

Boundary Management in Online Communities: Case Studies of the Nine Inch Nails and ccMixter Music Remix Sites

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Online communities foster unprecedented creativity, but at the same time they challenge the contemporary organisational boundary literature. They represent a new kind of non-traditional, nonhierarchical organisation where boundaries go beyond efficient (economic and legal) transaction logics to include boundary logics of identity, power and competence that need to be integratively managed. Moreover, these boundaries are not necessarily under the control of management, but rather are constantly negotiated between the platform providers, community members and content owners whose materials are used in collaborative production. In this paper, we explore the questions of how boundaries interact and how they can be managed integratively to render creative content production. Our empirical study involves an exploratory case research design of two established music remix sites: nin.com and [ccMixter.org](http://ccmixter.org). We report on the community boundaries and their interdependencies, as well as on how the interdependencies are related to the goals and creative content production of online communities. The paper offers new insight into the role of integrative boundary management.

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Introduction

Online communities (OCs) are highly distributed networks in which users with shared interests and attention create and use content, as well as discuss and resolve relevant problems, with the help of digital platforms (Olson, 2009). The digital community platforms make a set of content available through browsing or searching features and they offer tools to support different levels of aggregation, integration, modification and recombination of content (Murray and O'Mahony, 2007). When new content

production methods are adopted, creativity is likely to occur; for example, as previously created content is disclosed to other creators via the new methods, and as content becomes available for reuse, components can be recombined in new and creative ways (Faraj et al., 2011).

One of the fundamental issues facing creative OCs is how to increase their *generative capacity* – their “ability to engage in acts of rejuvenating, reconfiguring, reframing and revolutionising within a particular goal-driven context” (Van Osch and Avital, 2010). OCs represent a new type of organisation where ideas, resources and members flow in and out and boundaries are highly permeable and dynamic. This notion of boundaries is in contrast to the one in the traditional organisational literature, which depicts boundaries as relatively stable, demarcating what is inside and what is outside. Boundary management refers to a set of activities involved in defining, negotiating and protecting organisational resources and domains of action, as well as managing relationships with external stakeholders, to achieve the organisational goals (Ancona and Caldwell, 1990; Reagans and Zuckerman, 2001; Burger-Helmchen and Cohendet, 2011). In OCs, boundary management involves trade-offs between openness (attracting external participation, stimulating innovation, creativity and organisational growth) and control (over platform activities and content production and appropriation), or trade-offs between standardisation and formalisation of production processes and availability and accessibility of diverse resources (West and O’Mahony, 2008; Engeström, 2007; Tiwana et al., 2010). Boundary management aims to balance tensions related to these key trade-offs with respect to the particular organisational context and goals.

Boundaries have an important dual nature. They *enable* the community to grow and thrive, but they also *protect and secure* the community from external threats. The existing literature on OCs recognises well the enabling role of boundaries. For example, the boundary logic of *identity* is associated with increased coherence of community activities (Blanchard and Markus, 2004). The boundary logic of *power* is associated with the control of key resources, determining the appropriate domain of activity and influence in the community and managing relationships with external groups (Murray and O’Mahony, 2007; O’Mahony and Bechky, 2008). The boundary logic of *competence* is particularly salient in open source software communities where both technical competence and leadership competence have been heralded as critical in driving participation (Hertel et al., 2003; Fleming and Waguespack, 2007; O’Mahony and Ferraro, 2007; Lerner and Tirole, 2002). The boundary logic of *transactional efficiency* of the community is fundamental to the resource view of the communities as well as to developing economically efficient social production models of communities (Butler, 2001; Benkler, 2002; Benkler, 2005).

The boundaries also play a critical role in protecting and securing the community (O’Mahony and Ferraro, 2007; Murray and O’Mahony, 2007). In OCs, innovation often takes a form of indirect collaboration between strangers, without explicit co-ordination, where two or more creators share and rework common pieces of content without necessarily knowing who the other persons are or what their aspirations and limitations are. To further complicate matters, the authorship of collaborative content is nonlinear and difficult to handle with traditional copyright arrangements (Lessig, 2008). Legal uncertainty arises and conflicts can occur and without proper boundary management, the community may suffer and possibly disintegrate. The music video remix site, Mixmonsta.com, offers one such example; this once-thriving community disappeared nearly overnight because of legal complications.

In a study of open software communities, West and O’Mahony find that platform ownership (firm-based or community-based) has a significant effect on boundary management (West and O’Mahony, 2008). They contrast autonomous, open source software development communities that are started by individuals or groups and that are self-managed by the community as they grow organically over time with firm-sponsored ones. In the latter, a profit-orientated firm sponsors the community and may provide and run the community platform (in an online setting) and take a lead in boundary activities. West and O’Mahony argue that autonomous communities generally tend to be more generative (West and O’Mahony, 2008).

Although the existing literature on OCs recognises the role of boundaries as both enabling and constraining communities, it has for the most part treated these boundary logics in isolation. For

example, Blanchard and Markus only consider identity (2004). O'Mahony and Ferraro focus on power (2007). What is largely missing in the literature is a study on how these boundary logics interact and how their interactions affect generative capacity in the community.

Understanding the interactions of different boundaries and their effect on generative capacity is a strategic question for OCs as they aim to leverage potential creativity towards their *community goals*. Creativity is generally associated with environments that bring together sets of diverse resources (Amabile, 1983). But if it is not well managed, diversity can easily get out of control and the boundaries of the communities become at odds with the community goals. The goals of creative OCs are generally related to both setting up the conditions and offering a space for producing creative output (in terms of volume, novelty, diversity, quality, etc).

Various music remix OCs serve as examples of creative sites that present a novel organisational approach to creative collaboration; they demonstrate novel approaches in music-making and provide new artistic expressions by offering digital platforms explicitly designed to allow users to work with recombinations of previous works (Lessig, 2004). Creatively linking different songs, artists, themes, styles and genres into new combinations (or remixes) can yield interesting new music in terms of quality and variety (Katz, 2004).

To examine our research question of how boundaries interact to affect generative capacity – that is, how the interactions of power, identity, competence and transactional efficiency boundaries play a role in creative content production on digital platforms – we conducted case studies of two platform-based music remix websites. Both host active communities and have been operating for several years. One site represents a firm-sponsored community that fosters collaboration between a commercially successful music band and its fan community (NIN.com), while the other site is an autonomous community that is involved with the open culture social movement and organises collaboration among independent artists to promote the practice of open music production (ccMixter.org).

The contribution of this paper is twofold. First, from a theoretical point of view, we present a richer explanation than what is currently offered in the literature regarding the issue of why autonomous communities exhibit higher generative capacity compared with firm-sponsored communities. Our study is among the first to give an explicit account of how OCs implement boundary logics in different situational configurations and how interdependencies among boundary logics influence generative capacity. The integrative boundary management provides a better perspective to creative OCs because it allows taking into account both the positive and negative effects of salient boundaries and their interactive effects on the community's generative capacity. Second, from a managerial perspective, our study offers important lessons to platform owners in content-producing industries in terms of designing participation platforms. Our findings underscore the importance of establishing an appropriate level of openness versus control, but also reveal the importance of community decisions involving identity and competence.

The remainder of the article is structured as follows. The next section reviews the literature on boundaries in online communities, followed by the methodology for our empirical study. We introduce the two cases and discuss our findings. We conclude with implications to theory and practice.

Boundaries in online communities

The organisational literature has focused on studying boundaries in large corporations in traditional industry sectors (Santos and Eisenhardt, 2005). That literature has been predominantly concerned with boundaries that are related to economic and legal efficiency, including transaction costs, incentives, and property and decision rights that govern what work activities are organised within the boundary of the firm and what is contracted out to the market (Coase, 1937; Williamson and Winter, 1991). The resource-based view (RBV) of the firm focuses on organisational boundaries that define which strategic resources are controlled by the firm in order to identify potential sources for competitive advantage (Barney, 1991). More recently, however, Santos and

Eisenhardt call for a broader study of boundaries, including the interactions among the efficiency (economic and legal), identity, power and competence (expertise) concerns, and in a broader set of organisations, including nascent markets, non-profit organisations and social movements (Santos and Eisenhardt, 2005; Santos and Eisenhardt, 2009). OCs are increasingly important examples of nontraditional and non-hierarchical organisations.

Our focus is on creative OCs that involve a dynamic organisational mechanism, called combinative capability in the organisational literature (Kogut and Zander, 1992). The combinative capability takes existing diverse resources (i.e., ideas, content, people, interactions), synthesises them and creates new combinations in a particular context. In information systems, Avital and Te'eni introduced the concept of "generative capacity" to emphasise perpetuating combinative capability (Avital and Te'eni, 2009). Van Osch and Avital further extended the generative capacity concept to OCs and defined it as "the ability to engage in acts of rejuvenating, reconfiguring, reframing and revolutionising within a particular goal-driven context" (Van Osch and Avital, 2010). The concept of generative capacity is valuable in understanding creative content production in OCs.

Van Osch and Avital's exploration of generative capacity in OCs focuses primarily on the fundamental trade-off between openness and control that relates to the boundary of power (Van Osch and Avital, 2010). Structures that are stable and hierarchical are theorised to reduce generative capacity. Power-related boundaries are also examined by Murray and O'Mahony in terms of decisions about resource inflows, production processes and outcomes (Murray and O'Mahony, 2007). Markus argues that power is instrumental to the functioning of communities and is largely managed through rule sets that govern interactions (Markus, 2007). Power is also critical for building external relationships to reduce uncertainty or threats in the environment and to promote community growth (O'Mahony and Bechky, 2008). In a study of open software communities, West and O'Mahony find autonomous communities governed by peer-based relationships to be stronger on generative capacity than firm-sponsored communities governed by hierarchical relationships (West and O'Mahony, 2008).

Besides power, identity is well acknowledged as a key boundary determinant of sustained OCs (Bagozzi and Dholakia, 2006; Blanchard and Markus, 2004; Ma and Agarwal, 2007; Ren et al., 2007; Stewart and Gosain, 2006). As with other entities and institutions, people derive a sense of self from participation in communities to which they belong and this identity affects how they respond and act in different situations (Hogg and Terry, 2000). Culnan describes how *backstreets.com*, a Bruce Springsteen fan community, draws in members who strongly identify with the artist to discuss his music and concert performances (Culnan, 2005). Identification with values and norms of the open source ideology motivates contributions in communities that are associated with the open source software movement (Moon and Sproull, 2000; Hertel et al., 2003; Stewart and S. Gosain, 2006). In addition, community participation also verifies one's sense of self worth (Ma and Agarwal, 2007). Ren et al. differentiate between identity-based and bond-based attachments, where the former deals with the commitment to a community's goals and the latter with the interpersonal connection with specific members (2007). Nambisan and Baron find that when communities are firm-hosted, it is necessary to separate members' identification with the community from their identification with the firm to understand the members' behaviour and expectations (2010).

In terms of a competence boundary, the literature on open source software communities conveys that developing and mastering technical and leadership skills and knowledge are the main drivers for user contributions (Hertel et al., 2003; von Krogh et al., 2003; Shah, 2006; Fleming and Waguespack, 2007; Jeppesen and Frederiksen, 2006). Members are driven by intrinsic motivation to explore, learn and improve their capabilities and by extrinsic motivations to build reputation and advance career opportunities (von Hippel and von Krogh, 2003; von Hippel, 2005; Frey et al., 2011).

Although Murray and O'Mahony encourage researchers to go beyond the boundaries of efficiency and to understand cumulative creativity in communities, efficiency-related boundaries cannot be ignored (2007). The boundary logic of *transactional efficiency* of the community is fundamental to developing economically efficient social production models of communities

(Butler, 2001; Benkler, 2002; Benkler (2005). The efficiency of social production models makes on-line communities ideal for cumulative creativity that relies on both human creativity and communication and computational resources (Benkler, 2002; Lerner and Tirole, 2002). Others derive efficient joint ownership boundaries when social production (by self-organising networks) incurs lower transaction costs than exclusive rights of private production (by organised hierarchies) (Arakji and Lang, 2007).

Although the OC literature has established power, identity, competence and transactional efficiency as key boundaries of sustaining communities, the literature is unclear on how the boundaries interact and influence generative capacity with respect to the particular organisational goals and contexts. In the rest of the paper we explore this question.

Research methods

Rationale for the selection of communities

We selected two music remix communities (not mere music file-sharing sites) for our study to complement the work on more commonly studied open source software and knowledge communities, such as Wikipedia, where productivity and quality are often of greater importance than creativity (Kane, 2009).

Music remix sites are examples of a new form of collaboration among (professional and amateur) artists, and also between artists and fans, that is based on digital platforms (Shirky, 2008). Individual remix artists often specialise in creating very unique musical expressions via recombination of music samples, and because music samples are digital objects, they can be manipulated and reused in a myriad of ways, enabling new degrees of flexible recombination of cultural objects (Storper and Christopherson, 1987). A digital platform offers both the content and the tools to facilitate the recombination of digital music objects.

We selected one community that is firm-sponsored and another that is autonomous. Our choice was based on exploring a new phenomenon and understanding how the ownership structure of the community interacts with other boundaries. Some digital remix sites are firm-sponsored, while other sites operate more like a public good (commons) (Lessig, 2004; Boyle, 2008). West and O'Mahony (2008) conjecture that there are principle differences in the design, behaviour and performance of firm-based versus community-based platforms and call for more research studying these differences. For example, because providing easy access to previously recorded music (in terms of legal, economic and technical access) lowers the cost for creators to make new music, open music movement advocates promote more flexible copyrights (e.g., through creative commons content licenses) on digital remix platforms that are aimed more at stimulating cultural creativity than at securing and protecting exclusive rights for economic exploitation of recorded music (Landes and Posner, 1989; Boyle, 2008; Lessig, 2008).

Rationale for research design and analysis

Because we are describing and analysing a new phenomenon, integrative boundary management in OCs, we do not attempt, in the present paper, to develop a full-fledged theory comprising readily testable causal relationships; rather, we focus on uncovering conditions and patterns that govern this newly-emerging phenomenon. We adopt an exploratory research design with the goal of better understanding how creative content production communities manage organisational boundaries and why the interactions between them explain the different outcomes of generative capacity. Thus, we are not following a classical inductive approach; that is, we do not build a theory from multiple case studies, which would typically use a theoretical replication logic across and literal replication logic within groups of cases in an attempt to increase external validity and generalisability of the research findings (Eisenhardt, 1989). Neither do we try to adhere to a traditional deductive approach because no solid theory has yet been established from which we could derive testable propositions about boundary management in creative content production communities.

Instead, we follow an abductive reasoning strategy based on contextualisation that uses inference to the best explanation (IBE) as its method to develop (theoretical) explanations for the observed phenomenon (Ketokivi and Mantere, 2010). Data and theoretical concepts are intertwined and examined simultaneously until a plausible explanation is found that satisfies criteria for plausibility, simplicity, novelty and interestingness. IBE is a context-dependent reasoning process and acknowledges a certain level of subjectivity in that the researcher's role is to find the best possible explanation using best judgment. Hence, it is important that the research process be transparent and the inferences be authentic to both observed data and the extant literature.

For the purpose of our study, and in accordance with Yin, a two-case study is an appropriate research design that is consistent with the contextualisation research strategy described above and which can provide valuable input for subsequent research that generates testable propositions (Yin, 2008). We chose two cases that followed a partial replication logic. The sites differ in terms of platform ownership (firm-sponsored and autonomous) but share several other variables (see Table 1).

Case studies were conducted in two online music remix communities: nin.com (firm-based) and ccmixter.org (autonomous). Both of these sites are considered successful in sustaining creativity in the popular music industry. We conducted a detailed examination of both sites and made observations of the boundary management activities. Our examination was driven by the question of how music communities manage boundaries to support creativity. We also conducted structured online interviews with participating community members. (See the Appendix for the interview protocol.) We participated actively in both remix communities, preparing music remixes and posting comments to gain experience on the sites. We collected qualitative data from the discussion forums on the two sites and also communicated via email with the site administrators. A narrative was prepared for each site.

Our analysis strategy followed empirical contextualisation and inference to best explanation (Ketokivi and Mantere, 2010; Lipton, 2004). We used an iterative process of cycling between our data, emerging concepts and relevant literature (Corbin and Strauss, 2008; Miles and Huberman, 1994). We initially related our observations to the boundary categories of efficiency, identity, competence and power within each site, identifying how these boundaries relate internally. After conceptual insights emerged about the interrelations among the boundaries, we turned to cross-case analysis. Explorations of why these interrelations appeared to be different on the two sites led us, after an examination of competing theoretical perspectives, to focus on the theoretical concepts of *community goals* and *generative capacity*. We then revisited the data and began to compile pertinent evidence from the two sites by gathering related instances of how community goals, generative capacity and boundary logics related. Finally, based on our interpretation of the data, we wrote our observations up and offered an explanation regarding the categories of goals, boundaries and generative capacity, weaving together conceptual arguments, additional evidence, and citations to the relevant literature.

Table 1. Organisational characteristics shared by the NIN and CCM communities

Community purpose	Content production
Platform technology	Provision of similar digital functions, tools, user interfaces, and access protocols for users to participate in content production
Content licenses	Variants of the creative commons license
Location and reach	US-based, global reach
Size	Medium (in terms of membership and content output)
Time	Founded a few years ago and still in active operation
Domain	Music remix communities
Participation reward	Intrinsic benefits

Analysis of the two community sites

We next provide some background on the two remix sites and then compare them in terms of their technical platform characteristics.

Nine Inch Nails (NIN)

NIN is a popular and critically acclaimed US rock band that was founded in 1988 by Trent Reznor. NIN was included in the top 100 list of the greatest artists of all time by *Rolling Stone Magazine* in 2004. The band released eight major studio albums between 1989 and 2008 that have sold more than 20 m copies worldwide. It is known for its powerful live performances and its large and committed fan community, which includes many long-term followers as well as a steady stream of newcomers. NIN is also known for its technical prowess, experimenting as early as 2005 with releasing some of its music in remixable data formats. Besides its music products and services, NIN has developed a substantial revenue stream in merchandising (clothing, posters and accessories).

In 2007, the band ended its contract with the Universal label because of disputes over the pricing and distribution strategies for its sixth studio album, *Year Zero*. The label refused to support NIN's digital distribution plan, which included free digital downloads of some material, an alternate reality game based on the album and free audio files for fans to download and remix.

Since 2007, the band has been operating independently, releasing music and touring without the support of a record label. The two most recent albums, *Ghost* and *The Slip*, have been released under the *Creative Commons* licence and in various formats and prices.¹ Grossing over \$1 m in revenue shortly after its release, *Ghost* was distributed in various formats at differential price points, ranging from free downloads, a \$5 digital album download or a regular CD release for \$10, to a \$300 deluxe limited edition of 2,500 copies, which sold out almost instantaneously. The band's website, nin.com, has 402,476 registered members (as of March 2011). The site offers news and information about the band and its music, runs discussion and chat forums related to NIN, links to other sites where NIN music is available for free (including last.fm, imeem, facebook, ilike and MySpace) and hosts a video and photo sharing site. In 2009, NIN released an iPhone App that makes the site accessible to mobile phone users (Rose, 2009).

The band also has a remix site (remix.nin.com) that establishes a digital platform for the NIN fan community. NIN offers the songs from its three most recent albums in various multitrack data file formats (including the digital remix tools Ableton Live for Windows PCs, Garageband for Mac and raw wave files that work with other audio editing and remixing software); these files can be imported into remixing software that allows the user to rework original NIN content and share the creations with others.² (The copyrights of the previous albums remain with Universal and are not available for remix on the site.) Fans can listen to remixed music, rate and comment on the posted remixes and create various playlists that are shared on the site. As of April 2009, more than 11,000 remix songs, based on about 100 original NIN songs, had been co-created by the NIN fan community.

ccMixer (CCM)

The music remix site www.ccmixer.org was initiated by *Creative Commons* (CC), a nonprofit organisation that developed a set of CC copyright licences designed to support open culture. A remix contest was used to launch the ccMixer site in 2004; the contest was organised in collaboration with *Wired Magazine*, which distributed a CD with original music by well-known artists (including David Byrne, The Beastie Boys, Gilberto Gil, Chuck D and others). The site is specifically designed to facilitate interaction and collaboration between musicians to stimulate creativity (Stone, 2009). The site offers more than 22,000 instrumental music samples and vocal tracks that are CC licensed

¹ Similar to GPL licences in open source software, CC licences can incorporate different levels of ownership rights, ranging from no rights reserved, to attribution requirements, to various options that allow for the commercial resale of a new derivative work.

² Remix artists very much prefer to work with multitracks if they have a choice. Mixed down, final versions of songs in single-track (mono) or two-track formats could also be sampled for remix purposes, but those are more difficult to access and work with than multi-track formats.

and available in an easy-to-mix file format (as of March 2011). A number of notable artists have contributed, including DJ Vadim, Calendar Girl, Brad Sucks, Black Eyed Peas, Fort Minor and Kristin Hersh. There is no predominant musical style; neither are there any megastars from big labels, although many contributing members are accomplished, recorded artists. The site also hosts open remix projects that solicit themed remix contributions from community members for specific events.

The site is open to anybody; an unknown number of people tune in just to listen to the music, without registering. The registered users (over 27,000 as of March 2011) mainly comprise active musicians and remix artists and a number of serious amateurs from a wide range of musical backgrounds and genres.

Technical platform designs of NIN.com and ccMixer.org

While similar in many aspects of the remix platform design, the NIN and CCM sites differ in a few important ways. One difference involves the amount of information that members are expected to disclose. While NIN's profile pages are rather informal, asking members to share only some of their personal background (which helps to reinforce their identity as NIN fans), CCM members are expected to provide information about their artistic background and technical expertise and experience with digital remixes (which helps in brokering new collaborations).

In terms of their respective online community platforms (i.e., user interface, tools, and basic functionality), both sites provide remix objects in the form of multi-track formats that remixers can download and readily reuse to explore new combinations. However, the sites differ markedly in terms of how they organise remixes in data files and how they manage and track contributions to remixes. The technical platform of CCM is a open source content management system, ccHost, which implements an attribution tree engine that can track who has used content pieces in remix creations and how those tracks have been used. The attribution tree indicates who contributed samples to a remix project, thus offering an intrinsic kind of reward to artists whose creations have been made available for remix. Artists are required to attribute the constituting parts (e.g., vocals, rhythm tracks, baselines, keyboard melodies, guitar riffs, etc.) of any uploaded remix and to make these parts available to others as separate pieces in the sample pool. This technical feature governing the remix uploads is designed to promote cross-collaboration and flexible recombination. In contrast, the NIN site lacks such a sophisticated upload and attribution mechanism. NIN members can upload remixes only as single-track files and the site does not support member-to-member collaboration. [Table 2](#) summarises the key differences in the sites' technical platforms.

Discussion and implications

The study is motivated by the following question: How do organisational boundary logics interact and influence generative capacity with respect to the particular organisational goals and context?

The analysis of the two sites suggests that generative capacity appears to be a function of community goals and of the synergistic effects among the boundaries of identity, power and competence. Boundaries work in integrated ways that both constrain and enable activities that support the community goals to render generative capacity (see [Figure 1](#)). [Figure 1](#) illustrates empirically-derived results and while the relationships depicted indicate influences, they do not necessarily imply directional causality. The empirical findings suggest a more complex and nuanced explanation of generative capacity in creative OCs than previously provided ([Van Osch and Avital, 2010](#)).

At [nin.com](#), generative capacity is limited to producing new NIN music; the site does not support a broad level of collaboration and recombination. At CCM, generative capacity has a much broader domain, promoting the nascent open music movement and new music production without limits in terms of genre or style. Hence, the autonomous CCM community appears to be more generative than the firm-sponsored NIN community, consistent with the conceptual arguments of [Van Osch and Avital \(2010\)](#). However, the power boundary in the autonomous form is not the only factor

Table 2. Differences in the platform designs

	NIN (Firm-sponsored community)	CCM (Autonomous community)
Content output	Homogenous (similar to original NIN music)	Heterogeneous (innovative combinations of diverse genres)
Content input control	Closed (NIN decides the original content available on the remix platform)	Open (any member can supply original content to the remix platform)
Content modularity	Moderate (multi-track seed content but only single-track remixes)	High (both seed content and remixes are multi-track)
Reuse genealogy	One-generation remixes only	Multi-generation remixes permitted (documented via attribution tree)

responsible for the higher generative capacity, as explanations in the literature might suggest. The explanation that is emerging from our analysis is more complex. The power boundary interacts with the boundaries of identity and the competence boundary interacts with the efficiency boundary. These interactions of boundaries mediate the community goals, thus influencing and rendering the different levels of generative capacity at the two sites.

Community goals

Community goals provide the rationale for organising and sustaining a community. When a firm sets up an OC as part of its business strategy, the evolving community is expected to align, at least partially, with the goals of the sponsoring organisation (West and O’Mahony, 2008). Autonomous communities are set up by individuals or groups that are often related to broader societal goals or social movements. Hence, generative capacity is affected by whether the communities are tied to specific firms or are autonomous.

The two sites of NIN and CCM differ in their community goals. As in many firm-sponsored OCs (West and O’Mahony 2008), NIN needs to balance commercial and community interests: it needs to protect and control the NIN brand; it also aspires to deepen relationships with its fan base by giving fans access to music and generating perceptions that access is shared fairly between the sponsor and the community. In addition, the site must not be allowed to harm the artistic reputation of the band by digressing too far from the known sounds of NIN, and members cannot take music off the site and release it elsewhere. Although the band does not monetise the content on the site directly, generated content gives the band information about what their core fans like, and it might help them in determining what they produce next. More importantly, the remix site provides fans with new experiences that create value that is complementary to the other NIN products.

CCM is organised as a commons, where each piece of output is available for use by others in the community as input into their own music projects and within the genre of their choice. The music objects (i.e., the data files that represent a piece of music) are the main vehicle of collaboration (rather than, e.g., explicit co-ordination and discussions via text messages). However, open music in practice is still a newly-emerging phenomenon that occurs at the fringes of the music industry. CCM contributes to advancing the cause of the open music movement by offering a platform to (an

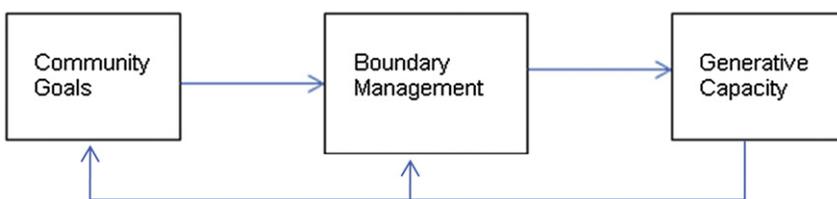


Figure 1. Generative capacity of online communities (no causation implied with arrows)

increasing number of) interested musicians that allows them to explore and experiment with the open remix practice in a legally safe environment. To recruit new members, CCM needs to demonstrate that open music is a viable concept and to show that it can produce compelling new music that attracts an audience.

As NIN strives to use the community to enhance its brand, it shares access only to original NIN songs and a handful of songs from a NIN peer band, Jane Addiction. The site does not support multi-generation remixes (i.e., remixes of remixes); the community members can collaborate only with NIN (i.e., its leader, Trent); and in the end, remixes by NIN fans are likely to sound relatively similar to NIN music.

CCM, on the other hand, solicits contributions from many different artists who are willing to supply original content (usually vocal and instrumental tracks rather than complete songs) to seed the remix library. Additional variety comes from multi-generation remixes. There is great diversity in the collective output at CCM. Table 3 summarises the differences in community goals.

Boundary management

The sites vary in terms of boundary logics.

Power

The sites differ markedly on the boundary of power (i.e., sphere of influence), as would be expected, given that one site is firm-sponsored and the other is autonomous. The differences are notable not only in terms of the level of control of key resources, but also, and perhaps more surprisingly, in terms of the dynamicity of control.

As a firm-sponsored fan community, NIN exercises hierarchical control. On the “Mix page” for example, NIN simply declares: *“To expand the concept of the “remix record” we’ve decided to give [emphasis added by the authors] you the tools to experiment with the remix process yourself. Included on this site are a variety of Nine Inch Nails songs available for download as multitrack audio files.”* Unpaid, volunteer users (who are passionate music fans) are granted special privileges to act as moderators and supervisors to help make sure that the community follows the policies set by NIN management.

CMM relies much more extensively on peer relationships. Outside the daily operational management by *Artis Tech Media*, a small non-profit organisation that hosts and runs the site, the community members at large are involved in making decisions and finding solutions when problems occur. For example, a community member faced a data-related problem, and the potential solutions were discussed and debated via 29 different posts for four days until the final solution emerged from two community remixers. Importantly, community members can start their own projects using the CCM platform and post calls for projects (CFPs), soliciting remix submissions from the community and stipulating varying, specific rule sets concerning admissible content and remix process, depending on the purpose and context of the specific project.

Table 3. Community goals

	NIN (Firm-sponsored community)	CCM (Autonomous community)
Organisational goal	Business value creation for platform owner (profit-orientated enterprise)	Support open culture social movement
Target group	Fan community	Community of practice (musicians)
Target content	Similar to original NIN music (homogeneity)	Innovative combinations of diverse genres (heterogeneity)
Community structure	One-sided market (fans)	Three-sided market (content suppliers, remix artists, listeners)

Another difference between the two sites is the dynamicity of the power boundary. The rules at the NIN site have remained largely unchanged since it was launched. At CCM, the rules evolve dynamically: as the site offers new technical remix capabilities and hosts new remix projects that involve new project sponsors, both from within and outside the CCM community, the new sponsors negotiate variations of rule sets depending on new technical possibilities and the particular context and purpose of the remix project for which the rule set applies. Different projects typically have their own rule sets, although they all follow general principles laid out on the site.

At CCM, there is a focus on collaborating with external communities, using both virtual and mix-reality collaborations, that is, co-ordination and co-operation between physical events in the real world and digital activities in cyberspace. An example of the latter was the collaboration with a real-world community conference event in Texas that promoted the use of sustainable energy. In another mix-reality collaboration, the “White Cube” remix project was curated by an art gallery in Oslo, Norway. Mix-reality collaborations extend CCM’s external influence by forging partnerships with organisations in the arts community.

Identity

The boundary circumscribing identity also differs on the two sites. The NIN site offers members opportunities to verify their identity as active NIN fans who not only listen but also contribute to the NIN brand via participation in community activities. The site provides easy-to-use tools to browse and sample remixes uploaded by others (access to new ones is especially straightforward) and to post comments, reviews and ratings. Remixers can expect to hear back from the community when they upload a new track. Comments are generally supportive and emphasise discussion of NIN culture (e.g., moods, attitudes, feelings, experiences and memories associated with NIN) rather than technical discussions (e.g., remix technologies and musical styles). This mechanism helps build fan identity and a sense of belonging to the NIN community. In terms of generative capacity, the identity boundary both constrains and enables, consistent with community goals. The focus on promoting the NIN identity on the site restricts the recruiting of new members largely to NIN fans and likely deters participation from other talented remixers. However, the concentration of like-minded, peer, NIN fans reinforces the identity-building efforts of the site, which increases the motivation of the fan remixers to engage in producing NIN music and thus increases the generative capacity in its specific, narrow domain.

At the CCM site, identity-building mechanisms are much less pronounced. CCM members are not fans seeking identity within a particular band or fan community; they are, foremost, practitioners who join the site to become better musicians. Commenting on songs and sharing stories and experiences is less common. There is little back-and-forth dialogue between individuals. Instead, what dialogue exists usually occurs in the context of technical problems, project proposals, or artistic questions. The CCM members are not necessarily active supporters of the open music movement, but rather consider the site as a productive environment for their open remix practice.

Competence

Whereas identity is less pronounced on CCM than on NIN, competence is, in turn, more pronounced on CCM. CCM members see digital remix as an important competence for their musicianship. As practising musicians, CMM remixers are interested in professional recognition and in using opportunities to develop skills and expertise. By participating in CCM, they want to become better musicians. They appreciate free access to a large collection of music content, often seeking fairly specific inputs for their own projects (e.g., specific vocals or sounds). They learn from each other about remixing techniques. Competence-enhancing opportunities at NIN are much more limited because community activities are centred on NIN content and NIN fans.

The CCM site requires remixers who upload a new remix to provide the technical information of how the remix was done. The NIN site has no such requirement. Similarly, in contrast to the CCM site’s discussion forum, which includes many threads on technical issues of remixing (tools, techniques), NIN has no such forum for remixers. (There is one at the general NIN website, but there is little discussion

on remixing techniques and methods.) Because the CCM platform is not specific to a particular band or style of music, remixers with very different backgrounds and interests find participation useful and productive. The competence boundary at CCM contributes to the diverse and novel content on the site.

Efficiency

On the one hand, both sites seem to be excellent examples of efficient social production models and open service innovation models alike (Benkler, 2005; Chesbrough, 2011). CCM represents a single venture that has collaboratively created millions of remixes. Similarly, creating 11,000 NIN remixes is a complex and large-scale project that would pose substantial risk and cost to profit-orientated hierarchies. Both sites provide a legally safe environment to engage in sampling and remixing without fears of copyright infringement.

On the other hand, both sites struggle to keep up with user expectations in terms of user interface issues and offered features. One CCM remixer commented: “*I have uploaded a couple of pells [capella tracks], but really don’t feel like I know my way around. I’d like clearer navigation and more help, especially with uploading my content.*” One CCM member more specifically thought the site “*could benefit from a simpler layout [user interface]*”. Both sites seem to present challenges, particularly for novice users with lower computer skills. In addition, CCM members express a desire for more social media tools that would provide users with a more modern look and feel.

Boundary interactions

Perhaps most importantly, there are also significant ways in which boundary interactions cause the boundaries to vary across the two sites.

At NIN, the power decisions restrict generative capacity. However, at the same time, they synergistically reinforce the identity boundary by focusing on the collaboration process and the coherence of the remix output, centering activity around the NIN brand and ensuring consistency with community goals. The power boundary thus reinforces the identity boundary on the site. The specific combination of boundary decisions creates interactions with generative capacity that support the organisational goals of producing new content (brand enhancement) and fostering fan participation (relationship enhancement).

At CCM, the reinforcing dynamic between those two boundary decisions keep the site free from hierarchical control and open to different kinds of external content and collaborators (i.e., power boundary) while making the site a place where musicians can claim and improve their competence as remix artists (i.e., competence). The diversity of content on the site attracts a diverse set of new members, who, in turn, diversify the content even more. The high degree of openness in lateral relationships brings in high levels of diversity in content and creators, and this diversity increases CCM’s generative capacity and further promotes the goal of building a broad member base to produce creative music.

The efficiency boundary is not a critical differentiating boundary between the two sites, except when examined in terms of its interactions with the competency boundary. The CCM site appears to be better designed to help hone remix skills. The CCM site also is more complex in terms of operation and requires more experience with digital media.

Theoretical implications

From a theoretical point of view, the cases suggest that boundary management is multifaceted in online communities and requires an integrative view. The complex, multilayered view of boundaries contrasts with the existing OC literature, which has taken a narrower view and focused on isolated, individual boundary decisions in online communities. Blanchard and Markus focus on identity as an organising principle for interactions and communications (Blanchard and Markus, 2004). O’Mahony and Ferraro focus on power boundary logic (O’Mahony and Ferraro, 2007). Others have examined boundary decisions from the transaction cost efficiency perspective (Arakji and Lang, 2007). We extend the online community research by providing a more integrative view of boundaries.

The integrative view is critical to the development of a more nuanced understanding of generative capacity that is consistent with the community goals. Van Osch and Avital argue that hierarchical control would limit generative capacity of the community (Van Osch and Avital, 2010). Our results are consistent with that argument if the power boundary is examined only in isolation. However, examination of the power boundary together with the identity boundary leads to a deeper understanding of how the NIN identity and power boundaries reinforce each other and promote generative capacity on that site, albeit in a narrow domain. Hence, power is a salient boundary in both sites, but it operates in qualitatively different ways because of the synergistic dynamics between the power boundary logic and that of the other boundaries. As shown, the power boundary reinforces the boundary of identity at NIN and the boundary of competence at CCM. Additionally, the efficiency boundary logic interacts with the competence boundary logic impacting generative capacity.

The findings also suggest that the boundaries, as well as their interactions, are highly context-specific. Even when community sites share key characteristics — they are of similar size (in terms of active members) and domain (popular music), for example — the boundaries create distinct differences. Identity is the salient boundary on NIN; competence is the salient boundary on CCM. The differences in these boundaries, and the ways in which other boundaries support or diminish them, leverage the potential for generative capacity that are consistent with the community goals. As goals and generative capacity change, the implication is that the boundaries would also be expected to change, both in their salience and in their interactions.

We also speculate that it is the integrative, interactive relation of boundaries on NIN and CCM that at least partly explains why both sites are sustainable. These two sites represent two different approaches and have two different starting conditions and goals; yet they are both long-lived, thriving OCs. Although the two differ in terms of which boundaries are salient and how they interact, the boundaries have synergistic effects in both cases. The synergistic and reinforcing boundaries ultimately may be responsible both for community growth and for protection from internal and external threats. In contrast, community sustainability may be jeopardised when communities implement conflicting sets of boundaries, as the example of mixmonsta.com, described previously, demonstrated. Rather than being arbitrary or capricious, boundary setting and management must effectively align with the community goals to promote generative capacity (see Figure 1).

Another nuanced theoretical finding pertains to the nature of stability in the structures of remix sites. Van Osch and Avital argue that generative capacity is negatively affected by the temporal span of the community (Van Osch and Avital, 2010). The more mature the community, the more formalised its rules tend to become and the more routine its member activities; such an environment, they argue, reduces generative capacity. Meanwhile, we find that while the long-running NIN site has a high degree of stability in its rules, which may adversely affect its generative capacity, the CCM site, by contrast, is similarly long-lived, but there is both stability and change in its rules. The stability is present at the high level, ensuring that new projects adhere to the overall site principles, but there is dynamicity at the lower level as new types of projects and collaborative modes emerge. Hence, an increased temporal span of a community can bring both change and stability in structures (i.e., rules), and this paradoxical state may positively influence generative capacity.

Practical implications

An important practical insight is that framing the question of boundaries in online communities in terms of openness and control is too limiting. A much more complex understanding of different boundary logics is needed. We found salient differences in boundaries around power, identity and competence between the two sites. Moreover, the interactions and relationships between the salient boundaries were instrumental for promoting community goals and supporting the domain of generative capacity. Thus, platform providers need to make an array of boundary decisions and recognise their interdependencies, instead of simply considering levels of openness and control.

The current cases also suggest that community sustainability and customer value creation can result from both firm-sponsored and autonomous communities. A firm-sponsored community was associated with less openness and greater control, but less openness may be beneficial when

identities are important and when there are competing demands from other sites. For NIN to maintain the strong identity boundary, the site has to be cautious in expanding into new ventures. A new initiative at the site may require changes in the power boundary, which in turn might require a re-evaluation of the identity boundary. Similarly, if NIN decided to open its site to attract more professional remix artists (i.e., incorporate more competence-building opportunities) or to include more outside content (i.e. to permit more diversity), it might run the risk of undermining its identity-building opportunities.

The NIN case specifically implies that bands with a large fan community can effectively use on-line remix platforms to develop strong relationships with their customers, offering digital remix opportunities as an engaging service to their most devoted fans, who in turn act as brand ambassadors in the larger fan community. The findings also suggest that fans are willing to accept that platform ownership and management resides with the firm because they strongly identify with the band and appreciate the opportunities to work with their favourite songs and to participate in creating musical experiences. This sort of arrangement appears to work well when the business strategy seeks to organise community collaboration that promotes consistency and cohesion with the brand.

The second case, ccMixer, suggests that more creative content production is likely to occur when (remix) communities are set up autonomously, without the hierarchical control of a band or a label, with a platform designed to appeal primarily to remix artists. Such platforms should aim to attract resource diversity in terms of input content, skill sets, talent, tools and reward mechanisms that recognise creativity. Another important proposition at the site is offering music practitioners a chance to showcase their remix work to different audiences. Community behaviour and performance is less predictable and more difficult to manage, but it also is less constrained by special interests. Limited largely to experimental and noncommercial music production, CCM offers a participation platform design that, while it may not be a viable model for the commercial music business, may very well present an open community model that could be adopted by other communities of practice in the arts and culture.

The current study gives also rise to several questions of practical importance that need further research. The literature on platform leadership argues that strong network effects (in the technology industry) create the opportunity for platform owners or sponsors to pursue “winner-takes-all” strategies by forming partnerships and designing community platforms that create competitive advantage by leveraging network effects and using significant switching costs and user lock-in (Cusumano, 2010). Of course, the music industry is highly fragmented, comprising individual bands and music artists (like NIN) that compete for a (paying) audience. That a single band could ever create the kind of adoption and lock-in that would resemble a winner-takes-all situation is unlikely. Moreover, music fans typically follow multiple acts simultaneously, and different acts over time. How do fans navigate between music communities and are there opportunities to build ecosystems (for example by intermediaries such as Apple’s i-Tunes platform) that support such navigation and change over time? Should music communities of different bands co-ordinate their efforts or compete using go-it-alone approaches?

More research is needed to better understand the ecosystem that makes up the music industry, as well as how digital platforms can be designed to organise music content and content owners, music artists, fans, and casual music consumers. Remix is only one potential participation capability that users have in music communities. Are third-party developers important for music communities, and if so, in what capacity? What are the opportunities for advertisers? What about alliances with tour promoters?

Additional research is also needed on the transactional efficiency of remix, or digital reuse and recombination of previously-created content. Remix has become an established method of artistic expression in music and video, as well as in other art forms, such as digital collage (fine arts), digital cutup (literature) and mashup (web content). However, there is much uncertainty about how remix authorship should be defined, particularly over multiple generations. The NIN site did not allow multiple generations and the original content provider of NIN retained the rights on derivative remixes generated by the community. The CCM site used attribution trees to recognise multi-authorship.

Multi-authorship schemes can quickly become very complex and can make the assessment of the (relative) contribution of contributors to the remix work quite difficult. More research on methods that recognise multiple contributors over different generations of content reuse are needed. An important goal would be to find a practical and acceptable method to track, acknowledge and reward the different interests and stakeholders involved in creative content production.

Limitations

Several limitations with the current study provide opportunities for future research. We examined only two sites, which precludes the generalisability of the findings. Multiple-case studies that cover more sites and examine more domains, including those beyond the music domain, should be conducted; the greater contextual understandings would aid theory-building in the area of boundary management in creative online communities (Eisenhardt, 1989). Although the two music community sites examined are longer lived than many other music sites, our data collection was limited in the temporal sense. To understand temporal dynamics of boundary decisions – particularly how boundary management is a dynamic balancing act – requires a multi-year, longitudinal perspective in data collection. In this paper, we conjecture that the integrative set of boundaries is what distinguishes the two long-lived sites from other, shorter-lived, failed sites (like Mixmonsta.com). We encourage future studies that seek in a more systematic manner both confirming and disconfirming evidence that relates the integrative view of boundaries to site sustainability.

Conclusion

Our focus has been to contribute to the online community literature by providing a more complex, integrative understanding of boundary management. The paper highlights that not just power boundaries of the community (i.e., openness versus control), but also the identity, competence and efficiency boundaries need to be considered. Based on our examination of NIN.com and ccMixer.com, we identify first how the salient boundaries differ and then how the boundaries interact differently for the two communities. We explain how these differences both enable and constrain community goals, with important implications for the generative capacity of communities. We encourage future research on integrative boundary management that takes into account both the positive and negative effects of salient boundaries and their interactive effects on the community's generative capacity.

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Appendix

Interview protocol³

1. What do you like about the behaviour of your peer members on the ccMixer site?
2. What do you dislike about the behaviour of your peer members on the ccMixer site?
3. Are there any things that the ccMixer community should allow on the site that are currently not possible or tolerated?

³ The interview protocol here was used with ccMixer community members. A similar, slightly adapted protocol was used with the NIN community.

4. What are the things that the ccMixter community should not allow on the site?
5. Do you have any other considerations or thoughts about the ccMixter site you would like to share with us?

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