - moderators; C - operators	THREE: administrators 3: A - Admin A; B - administrators, moderators and co-moderators; C - operators and channel operators	THREE: administrators 3: A - Admin A; B - moderators and co- moderators; C - operators and channel operators
System Three*	THREE*: Admin A	THREE*: administrators	THREE*: administrators	THREE*: administrators
System Four	FOUR: Admin A	FOUR: administrators 4: B - moderators and administrators; C - operators and administrators	FOUR: administrators, workshops at team meetings, user surveys, evaluation of member feedback 4: B - moderators and administrators; C - operators and administrators	FOUR: administrators, workshops at team meetings, user surveys, evaluation of member feedback 4: B - moderators and administrators; C - operators and administrators
System Five	FIVE: Admin A, netiquette	FIVE: administrators, netiquette 5: B and C - terms of use (adopted from host board and self-devised for chat rooms), administrators	FIVE: administrators, netiquette, team meetings 5: B and C - terms of use (self-devised for bulletin board and chat rooms), administrators	FIVE: administrators, netiquette, team meetings 5: B and C - terms of use (self-devised for bulletin board and chat rooms), administrators
<p>Label in capitalization (e. g. TWO): first level of recursion (HDRF as system in focus)</p> <p>Label in numbers (e. g.2): second level of recursion (e. g. bulletin board as system in focus)</p>				

Analysis of the Community Management Team using the VSM

As the dimension for the levels of recursion within the VSM, the functions carried out by the community management team were chosen since we decided that for the research objective a team-oriented analysis was required. Figure 1 sketches an excerpt of the resulting VSM of the management team in Generation 4. The sub-systems of the first level of recursion are labeled in capitalization (e. g. System One as “ONE”), whereas the second level of recursion uses numbers (e. g. System One as “1”).

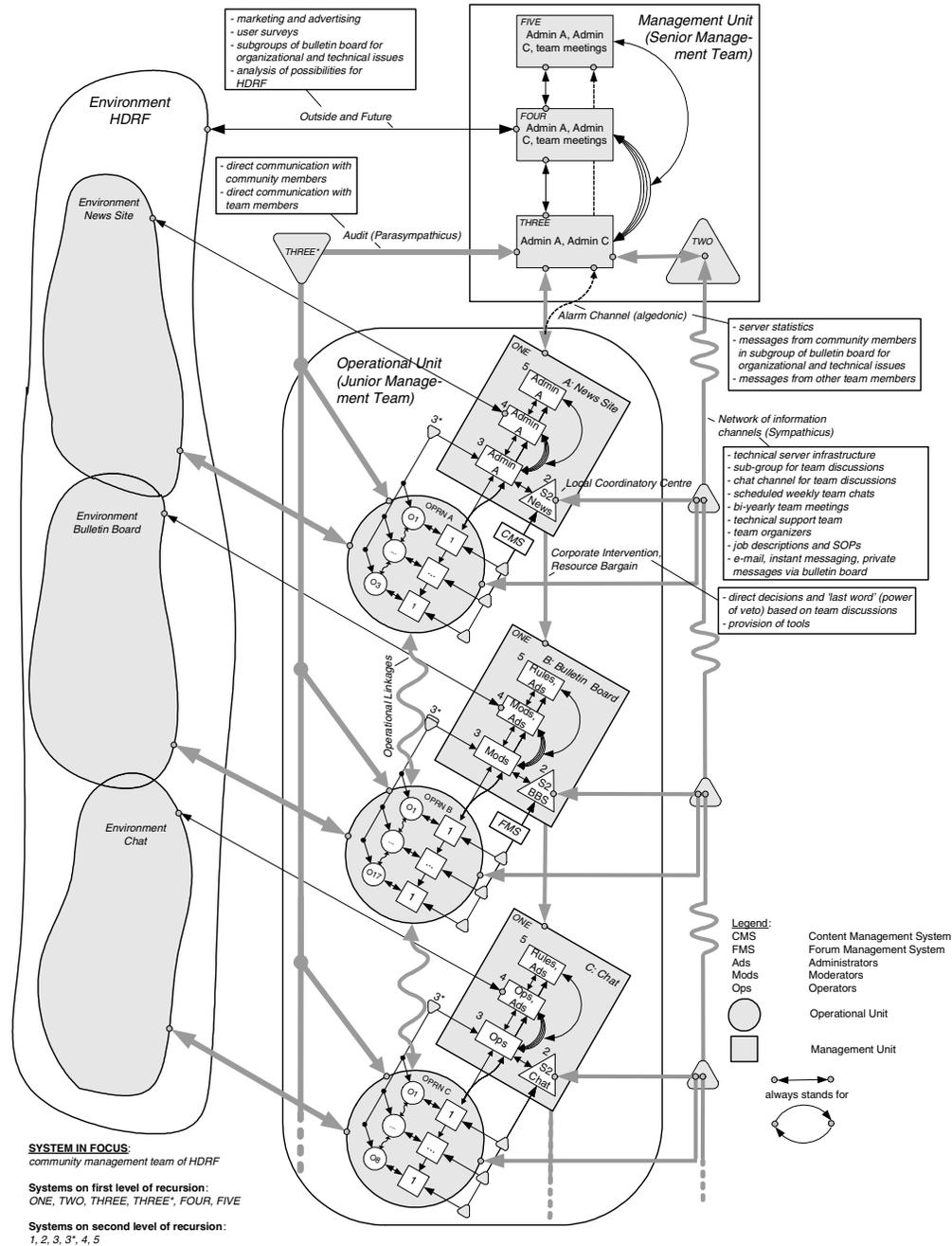


Figure 1. VSM of HDRF (excerpt for Generation 4)

HDRF was first created as a simple web site. Due to the fact that tools for interaction were created around this content-oriented web site a community started to form. The management team had no experience with organization and management of a virtual community and no knowledge about the technical requirements of a growing virtual community. Knowledge and

expertise in both areas were gained by hands-on experience. However, HDRF resorted to typical organizational instruments (Mintzberg 1979, pp. 65-181). The management team adjusted the variety transported to the sub-systems several times by introducing new sub-systems and information channels. In parallel, delegation and specialization led to autonomous decision-making in the operational units (System ONE) and consequently allowed the administrators to focus on the balancing of resources and the coordination of the whole community management team (System THREE) as well as on the future development of the community (System FOUR). Standardization and elements of bureaucracy (standard operating procedures and job descriptions) and mechanisms for coordinatory discussions were introduced (System TWO). In contrast, the overall strategy did not follow standardized ways: decisions of the whole team were reached during discussions at the team meetings. The administrators are in charge of coordinating HDRF as a whole. Meanwhile, autonomous decision-making at the level of the operational units takes place within the framework provided by the administrators and the team meetings (System FIVE). At HDRF, community members are only able to indirectly participate in modifying community rules, e. g. by making suggestions in the subgroups for organizational issues, or by being asked to volunteer for the team (System FIVE). Moreover, although community members can complain to moderators or operators about members' behavior, the monitoring is primarily undertaken by the management team. The graduated system of sanctions can only be applied by the moderators and operators. Moderators and operators are chosen by the team from among the community members. As a result, community members do not directly monitor other members' behavior.

(Ginsburg and Weisband 2002) conclude from their survey that volunteers encourage and enable intense interaction for the benefit of all the membership subgroups and provide the key to a virtual community's business success. According to our findings at HDRF, we agree with this. Although HDRF is a non-commercial virtual community, it would not exist in its current form without the efforts of the community management team. Survey results indicate that the work of the community management team is being accepted and appreciated, as the high acceptance rate among community members shows: of 327 community members that took part in the survey, 65% (213 members) had contact with volunteers and rate their experience with volunteers high and 90% (295 members) think that the work of volunteers is important for the community (Panhoff 2003).

The purpose of the community management team is to provide a platform, an infrastructure and a framework of rules for the interaction. The work that the volunteers of the community management team undertake is described by (Beer 1985, p. 81) as variety engineering. Each line or information channel of the VSM in Figure 1 is a two-way communication loop of variety attenuators and amplifiers. Attenuators and amplifiers do have to be designed; when they are not designed, they simply occur because Ashby's Law asserts itself (Beer 1979, p. 92). Consequently, their design is of special interest for successfully controlling a community management team. Therefore, in the next section, we propose design principles based on our case study findings. The following examples should not be understood as complete in any sense.

Discussion of General Design Principles for Virtual Community Management

- *System One – the community functions*: unique, interesting content in the operational units is the essential starting point (e. g. a news site). Furthermore, different interaction tools shape the other operational units (e. g. chat, bulletin board, or wiki). Each operational unit should be managed autonomously within the framework provided by the management team and the team members responsible for divisional management should be involved in the sub-community. It is important to notice that the community members and the user-generated content become more and more important over time. Scalability of the technical infrastructure of the operational units should always be kept in mind.
- *System Two – coordinating the team*: the coordination of the community management team needs a regulatory center and adequate information channels. Standard operating procedures and job descriptions act as variety attenuators, whereas collaboration software, team discussion subgroups and weekly team chats serve as variety amplifiers. The technical infrastructure should be managed by a technical support team with technical expertise. An important job is that of the team organizers who keep an eye on ongoing projects, maintain job descriptions and standard operating procedures and coordinate team meetings. In addition, Systems Two are important on lower levels of recursion, e. g. in form of guidelines for moderators and operators, forum management systems and internal discussion subgroups.
- *System Three – structure for internal decision-making*: empowerment helps to deal with decisions on the appropriate levels of recursion. For example, moderators and operators act as divisional management for their operational unit. If necessary, a third level of recursion should be introduced (e. g. channel operators and co-moderators). Final decisions for the whole of the community management team rest in the hand of the landlord of the community, who has the final authority and the power of veto. This is the 'deal' by which some degree of autonomy is agreed between the senior management and its junior counterparts. The bargain declares: out of all the activities that System One elements might

undertake, *these* will be tackled (and not *those*) and the resources negotiated to these ends will be provided (Beer 1985, p. 38).

- *System Four – decision-making for the future:* decisions that deal with the future of the community and the community management team as a whole should be made jointly, as no landlord can possibly know everything that is happening in System One. Therefore, team meetings and workshops provide a place for discussions on the future of the community. User surveys are a good preparation for these decisions: what do our community members want? What are areas of concern? Where can we improve? Furthermore, in non-commercial communities, the management of marketing and advertising becomes an important job with growing numbers of community members and rising costs for the technical infrastructure and the provided services.
- *System Five – ethos and spirit:* the values and norms that shape the interaction of the team members are of special importance. For example, the final word is the privilege of the founder and landlord, whereas the team members responsible for the operational units decide autonomously on the level of System One. A consensus existing among the whole management team is reflected in the terms of use and the self-imposed rules and guidelines. It is possible to create an area of trust among the team by selecting volunteers based on personal relationships and friendships. At the end, the *modus operandi* of System Five (e. g. democratic, autocratic, oligarchic etc.) determines the implementation of the other sub-systems.

Summary and Outlook

Based on a real case scenario at HDRF we introduced the organization of a virtual community management team. The VSM was applied to structure the analysis of existing information channels within the management team. We argue that the VSM is exceptionally suitable for analyzing the organization and communication between all stakeholders. In examining contributions of this research to virtual community management, we can conclude that HDRF is a viable virtual community and that the community management team shows the invariances described by (Beer 1989). General design principles for virtual community management have been derived from these findings. The primary contribution of the VSM was that it helped stakeholders and researchers to challenge their previous assumptions regarding the flow of information between operational units and individuals in the virtual community management team. Thus everybody was able to see the big picture, the actual flow of information to and from the operational units, and the impact on other systems of the VSM. The VSM and the deduced design principles are no magic bullet, but provide a language to analyze a given situation in detail and to identify possible bottlenecks within a virtual community management team.

As regards the initial hypotheses (H1) and (H3), both have been corroborated according to our findings. The community team of HDRF successfully employed empowerment on different levels of recursion and made use of System Two for reducing organizational complexity. Furthermore, we could show that community member participation in modifying community rules is not necessarily a prerequisite for successful community management. At HDRF, community members are only able to indirectly participate in modifying the rules, e. g. by making suggestions. Consequently, the experiences made in the case study do not support the hypothesis (H2). Furthermore, monitoring and sanctioning of member behavior are primarily undertaken by the management team and not by the community members themselves (H4).

We like to point out that our study has several limitations. It is exploratory and the corroboration of our hypotheses is not a validation of the relationship between the structure of the VSM and successful virtual community management. Since we examined only one single case for the single domain of communities of interest in detail, the suggested principles need to be examined in a cross-case analysis. Another suggestion is to use the findings and apply the design principles in an action research approach. Additionally, we propose that it would be useful to employ the VSM as a meta-language in order to compare different virtual communities' management teams. Future research will aim at addressing these issues and at applying the concepts to other cases and domains (e. g. commercial communities, where team members are not necessarily volunteers but employees).

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