

Contribution, Commercialization & Audience: Understanding Participation in an Online Creative Community

Eric C. Cook, Stephanie D. Teasley, Mark S. Ackerman
School of Information, University of Michigan
1075 Beal Ave, Ann Arbor MI, USA
{ericcook, steasley, ackerm}@umich.edu

ABSTRACT

This paper presents a qualitative study of attitudes towards participation and contribution in an online creative community. The setting of the work is an online community of practice focused on the use and development of a user-customizable music software package called Reaktor. Findings from the study highlight four emergent topics in the discourse related to user contributions to the community: contribution assessment, support for learning, perceptions of audience and tensions about commercialization. Our analysis of these topics frames discussion about the value and challenges of attending to amateur and professional users in online creative communities.

Categories and Subject Descriptors

H.5.3 Group and Organization Interfaces – *computer-supported cooperative work, collaborative computing.*

General Terms

Human Factors, Theory.

Keywords

Creativity, online community, community of practice, amateurs, professionals, audiences, learning, commercialization, user-generated content

1. INTRODUCTION

An increasing amount of attention has been paid in recent years to the study and facilitation of creativity. This has included work across a variety of contexts and disciplines. In particular, several researchers in Human-Computer Interaction and Computer-Supported Cooperative Work have begun to promote and acknowledge the necessity and challenges in designing and building appropriate information and communications technology to support creative activities [27, 29, 21, 7].

In this study, we were interested in examining and describing factors that allow communities that attempt to foster creativity to grow and be vital for their members. Our community focus

suggests a need to study creative practice in the wild, to witness situated tool use and the interplay of historically contingent local culture and conditions. Accordingly, this paper examines a specific online creative community, one that is focused on Reaktor, a music production software environment. In Reaktor, users take a pre-existing set of low-level musical components and connect them together into customized “ensembles.” These ensembles serve as musical instruments for recording or performing. Through the process of contributing their ensembles and engaging in discussion in associated forums, the users of Reaktor build and sustain a persistent online community of creative practice.

In this paper, we investigated the online bulletin board discussions of the Reaktor User Forum, focusing on a critical incident surrounding a contentious community contribution. We found four topics of specific importance to creative communities that emerged during our qualitative analysis of discussion threads, which were then expanded through follow-up interviews with active community members. The topics include: *contribution assessment, support for learning, perceptions of audience and tensions about commercialization.* In our discussion section, we use the analysis of these four topics to explore both the value and problematic aspects of attending to both amateur and professional users in online creative communities.

2. LITERATURE AND FRAMING

2.1 Creativity: What and Where

The study and facilitation of creativity in recent years encompasses several disciplines and agendas. Within business and organizational studies, there has been an influx of literature calling for businesses to support and harness end-user innovation [35]. In the popular press, there have been examinations of the economic and social importance of the “creative class” [11], driving new initiatives in civic planning and public policy. Others have emphasized the potential role of creativity support tools in driving scientific and engineering work [29]. A growing body of research in HCI and CSCW literature details the necessity and challenges in designing and building information and communications technology to support creative activities [27, 7]. In a report [21] issued earlier this decade, the National Research Council explicitly called for additional work in the intersections between information technology and creative practice, calling on researchers of ICT to go “beyond productivity.”

As may be expected, this broad set of agendas also creates definitional challenges, as there are many disparate theories of creativity. Meta-analysis by Couger, for example, identifies and analyzes twenty-two distinct models of the creative process [28].

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee.

GROUP '09, May 10–13, 2009, Sanibel Island, Florida, USA.
Copyright 2009 ACM 978-1-60558-500-0/09/05...\$5.00.

In this paper, we apply a socio-cultural perspective [8], in which creativity is inextricably situated in the interrelation between the domain, the field, and the individual. Here, domain refers to the preexisting set of knowledge, rules and symbols used by a type of endeavor. A field includes the individuals, infrastructure and social conventions that serve as gatekeepers and evaluators for contributions to the domain (such as editors, art critics, norms of taste, and so on). The influence of field and domain is also highlighted in related literature, such as Becker's sociology of "art worlds" [3] which explored the largely invisible but extremely influential connections between artists and the broader cultural and technological factors (ranging from the locations and sizes of museums and galleries to production decisions made by paint manufacturers, for example) that direct, channel and limit the production of art and culture.

Because an individual is always informed by and acting in relationship to their field and domain, this socio-cultural view asserts that it is necessary consider the individual's creativity in the particular context in which it is enacted. Creativity rests not just in one individual's abilities, but also in the windows of opportunity presented to them by their historic, cultural and social positioning. A socio-cultural perspective also posits that creativity is inherently collaborative and enacted on multiple simultaneous levels, encompassing interactions between work group participants, overlapping communities of practice, accumulated symbolic structures of the domain, audiences real and perceived, and the individual creator's own self-referential reflection on their own past activities. [2]

Combined, the literature referred to above suggests both the value and necessity of considering individuals and their community contexts in an analysis of creative practices. If we are to successfully design the next generation of information systems that support the creativity of millions, we should not focus solely on genius-level exemplars, but rather on the types of personally creative activity and work that millions already engage in every day. Similarly, if we are to get an accurate representation of the types of issues, affordances and tensions that impact everyday creative activity, we must consider that creativity in context, where the context includes tools, peers, and the broader culture.

2.2 Member Diversity in Communities

The topic of communities is recurrent in the CHI, CSCW and related literatures, and has produced a large set of research (for overviews, see [30, 25, 23]), as well as spawning specialized conferences [14]. In recent years, some researchers have begun to suggest ways of approaching the definitional challenges that are inherent in the topic [4, 26]. While much research has been done over the past decade on online communities in general, and contribution-based communities such as Wikipedia and F/L/OSS [36], there has been comparatively little done on communities engaged primarily in aesthetic and artistic production (see [19] for one recent example). Additional work in describing the similarities and differences of these latter communities will be increasing salient, given the rapid rise of user-generated media sites (such as Youtube, flickr, etc) where subjective activities such as individual self-expression, presentation of self and aesthetic production are often primary goals, rather than the more objective outcomes of Wikipedia, for example (again, see discussion in [19].) For purposes of brevity, we focus more specifically on variation between members in communities, and how that might affect engagement in creative communities.

There are many possible forms of member diversity in a given community. For example, Lave discusses different roles for newcomers and old-timers [17]. Zagal and Bruckman's description of Samba schools [38] emphasizes the diversity of membership that exists in these cultural institutions, a pluralism that spans ages, sexes and socio-economic status. Others have motivated a concept of "learner-centered design" in part by criticizing the assumption of homogenous user populations tacit in "user-centered design" approaches [28].

Enacted and social definitions of practice are potentially problematic in the case of groups containing a high degree of diversity, where overlapping communities of practice are present or where individuals must negotiate variable social roles. These tensions will likely be intensified in the case of heterogeneous online groups, given what is known about the additional challenges to communication, collaboration and creation of common ground by the fewer social, physical and sensory cues present in computer mediated communications [31, 22, 16].

Differences between community members should be particularly relevant in regards to creative activity. Research on the role of motivation in creativity has demonstrated that there are both positive and negative effects on particular aspects of creativity. For instance, Amabile's meta-analysis [1] of intrinsic and extrinsic motivational factors has demonstrated a complicated and nuanced set of effects at different stages of the creative process. Even subtle differences then between the motivations of different user populations in creative communities will impact their creative activity and their interactions.

What constitutes a valued contribution of creative practice to a community is then highly contextualized. Assessment will be driven by the domain of activity, but also driven by social construction of meaning and identity, generated both from within (by the individual participant), as well as from without (by the community/context). This intersubjective and bi-directional notion of legitimate participation is supported also by the Community of Practice perspective [37], emphasizing the individual's process of negotiating multi-membership across multiple communities of practice as a key process in identity formation.

3. CASE: REAKTOR

Driven by the increasing power and decreasing cost of computers, recent decades have seen a dramatic popularization of approaches to music composition and audio synthesis previously accessible only to professional composers and academics. For instance, digital multi-track audio recording was once reserved for expensive recording studios and specialized computer labs, but is now possible with free software on any audio-equipped PC. Similarly, techniques such as granular synthesis and image-to-sound translation that were once primarily the domain of avant garde composers are now available as part of the default presets of consumer level synthesizer plugins. The laptop is now a common "instrument" on many concert stages and in DJ booths, used in service of nearly every popular music genre, as well as helping spawn new genres in its own right [6].

For many musicians, composers and performers, one of the most appealing aspects of software tools is the great degree of flexibility and customization they make available to the user. This is particularly the case for visual programming toolkit environments such as MAX/MSP, PD, Reaktor and Synthedit. Drawing on visual and functional metaphors taken from circuit

diagrams, programming flowcharts and physical modular analog audio synthesis, users of these software tools can create virtual musical instruments, performance interfaces and audio composition tools by drawing connections between small functional units (such as oscillators, filters, audio samplers, etc). These software environments allow much of the tool customization, expandability and flexibility available to programmers writing code, but with a reduced learning curve and wider appeal due to their visual interface model. They also support tool-sharing and reuse, as custom instruments may be distributed to other musicians using the same program. These production environments have grown in popularity over the last decade, developing large user bases aimed at fostering innovative artistic practices. Even though there are tens of thousands of users for these production systems, much of their interaction is online; the primary context for practice development and transmission in these communities is virtual and technologically mediated.

This study examines a specific user community focused on one particular toolkit environment, Native Instruments' Reaktor software¹. Native Instruments (NI) is a German software company that produces music and audio software; Reaktor is a commercial product, in its fifth major version at the time of data collection. In Reaktor, users take a pre-existing set of low-level components called "modules," and connect them together into larger functional units called "ensembles." These ensembles can be thought of as complete programs for sound generation, are used for recording, processing sound, and performing. Once put together into functional ensembles, users can ignore the flowchart-like representation of the "Structure" view (figure 1), and interact with the finished units via custom on-screen controls in the "Panel" view (figure 2) or with standard electronic music interfaces, such as MIDI keyboards.

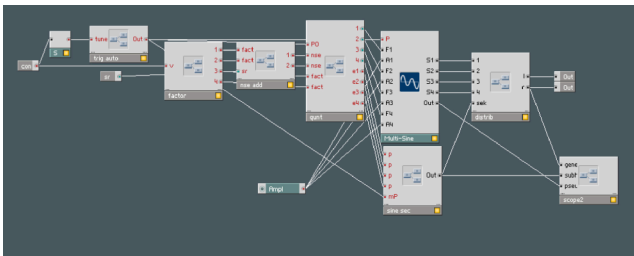


Figure 1: A Reaktor ensemble's Structure view.²

Users of Reaktor need not design their own ensembles to make use of the program. A set of ensembles ships with the program, and "Premium Libraries" of professionally-designed ensembles have been periodically marketed by the company. In addition, any user who creates his/her own ensembles may share them with any other user. One of the primary modes of sharing ensembles is via the "User Library," an online collection of over 2380 ensembles (as of December 2006, when the participant observation portion of this study was concluded) accessed via the

¹ http://native-instruments.com/index.php?id=reaktor5_us

² All Reaktor images are sourced from the Native Instruments website, and reproduced here for illustrative and academic purposes only. No claim is made to the ownership of the images or the software represented therein, which are © Native Instruments.

"Community" section of the NI website. This archive is accessible to all registered users of Reaktor, and is comprised entirely of user-made ensembles that were contributed voluntarily since its inception.



Figure 2: A Reaktor ensemble's Panel view, showing custom UI.³

Each ensemble contributed to the User Library is associated with a web page that features related information, including a textual description, creator credits, a comment section for Library users to leave feedback, a numerical user rating, screen shot and optional sound samples. Norms of practice and community behavior are learned and transmitted in two primary locations on the Native Instruments website: in the User Library (via attributed comments, anonymous voting, and contributed ensembles) and in the User Forum (via a threaded discussion board).

A key characteristic of the software, particularly relevant to the concerns of our study, is that the open structure of Reaktor ensembles has been designed to allow for a flexible degree of reuse. Ensembles may be used as-is, customized, or ripped apart and reused piece by piece (like "LEGO blocks," to use a metaphor provided by two interview participants) in new constructions. This level of modularity and reuse is possible because the construction details of each ensemble are inherently open to all registered users. That is, not only do Reaktor's users have the option to explore an ensemble's inner workings, there is literally no way currently built into the software to prevent this. Unlike stand-alone programs, or tools built with some competing modular audio software (such as MAX/MSP or Synthedit), Reaktor ensembles at the time of this research were not able to be compiled into a program that will work independently of the host software, nor can they be encapsulated or encrypted. Users cannot restrict entrance to inside workings of Reaktor ensembles; anyone with the software and the motivation to look has full access to the "blueprint" of their construction.

The Reaktor online community provides a robust case in which to examine issues of participation and creative practice. Both the User Forum and User Library are active and dynamic spaces; at the same time the community is highly centralized, with the majority of Reaktor-related activity online occurring in these two related locations. This focus provides both a pragmatic and conceptual bounding for this analysis.

³ Image of the "Sofa" ensemble, uploaded to the NI User Library by user Jo Oheim.

4. DATA & METHODS

This research project included two years of participant observation, conducted in 2005 and 2006, as well as a statistical analysis of contribution patterns. Directed by a critical incident that arose during the participant observation (described in 5.3 below), this paper focuses on two sources of data: qualitative analysis of a month-long set of forum threads, and semi-structured interviews with members of the community.

The primary data was taken from online textual conversation in the Native Instruments Reaktor User Forum. The forum data was analyzed via qualitative content coding [20]. Content coding was used to identify thematic issues related to community participation and engagement, as well as determine presence of agreement and disagreement. We examined the 164 threads in the user forum that were active during February 2006; initial collection and coding was conducted in March 2006. This data was chosen for several reasons. First, a month provides a pragmatic and logical time delineation. The Reaktor online community and the Reaktor software are both dynamic, and several large updates (versions 5.0 and 5.1) had been released in the year prior to the thread analysis. At the time of data coding, February represented a frame of time that was recent enough to capture the user community's current behavior in response to the current functionality of the software, but far enough into the past that most conversational activity had ceased in the threads in question.

To conduct the thread analysis, we first identified the specific threads containing discussion related to the issues of valued practice and community contribution. Next, each of the selected threads was coded for the presence of agreement/disagreement, specifically in reference to issues of practice and contribution. Finally, an iterative and open-ended round of coding was used to identify topics of discourse in the selected threads. The specific coding categories were emergent, arising through this iterative process, though they were clearly influenced by the issues raised in the original critical incident [33]. The coding categories related and influenced one another, therefore we allowed for overlapping codes. Technical debugging messages were not coded as relating to creative practice unless the thread also included some sort of additional value judgment, reference to community norms or meta-cognition. When quoting multiple users from the thread data, we will refer to them as *User A*, *User B*, *User C*... for purposes of clarity and anonymization.

Secondary data was provided by eight semi-structured interviews, conducted via phone and email in March through August 2006. The interview participants were chosen via purposive sampling, targeting active members of the Reaktor online community who contributed comments in both the User Forum and User Library, as well as uploading multiple ensembles to the User Library. In addition, a NI company representative was also interviewed. The interview data were used to verify topics that arose during thread coding and provide additional contextual description. When quoting from interviews, participants will be anonymized as *I1*, *I2*, *I3*, and so on.

5. FINDINGS

5.1 Characterizing the Community

The creative practices visible in the Reaktor online user community centered on the use and customization of the software. A primary focus of the Reaktor user community is developing and transmitting their creative customization practices through the

construction of ensembles ("building," in community parlance), as well as developing the community and Library, a socio-technical system that facilitates those creative activities. This socio-technical system involves engaging in work with the software but also developing and maintaining the local cultures and norms for reinforcing participation.

The community was not monastic in focus; there were occasional discussions of art, music and aesthetics in the user forum. There are also the inevitable off-topic comments that appear in any online forum, such as discussions about politics and current events, personal conflicts, and general rambling. For the most part however, the Reaktor user community was prompt and strong in enforcing norms for being cordial and staying on-topic. The company further facilitated these processes by providing separate "free-for-all" discussion areas where less-focused participants may rant and flame without disrupting the primary community forums, and by granting moderator privileges to core community members.

Individuals come to the Reaktor user community from a wide variety of backgrounds and skill sets. Certain common characteristics were visible in the interviews, and thus are presented here for purposes of grounding and contextualizing our analysis. First, none of the community members interviewed came to their work with Reaktor *tabula rasa*; some brought with them prior related experience in music composition and performance, some had programming experience, still others arrived with both. For example, one participant described his background as "*an instrumental composer*," who "*wrote complex euro scores for small ensembles by hand*." He originally felt that electronic music was "*cheating*" before warming to it in the 1990s [I2, 3/22/2006]. Another user spoke of his undergraduate degree in music composition, and described his professional work as an audio producer and engineer for commercial television. A third participant emphasized his background in computer programming, characterizing himself as a "*kind of a geek*" with musical leanings who had come to Reaktor after spending several years building analog synthesizers by hand.

Several of the interview participants emphasized the desire for greater tool customization and a related drive toward experimentation that led them to Reaktor. These participants spoke of the excitement that came out of their first experiences and development of skill with the software. "*It just reminded me of the feeling you get when you're a kid like playing with LEGOs...It gave me this mad scientist feeling*" [I8, 8/04/2006]. Participant 1 spoke in similar exploratory language of his early work with the software, saying that he spent hours "*like a scientist looking at a rock from Jupiter*" [I1, 3/21/2006].

Within even this small set of interview participants, there were a mix of professionals of various stripes (musicians, music professors, studio engineers), would-be professionals, and avowed amateurs who stated a strong desire to keep their work as purely an avocation. As we will see, this variety of professional and amateur backgrounds will have implications for understanding important dynamics of participation in the community.

5.2 Critical Incident

During our participant observation in the community, we witnessed a critical incident that focused our attention on user attitudes toward participation and contribution. In mid-2005, a professional electronic musician contributed a performance-oriented ensemble to the Reaktor community as an adjunct to an

on-site profile of this artist by Native Instruments. The ensemble was one that the artist used in his own music production, and had a streamlined Panel interface designed for clarity and ease of use in live settings. In contrast to the clarity of the Panel layout however, was the layout of the ensemble's Structure view.

The musician had taken explicit steps to protect his ensemble construction through obfuscation of labeling and the arrangement of components in the structure view; essentially, the normal flowchart-like arrangement of the structure had been compressed into a poorly labeled lump (see figure 3, and contrast with the flowchart style Structure in figure 1).

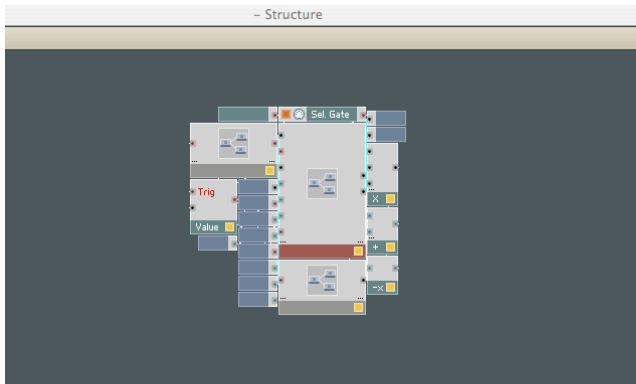


Figure 3: Obfuscated Structure layout of Reaktor Ensemble in critical incident.

These actions helped spur a particular contentious discussion thread in the User Forum. In the Reaktor user community, many members sanction against confusing or intentionally obscured ensemble programming, as a poorly organized or poorly labeled structure discourages convenient reuse and inspection of others' work. The discussion forum thread we observed in this critical incident demonstrated the strong and conflicting feelings held by members of the community at the time. Below, two users react negatively to the obfuscated ensemble, presenting a pro-sharing stance:

User A: *this concealed programming, as well as the idea of paid ensembles, almost completely kills everything i love about the reaktor community and the reaktor concept*

User B: *i agree with you... those comments [by the author justifying his layout] disgust me... i think it would be a tragedy if Reaktor moved further towards obscurantism and commodification.*

User A: *i just cant see how bad it can be letting others learn from your own designs, its really the only way to learn this program.*

A third user replies with an equally strong defense of the obfuscated ensemble, justifying it as protection strategy:

User C: *People should be more appreciative and less critical about sharing. I am also pretty sure some of the most wicked reaktor creations will NEVER appear in the userlibrary and taking some simple steps to PROTECT THE INTEGRITY OF YOUR EXPRESSION is not only your right but indicates your own artistic emphasis on sound vs structure.* [thread start date: 8/23/2005]

When a critical incident such as this occurs, we see the norms, values and concerns of a community revealed. This particular incident showed us the need for understanding how different

modes of participation restructured online support for creativity and community contributions.

5.3 User Forum Thread Analysis

During the review period, the majority of 164 threads in the User Forum focused on technical troubleshooting concerns, but we classified 28 threads as including discussion about community participation and contribution. These discussions arose in a variety of conversational contexts, often in presented as a sidebar comment or meta-commentary in the middle of a more technical problem-solving conversation.

Four recurrent topics regarding community participation and engagement emerged in our coding, and were further investigated in follow-up interviews: *contribution assessment*, *support for learning*, *perceptions of audience*, and *tensions around commercialization*. Each of these topics is discussed individually below.

5.3.1 Contribution Assessment

Analysis of discussion about participation revealed a complicated and contingent set of agreement and disagreement. The first topic in which this discourse can be seen is that of *contribution assessment*. This theme encompassed discussion about all forms of contribution to the Reaktor community in both the User Forum and User Library, including contributions of ensembles, as well as of assistance and commentary.

Users often publicly reinforced contributions, and the behavioral norms supporting contribution were fairly common in the User Forum threads. Sometimes these statements of reinforcement concerned the contribution to public knowledge and practice formation in the forums:

please ask me any questions. Id say to email me, but I think a public discussion here would be good for others to learn about [the thread topic], and I like helping out, as this forum has been good to me and Reaktor knowledge is one of the few things that I can really help folks with. [Thread start date: 2/02/2006]

Other cases concerned highlighting specific ensembles, reinforcing exemplary contributions. In the following example, a user noted he was evaluating a given ensemble across a variety of criteria, including sound, ease of use and appearance:

I wanted to bump this [thread] so anyone else who hasn't downloaded this [highlighted ensemble] will give it a whirl... it sounds unbelievable, it's very easy to set up controllers so you can play it, and it's straightforward to program. Incredible achievement. And it looks really cool. Which is a plus. [Thread start date: 2/07/2006]

When disagreement about contribution value was present, it usually appeared as driven by confusion or lack of common ground, rather than outright conflict or antagonism. For example, in a conversation about the "best" user-created Reaktor 5 ensembles, this exchange took place:

User D: *Go here: [url to ensemble] This definitely is My No1 User created ensemble. No question...*

User E: *I don't get it. I downloaded it. It doesn't come w/any loops or snaps. Loaded some stuff in but it's not blowing me away. What does it do?* [Thread start date: 2/23/2006]

Though rare, different personal opinions occasionally surfaced in reference to the value of particular kinds of contribution. In a thread about the value of contributing “snapshots” or “snaps” (saved settings for existing ensembles) as opposed to new ensembles, the following exchange took place:

User F: So if NI would try to add value to Reaktor, 5000 snaps [for a single complicated ensemble] would be more value than 5 new ensembles with 100 snaps each.

User G: 500 presets to wade through? No thank you! Let alone 5000. [Thread start date: 2/14/2006]

Here the two users are differing about where Reaktor development effort would be best-placed – expanding existing ensembles versus creating new ensembles.

In another thread, three users discussed that they gravitated to “sample transformer and effects” ensembles (that is, units which processed existing sounds, rather than generating new sounds from scratch), causing one to comment, “Haha, I do that too! Who needs synths eh?” [Thread start date, 2/7/2006]. In this example, we see priority being given to ensembles that support one set of electronic music techniques (audio processing) over another set (sound synthesis).

Despite these occasional differences of priority, the importance of public evaluation and acknowledgment of contribution was clear. Contribution of ensembles and expertise serves both to establish individual reputation as well to sustain the community as a whole, building up the library and forum as a functional resource and as a form of social memory for creative practice.

5.3.2 Support for Learning

Another prevalent and recurring topic related to learning, specifically requests for and discussions of particular contributions that supported learning. These discussions were often situated in threads containing commentary and complaints about the existing documentation:

can anyone give me an idiot-proof guide on how to set it [a particular ensemble] up? I've tried following instructions in the documentation (which reads like Urdu to me), and using the demo, all with no luck. [Thread start date: 2/14/2006]

Related discussions about the need for more tutorials and learning opportunities also occurred on several occasions:

I found it [a user-generated tutorial] great. It made stacked macros look really easy to use.... But what I would really love is for NI to invest in a great tutorial bringing us from an intermediate to a more advance level written by the reaktor gurus out there.. [Thread start date: 2/23/2006]

In a few instances, trouble-shooting threads showed instances of more experienced users providing directive scaffolding [23] and skill-level appropriate goal calibration for new users. In these cases, a specific plan or path was suggested to the novice users that would start them toward their stated goal:

give it [a proposed ensemble plan] a shot. Start by opening [related ensemble 1] or [related ensemble 2] and figuring stuff out. Report back here with any problems... [Thread start date: 2/07/2006]

The topic of contribution for supporting learning was not without disagreement, however. Requesting assistance is a common activity in the User Forums, but some means of doing so were treated as inappropriate. A request for help without authentic

reciprocal contribution (such as making a visible effort toward self-teaching) was more likely to be sanctioned against and result in disagreement. Stated another way, asking for help is fine and encouraged; asking for someone else to do your work for you is not. One example of this arose in a thread that began with a student asking for help on their homework: “hello i'm a music technology student and need some urgent help with my reaktor assignment for tommorrow.” [Thread start date: 12/15/2005]. Approaching the community in this manner generated some gentle mocking of his request and discussion about his degree program, but no substantive help.

In another case, a user started a thread entitled “Gimme some new sounds” which was viewed as overly demanding in tone by some community members: “Why don't you do you own research? It's not difficult.” [Thread start date: 2/26/2005] In third example, a new user posted a list of musical goals and tasks, and then asked: “Can reaktor do this for me?” To which a more experienced user replied: “no. ...but *you* can do it for you using reaktor. the user library is filled to the brim with oddities, many of which will give you part of what you're looking for.” [Thread start date: 2-21-2006]

As noted previously, any user who creates his/her own Reaktor ensembles may share these with any other user. In doing so, the ensemble contributor gives other users the opportunity to inspect the Structure of their layout, and to copy and paste portions from it. Thus each ensemble may not only be reused and repurposed, but can also serve as a learning object, a fully operational tutorial or mini-laboratory for situated learning. This property of openness also impacts on the way that users in Reaktor community of practice view, construct and relate to their audiences, as will be seen in the next section.

5.3.3 Perceptions of Audience

The topic of audiences appeared both in the thread analysis and in the interviews. In both cases, the results were at times conflicting and individualized. The theme of audience arose less frequently than that of contribution assessment, although when this theme did appear in the Forum, it often developed into some of the longest threads, providing some indication of the level of interest and strength of feelings in these issues.

In the thread analysis, the topic of audience was typically discussed in reference to NI or in reference to the related issue of commercialization of ensembles. (The topic of commercialization will be addressed separately in the next section.) When discussing the company as audience, members were typically proposing ways to trying to generate more acknowledgement and legitimization from the parent company for user contributions and participation. For example, one thread proposed new ways for the company to promote key users, including suggesting an approach of distributing company endorsed “stand-alone” ensembles:

whatever happened to those 'powered by NI' stand-alone Reaktor instruments used to give away as promotions in music magazines?... Does anyone feel that producing those polished-up...stand-alones more often, and producing them from popular instruments from the community/library, would help appease a lot of people who burn for [export options]? [Thread start date: 2/28/2006]

In turn, raising these topics would typically spur debate about the value, desirability and realistic prospects of seeking validation from the company.

Distinct types of audiences came up repeatedly in the interviews. One participant indicated that his perceived audience was artistic, comprised of “*people who make boundary-breaking music and are in love with unconventional sounds and forms.*” [I2, 3/22/2006]. He made a point to differentiate himself from those in the community whose goals and audiences were more oriented toward technical and programming achievement:

some builders find their greatest personal payoff in programming, or dsp theory, or emulating existing instruments, or architecture, or panel display, or technical innovation. this is almost never true for me. [I2, 3/22/2006].

In contrast, another participant indicated that his audience was primarily (but not exclusively) the other builders in the community, and those who would appreciate his technical skill:

It's really the more technical builders than the musicians. An email from [well-regarded long-time builder] saying 'hey, great job' would be great – 'oh man!'... Ultimately, it is what you can do with it musically, that's the point...but the things that I'm proud of about it, are not necessarily the ones that a musician would pull out. [I1, 3/21/06]

Finally, participant 3 suggested that he subdivided audiences in another fashion, by musical genre, saying “*my uploads are targeted to the IDM people⁴ (hence the names of the ensembles)*” [I3, 4/10/2006]. In a follow-up question, participant 3 clarified that this genre-based classification represents his perception of the Reaktor user community as a whole, stating “*I think most Reaktor users are IDM people. Occasionally you recognize a Trance artist and a Hip-Hop artist. They don't seem to hang around for very long.*”

5.3.4 Tensions Around Commercialization

In the coding, the topic of commercialization was related to both concerns of audience and the technical issues of exporting Reaktor ensembles. At the time this study was conducted, small-scale attempts to generate a secondary market in ensembles had been attempted, though none had shown signs of large-scale economic success. The inability to compile or export Reaktor ensembles has been one key sticking point in this process. As previously noted, in the current version of the software, any Reaktor ensembles are inherently “open” in that anyone using the software can examine the structure view, and cut-and-paste or reverse engineer a commercial ensemble. Some users tend to promote this characteristic of the software as contributing to the community’s culture of contribution; other framed this as a missed opportunity for the company and for would-be professional ensemble builders.

Many of these issues are demonstrated in a thread initiated on 2/19/2006. The originator of this thread promoted the idea of a free run-time library (that is, a limited host program for running but not editing ensembles) for the intention of allowing users to demo their Reaktor creations for non-Reaktor owners. Though initially presented as a way to showcase individual builders’ work to a wider audience, the thread quickly evolved in a debate about the merits of commercialization, the trade-offs of different technical models that would facilitate or hinder

commercialization, and potential effects on the company and community:

User J: I don't see why having the option to export your work as a...plug-in would harm the community in any way... I know that there are others [like] me that wish Reaktor would develop into a development environment for effect and instrument plug-ins... It's very obvious to me that NI is missing the chance to establish themselves in this market.

User K: 1. the probability of your earning decent money [selling ensembles] (rather than a few hundred \$ per year) is low... 2. the best thing about reactor is its community...doing what you're talking about could undermine this community, which would be a real shame.... 1 and 2 are strong arguments for leaving things the way they are. Even better: take your building energy and use it to give gifts to the community. [Thread start date: 2/19/2006]

While users in the forum threads tended to take a clear stance for or against commercialization, the interview participants typically presented a more set of ambivalent opinions about this topic. One participant noted that he uploaded his ensembles “*always for free.*” [I2, 3/22/2006] When asked to follow up on the issue, he stated:

music is my gift to the world; compositions, reaktor ensembles, samples, etc. i want it to go out and become part of the world, help others, inspire others, challenge others, perhaps even delight others. ;-) but that's me. [I2, 3/29/2006]

Yet, the prospect of others commercializing their work spurred a more mixed response for this subject. After stating his feeling that widespread commercialization would harm the user community, I2 was reluctant to pass sweeping judgment on those that promoted it:

in terms of people selling their ensembles ... who am i to object? it's their decision, their way of seeing the world. it would be a shame if the sharing that goes on in the reaktor community would diminish due to commercialism; but i don't see that happening (at least not now).

Participant 1 mentioned that he preferred to keep his Reaktor work as his avocation, noting that: “*The difference between a job and a hobby... with a job, it gets tedious and even when you don't want to do it, you have to do it.*” [I1, 3/21/2006]. But at the same time, he did not object to others trying to sell their work, stating “*I'm really indifferent about it. I wouldn't build ensembles for money, but...*”. His ambivalence, however, was less derived from an ideological position as from skepticism of the viability of such a commercial enterprise: “*I can't really imagine that there would be many ensembles that I would actually pay for. But if they could get someone to do so, could find a market, more power to them.*”

6. DISCUSSION & ANALYSIS

In this examination, we see how these four topics are deeply intertwined, and how each will impact the types of participation and contribution that users make to an online creative community. The form, quality and specificity of ensemble contributions affect the Reaktor community’s ability to use, reuse and learn from those contributions. Supporting more effective learning in turn supports and develops both individual practice and a robust community. As a form of reified practice, a Reaktor ensemble has not only its specific intended functions of sound production, but

⁴ IDM is an acronym for “Intelligent Dance Music,” a specific genre of electronic music. Interviewee 3’s later mentions of Trance and Hip-hop also denote specific musical genres.

through the visibility of its structural layout can also be viewed as a way of conveying an embodied set of decisions about construction, use and constraints. Each ensemble, by revealing its construction, carries messages of *possibility*, “this can be done in such-and-such manner,” and *priority*, “I think such-and-such problem should be addressed this way.”

However, different audiences will motivate, authenticate and evaluate contribution in distinct ways. Thus different audiences thus will indirectly shape the form, use and genre of practice contributions, in Reaktor or any other creative community. The persistent internal audience of the Reaktor community provides members with access to learning and problem solving assistance. The presence of the user community is thus an incentive in its own right for individuals to become more active participants themselves. Again, individual creative practice becomes intertwined with the maintenance and expansion of the creative community as well.

In the data presented here, commercialization of creative practice arises as a particularly charged theme, in part because it has the potential to drastically influence all of the other topics that arose in our analysis (contribution assessment, learning support, perceptions of audience). A drive toward commercialization of ensembles in the Reaktor community may impact freely shared contributions back to the User Library, reducing the community building effects and social memory associated with that collection. Yet the monetary incentives that could result from commercialization clearly would serve as motivation for some users. We believe the salient issue is not commercialization per se, but specifically commercialization of practice, since that is what impacts the ability of the community to build and sustain itself. The sanctioning and dispute that we saw among users in regards to this issue was not directed at those that wanted to make money off of their music, but off of the tools that can be used to make the music, the embodied practice inside each Reaktor ensemble.

Thus there exists a fundamental tension in the dynamic between free sharing of creative practice and protecting creative practice. As we saw in the critical incident presented in section 5.3, commercially oriented users may choose to protect the market value of their work by limiting ensemble’s functionality for reuse, expansion and learning. Such users may also decide not to contribute their work at all to the community. At the same time, the presence of free community contributions (in the form of ensembles themselves or in the unpaid assistance provided in the forums) pushes back and hurts the market for commercial ensembles. As one interview participant noted, “*there’s just so much good stuff in the library that I have a hard time seeing why people are going to spend money unless they think it’s just...great.*” [18, 08/04/2006].

Commercial motivations are an unavoidable force on creative activity situated in a market economy. But these motivations and counter-motivations also will clearly shape the practices and contributions of creative communities, and thus require attention of researchers in this domain. The topics of commercialization and audience in particular suggested to us that tensions in the valuation of creative practice are likely to occur between amateur and professional social roles. How to untangle and understand these interactions between these groups? Sociologist R. Stebbins’ [32] studies of “serious leisure,” provide a lens through which to examine the different social roles of amateurs and professionals in communities such as Reaktor’s. This role distinction is not related to skill level; here, amateur does not mean novice. Rather, we can

visualize continuums of skill level and social role as being plotted along two distinct axes, a first step at disentangling roles, motivations, and attitudinal stances.

The user innovation literature provides additional examples of how the varying motivations and audiences of amateurs and professionals may impact the development and sustainability of creative communities. In [15] researchers surveyed an online “mod” (user modification) community for Rebirth, a commercial music synthesizer program. Through their survey, the authors ascertained that users who self-identified as professionals were less likely to contribute innovations back to this community. This was attributed to there being “no competition among users or no lost rents from free revealing” for amateurs, whereas for professionals, “secrecy would often be a pre-condition for reaping the benefits of a given innovation.”

Yet while highlighting and attending to the different modes of community engagement for creative amateurs and creative professionals interactions, we must also take care not to oversimplify or reify these roles. While amateur and professional stances may be in tension, it is important also to emphasize that these roles are not intrinsically antagonistic; both also share some sympathetic goals. Though professionals may have lower incentives to contribute freely to a practice community, they do still *benefit* from the sharing of amateurs. Contributing their custom Reaktor ensembles to the community may not be in a professional musician’s economic self-interest, but having access to a large and active library of freely shared custom ensembles built by others would be advantageous. Thus professionals may tend to encourage amateurs to contribute their creations, even when they do not directly reciprocate with contributions of their own instruments or expertise. A simple dichotomous model of professional/amateur motivations and contributions in online creative communities is thus not only a misreading of the literature, but also misrepresents the reality of the situation.

Intentionally designing for interactions between diverse sets of users in a community may in fact aid in facilitating creativity. Fischer’s research on social creativity [9, 10] emphasizes the important role of externalizations in generating creative solutions to design problems, particularly when serving as boundary objects that span different practice and interest communities. Design problems, asserts Fischer, are characterized by a “symmetry of ignorance,” where no single stakeholder holds enough knowledge to solve the problem in isolation. The symmetry of ignorance concept underscores the fact that no one group alone holds the key to driving and understanding activities within online creative communities. As such, we must be attentive to identifying and addressing multiple user needs concurrently as we design the next generation of creative support technology.

6.1 Implications for Future Work

We conclude this paper by highlighting two implications for future work.

6.1.1 Expanding our Understanding of Amateur and Professional Participation

Our findings suggest that the issues of commercialization of practice may be particularly contentious in creative communities, and that the relational roles of amateurs and professionals may provide one lens through which to approach this topic.

Future analyses should attend to amateur and professional roles in the context of creative communities, while also attempt to unpack

each role into their related clusters of traits, such as willingness to contribute, desire for peer validation, desire for remuneration of contribution, and so on. Stebbins, for instance, suggests that the difference between amateur and professional social roles finds expression along five attitudinal dimensions: confidence, perseverance, continuance commitment, preparedness and self-conception [32]. These dimensions vary both quantitatively and qualitatively between these two roles; professionals and amateurs are different both in the amount and character of their continuance commitment, for instance. Each of these attitudinal dimensions may impact the contributions and forms of participation made by members of online creative communities.

In addition, a better understanding of the effect of amateur and professional attitudes in creative communities not only illuminates these two roles, but sheds new light on emergent hybrids such as “prosumers,” “produsage” [5] and “pro-ams” [18]. Examination of amateur and professional engagement in the context of creative and aesthetic communities also provides a comparison reference for similar studies examining participation and motivation in Open Source Software and Wikipedia. For example, recent work into leadership in creative collaborations [19] demonstrated a set of organizational needs and strategies distinct from those documented in software development settings.

6.1.2 Attending to Heterarchies of Value

In [34], Turner applies Stark's concept of *heterarchies* to help explain the multiple social, economic and reputational motivations that drove participation with the WELL electronic community. In heterarchies, summaries Turner, "one encounters multiple, and at times, competing value systems, principles of organization and mechanisms for performance appraisal." Rather than destroying communities, heterarchies can help create value by inviting multiple concurrent assessments of the worth of a contribution. This seems a particularly fitting concept in the context of the Reaktor community as well. We can see expression of this in the different audiences flagged in our data – varying by musical genre, as well as varying in placing primacy on building expertise versus aesthetic or ideological concerns (as noted in the quotes from I1 and I3 in sections 5.4.3 and 5.4.4 above).

One design solution in response to this could be the intentional manipulation of feedback and audience targeting as appropriate for different user valuation schemes. For instance, the typical quality and popularity metrics in user-contributed content sites, such as 1-to-5 star rankings or leader boards, may be inappropriately competitive for some amateurs' audience models. Simple ranking metrics may be useful for organizing a market of content, but are not in alignment with the concept of heterarchies of value. For some users, popularity metrics may be ignored or even de-incentivizing, tacitly suggesting to amateur users that their creative media is not welcome on the system. Appropriate feedback design for these users might remove ranking metrics entirely, perhaps replacing them with an indication of the percentage of a target audience that has accessed a given creative product. In the case of professionals, a simple toggle setting to differentiate between work-for-hire and work-for-promotion might trigger a set of automatic watermarking and quality adjustment functions. In our study setting of Reaktor, these functions might include down-sampling audio quality, or reducing the number of presets included with an ensemble.

Another possible approach would be to encourage community structures that are supportive of heterarchies. As mentioned

earlier, [38] presented Samba schools as a model of community that successfully addressed a similar set of issues. In addition to the diverse populations that co-exist in Samba schools, the school structure is also able to successfully support transient members and outsider participation. Support takes the form of both social mechanisms and structured opportunities for authentic contribution to be made by less-engaged and/or less-skilled members. There is a need to explore more organizational forms in regards to creative communities of practice, both as descriptive and analytical frameworks, as well as prescriptively for community design.

7. CONCLUSION

Reaktor is a live community, and has continued to grow and develop since this research was undertaken. The research described here is informed by our longer participation observation of the community, but is situated at a snapshot within the broader lifespan of the case community, and the community's feelings and responses about these issues have changed and evolved as time has passed. This snapshot, of course, has value in documenting a specific point in the development of this particular community, but more importantly our findings describe a set of concerns and issues that are likely to be echoed in similar creative communities. These findings include the four themes that arose regarding community engagement: contribution assessment, support for learning, perceptions of audience and tensions about commercialization. In our discussion, we considered the interrelationship of these themes. We then suggested that in future work, the concept of heterarchies may be instructive in addressing user diversity in online creative communities.

In this paper, we have highlighted that access and ability to reuse embedded practice in Reaktor ensembles as a key factor in this community. Reuse facilitates learning and sustains the community over time. Yet while the open character of Reaktor ensembles has supported practice transmission in the ways described above, we also note that designed openness in production tools is not the only viable strategy for a creative community. Other solutions are both feasible and actively deployed by other similar communities. For example, the MAX/MSP system has long facilitated the ability for users to distribute their customized musical instruments as stand-alone programs, directly encouraging a secondary market. An examination of the different responses and mechanisms in the MAX/MSP practice community to facilitate contribution, participation and learning would provide an informative comparison case to that of the Reaktor community.

We conclude by recommending to those who build systems for creative communities to be mindful in their design decisions about how and when to facilitate reward and reuse of contributions and embodied practice. In designing systems such as Reaktor, as well as their accompanying support infrastructure, (e.g. the User Forum and User Library), we must be attentive to the tradeoffs between incentivizing contribution via commercialization and the community building aspects that come from more open, more prototypically "amateur" contributions.

There is no one single solution for all creative communities, but as with any group-oriented technology, appropriate system design considers who benefits and who pays [13]. The core tensions outlined in this paper are not likely to go away. Instead, we must mitigate the tensions and respond to them in ways that are

appropriate to the goals of our technology and to the needs of the communities that we seek to support.

8. ACKNOWLEDGMENTS

We thank Beth Yakel, Libby Hemphill and Jennifer Thom-Santelli for their comments on earlier drafts of this work. We appreciate as well the thoughtful suggestions provided by the anonymous conference reviewers. Finally, we particularly thank the members of the Reaktor community for their participation.

9. REFERENCES

- [1] Amabile, T. M. (1996). *Creativity in Context*. Westview Press.
- [2] Arias, E., et al (2000). Transcending the individual human mind—creating shared understanding through collaborative design. *ACM TOCHI*, 7 (1).
- [3] Becker, H. S. (1984). *Art Worlds*. Univ. of California Press.
- [4] Bruckman, A. (2006). A new perspective on "community" and its implications for computer-mediated communication systems. In *CHI '06 Extended Abstracts*.
- [5] Bruns, Axel (2007) Prodsusage: Towards a Broader Framework for User-Led Content Creation. In *Proceedings Creativity & Cognition 6*, Washington, DC.
- [6] Cascone, K. (2000). The Aesthetics of Failure: "Post-Digital" Tendencies in Contemporary Computer Music. *Computer Music Journal*, 24:4, Winter 2000.
- [7] Candy, L. and Hori, K. (2003). "Creativity and Cognition" Comes of Age. *Interactions*, 10 (4).
- [8] Csikszentmihalyi, M. (1996). *Creativity: Flow and the Psychology of Discovery and Invention*. HarperCollins.
- [9] Fischer, G. (1999). Symmetry of Ignorance, Social Creativity, and Meta-Design. In *ACM Creativity & Cognition '99 Proceedings*. Loughborough, UK: ACM Press.
- [10] Fischer, G. (2001) External and shareable artifacts as opportunities for social creativity in communities of interest. In *Proc. of the Fifth Int'l Conference: Computational and Cognitive Models of Creative Design*.
- [11] Florida, R. (2004). *The Rise of the Creative Class*. New York, NY: Basic Books.
- [12] Getzels, J.W. & Csikszentmihalyi, M. (1976). *The Creative Vision: A Longitudinal Study of Problem Finding in Art* Wiley, New York.
- [13] Grudin J. (1994). Groupware and social dynamics: eight challenges for developers. *Comm. of the ACM*, 37 (1).
- [14] Huysman, M.H.; Wenger, E.; Wulf, V. (Eds.) (2003). *Proceedings of the First International Conference on Communities and Technologies*. Springer.
- [15] Jeppesen, L. B. & Frederiksen, L. (2004) *Why firm-established user communities work for innovation*. (<http://userinnovation.mit.edu/papers/jepfred2.pdf>),
- [16] Kiesler, S., & Cummings, J. N. (2002). What do we know about proximity and distance in work groups? In P. J. Hinds & S. Kiesler (eds.), *Distributed Work*. MIT Press.
- [17] Lave, J. & Wenger, E. (1991). *Situated Learning: Legitimate Peripheral Participation*. Cambridge University Press, UK.
- [18] Leadbeater, C., & Miller, P. (2004) *The Pro-Am Revolution*. Demos, London.
- [19] Luther, K. & Bruckman, A. (2008) Leadership in Online Creative Collaboration. In *Proceedings of ACM 2008 Conference on Computer supported cooperative work*.
- [20] Miles, M. B. & Huberman, A. M. (1994). *Qualitative Data Analysis*. SAGE publications, Thousand Oaks, CA.
- [21] Mitchell, W. J., et al (eds.). (2003). *Beyond Productivity: Information Technology, Innovation and Creativity*. National Academies Press, Washington DC.
- [22] Olson, G.M., & Olson, J.S. (2000) Distance matters. *Human-Computer Interaction*, 15.
- [23] Preece, J., (2000). *Online Communities: Designing Usability, Supporting Sociability*. John Wiley & Sons, New York.
- [24] Quintana, C., Namsoo, S et al. (2006). Learner-centered design. In Sawyer, K. (ed.) *Cambridge Handbook of the Learning Sciences*. Cambridge University Press.
- [25] Rheingold, H., (1993). *The Virtual Community: Homesteading on the Electronic Frontier*. Addison-Wesley.
- [26] Ribes, D. and Finholt, T. A. (2008). Representing community: knowing users in the face of changing constituencies. In *Proceedings ACM CSCW 2008*.
- [27] Shneiderman, B. (2000). Creating Creativity: User Interfaces for Supporting Innovation, *ACM Transactions on Human-Computer Interaction*, 7 (1).
- [28] Shneiderman, B. (2003). *Leonardo's Laptop: Human Needs and the New Computing Technologies*. MIT Press.
- [29] Shneiderman, B., Fischer, G. et al. (2005). *NSF Workshop Report on Creativity Support Tools*. (<http://www.cs.umd.edu/hcil/CST/report.html>).
- [30] Smith, M.A. & Kollock, P. (eds). (1999). *Communities in Cyberspace*. Routledge, New York.
- [31] Sproull, L.S., & Kiesler, S. (1991). *Connections: New ways of working in the networked organization*. MIT Press.
- [32] Stebbins, R. A. (1992). *Amateurs, Professionals and Serious Leisure*. Montreal: McGill-Queen's University Press.
- [33] Strauss, A. L. (1987). *Qualitative Analysis for Social Scientists*. Cambridge Univ. Press, UK.
- [34] Turner, F. (2005). Where the Counterculture Met the New Economy: The WELL and the Origins of Virtual Community. *Technology and Culture* 46.3.
- [35] Von Hippel, E. (2005). *Democratizing Innovation*. MIT Press.
- [36] Weber, S. (2005). *The Success of Open Source*. Harvard University Press: Cambridge MA.
- [37] Wenger, E. (1998). *Communities of Practice: Learning, Meaning, and Identity*. Cambridge University Press.
- [38] Zagal, J., & Bruckman, A. (2005). Learning from samba schools: Cultural institutions as learning environments. *Convergence* 11(1).