

Leadership in Online Creative Collaboration

Kurt Luther and Amy Bruckman

School of Interactive Computing

Georgia Institute of Technology

Atlanta, GA USA

{luther, asb}@cc.gatech.edu

ABSTRACT

Leadership plays a central role in the success of many forms of online creative collaboration, yet little is known about the challenges leaders must manage. In this paper, we report on a qualitative study of leadership in three online communities whose members collaborate over the Internet to create computer-animated movies called “collabs.” Our results indicate that most collabs fail. Collab leaders face two major challenges. First, leaders must design collaborative projects. Second, leaders must manage artists during the collab production process. We contrast these challenges with the available empirical research on leadership in open-source software and Wikipedia, identifying four themes: originality, completion, subjectivity, and ownership. We conclude with broader implications for online creative collaboration in its many forms.

ACM Classification Keywords

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

General Terms

Design, Human Factors, Management.

Author Keywords

Animation, Leadership, Online Creative Collaboration.

INTRODUCTION

The proposition that teams of geographically-distributed people—numbering two to 100 or more, speaking various languages, embodying different age groups, levels of experience, and skill sets—could voluntarily meet together online and successfully produce high-quality animated movies seems almost unbelievable. Equally difficult to believe, however, are the extraordinary successes of Wikipedia, the free online encyclopedia with over 2,400,000 English articles comparable in quality to commercial competi-

tors [17]; Linux, the open source operating system used by 40 percent of large American corporations [42]; Apache, the open source web server hosting half the world’s web pages [27]; and Mozilla Firefox, the open source web browser with which 19 percent of Internet users browse the web [29]. All of these projects were made possible through online creative collaboration, and a growing body of research in CSCW helps us understand how they work.

We define *online creative collaboration* as comprising two key properties. First, people communicate and meet each other chiefly via computer-mediated communication. Second, they do so with the purpose of working together to create new artifacts. Among the best-known examples of online creative collaboration are open-source software (OSS) and Wikipedia. However, online creative collaboration is a broad phenomenon, encompassing a wide variety of activities. Understanding the unique properties of different forms of online creative collaboration can help inform the design of online collaborative socio-technical systems.

In this paper, we report on a qualitative study of three online communities where collaborative computer-animated movies, or “collabs,” are made. Effective leadership is crucial to the success of these collabs. Aside from the well-documented challenges to distributed work [21], collab leaders must manage additional challenges presented by the open-ended problem domain of entertainment, namely originality, completion, subjectivity, and ownership. We found that because of these challenges, and little technological support to help collab leaders manage them, most collabs fail. That some collabs succeed, however, is remarkable, and a goal of this paper is to elucidate how it is they succeed. Specifically, our research questions are:

- How do members of online communities collaborate over the Internet to create computer-animated short movies?
- What challenges must leaders manage throughout the collab production process and how do leaders manage these challenges?
- What are the broader implications of these challenges for CSCW and for online creative collaboration?

Correspondingly, our contributions are:

- An empirically-grounded description of practices surrounding online creative collaboration in the open-ended problem domain of entertainment.

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.

CSCW '08, November 8–12, 2008, San Diego, California, USA.
Copyright 2008 ACM 978-1-60558-007-4/08/11...\$5.00.

- A characterization of two major challenges faced by online creative collaboration leaders while creating entertainment and how they manage these challenges.
- A discussion of these challenges vis-à-vis those faced by leaders of other forms of online creative collaboration.

In the next section, we discuss related work on leadership in other forms of online creative collaboration to contextualize our results and the discussion that follows.

LEADERSHIP IN ONLINE CREATIVE COLLABORATION

Weber [42] argues for an empirically-grounded understanding of online creative collaboration rooted in actual practices rather than abstract theories. Following Weber's example, we review what is known about leadership in online creative collaboration from the available empirical research.

Project Leaders

The most prominent leadership position in many forms of online creative collaboration is that of the project leader. Some project leaders contribute in a largely administrative capacity, while others remain active in creating content. Often, as in the case of Linux [33], the person who begins an open-source software (OSS) project occupies the position of project leader, typically until he or she chooses to relinquish it. For this reason and the fact that many project leaders have broad authority over the direction of their projects, they are often referred to, half-jokingly, as the "Benevolent Dictator for Life" or "BDFL". For Reagle [34], the "BDFL" title exemplifies such leaders' "seemingly paradoxical" roles within online creative collaboration. On the one hand, they lead seemingly egalitarian communities, while on the other, they also hold authority over them. Reagle's theory of "authorial leadership" proposes that project leaders leverage accumulated social capital and humor to mitigate backlash from occasional exertions of authority [34]. Such mitigation is necessary because "[h]eavy-handed control can deter participation" [38, p. 1008].

Alternative Leadership Structures

Not all examples of online creative collaboration employ the "project leader" model of authority, although many do (e.g., Linux, Wikipedia, Perl). A notable exception is the Apache project [15,27], in which top-level decisions are voted on by members of the Apache Group. These members are core developers chosen based on their contributions to the project, in the style of a meritocracy [15]. Nakakoji *et al.* [28], in their classification of OSS project types, refer to this leadership approach as *council-style central control*. In reference to Raymond's [33] cathedral-bazaar dichotomy, they position council-style central control alongside *cathedral-style central control*, in which a project leader maintains tight control over the direction of a project, and *bazaar-style decentralized control*, in which loose control facilitates many variations via forking. They also draw a connection between leadership approaches and the project's purpose. For example, more original projects tend to operate via cathedral-like central control [28].

Decentralized Leadership

As online creative collaboration projects gain more members, their leadership structure often changes. Project leaders may quickly find themselves outmatched by the amount of work to be done. As a result, new technical systems or specialized roles may be created [12]. In the case of Linux, one result was BitKeeper, a revision control system that supports project management in a decentralized fashion [42]. Similar systems, such as CVS, have been attributed to the success of OSS projects [19,46]. Bug tracking systems, like Mozilla, provide complementary features that have also been identified as a "cornerstone" [12] of many OSS projects. These technical solutions substantially automate or decentralize portions of the development process that were once left to the project leader to deal with manually.

This theme of decentralization is clear in the social solutions that have been adopted in online creative collaboration projects. In particular, specialization of roles is commonplace in large OSS projects [12,36]. Weber [42] describes the process by which authority in Linux was gradually transferred from Linus Torvalds, the project leader, to a set of lieutenants called "maintainers." Rather than developing new code, these lieutenants were responsible for reviewing other developers' code, integrating code into patches, and ferrying the result up to Torvalds for approval [42]. Other roles may include bug triagers, quality assurance leaders, and release managers [14,27,12]. Developers may self-assign these roles or be assigned one by the leadership in a given OSS project. When developers join OSS projects, they are often rewarded for specializing in one area [23].

Decentralization and specialization have also been observed in open-content publishing projects, notably Wikipedia. Forte and Bruckman [16] found that elaborate governance structures have evolved in Wikipedia to manage the massive influx of new users and content (currently over 10 million user-created articles). What began in 2001 as a project led by founder Jimbo Wales and editor-in-chief Larry Sanger now includes a multi-tiered hierarchy of access levels, including administrators, bureaucrats, and stewards [16]. Moreover, governance in Wikipedia is increasingly decentralized. Administrators wield more local authority and small "WikiProjects" within Wikipedia embrace conflicting policies [16].

STUDY AND SCOPE

Sites

We studied three online communities where members collaborate over the Internet to create computer-animated movies. Of these, we focused on Newgrounds [30], the largest online host of Adobe Flash animations and one of the 500 most-trafficked sites on the web [2]. Over 130,000 animations have been submitted by Newgrounds' over 1.5 million registered members. To corroborate our findings, we also studied two smaller online animation communities that can be described as satellite communities of New-

grounds.¹ Members of these communities collaborate among themselves and then submit the resulting animations to Newgrounds. We found that practices surrounding collaboration were generally consistent across all three online communities, although members of the satellite communities tended to be more close-knit, and many of their projects involved permutations of the same cohort of animators.

These communities host a huge variety of interactions. For this study, we focus on collaboration practices related to computer-animated movie production. Although most animations submitted to Newgrounds are “solo projects” (created entirely by a single animator), we focus on collaboratively authored animations.

Content Analysis

We conducted a quantitative study of the success and failure rates for collabs whose last post was created between September 2003 and September 2006. Data were collected via a Python script that accessed the discussion forums of Newgrounds and downloaded threads in which collabs were organized. We analyzed these 1,668 threads using a web-based software application we built for the study and inter-coder agreement metrics [25]. Two judges analyzed the data, coding for whether the collab had resulted in a completed animation. We found that over 80% of collabs do not lead to a finished animation. These results prompted us to focus our investigation on the challenges of leading successful collaborative animation projects.

Qualitative Interviews

We also conducted a series of in-depth, qualitative interviews with Flash animators between October 2006 and October 2007. Our questions followed a semi-structured format [37] and focused on participants’ experiences as members of collaborative projects in online animation communities. The average interview duration was about 60 minutes (min: 40; max: 90). With permission, telephone interviews were audio-recorded and fully transcribed. We analyzed this data using a grounded theory approach [40], in which data are iteratively coded based on themes and categories to produce a coding scheme. This scheme is re-coded and refined, allowing conclusions to emerge from the data. We corroborated our interview data with participant observation in these online communities over the same time period.

We recruited participants by email, online ads posted on the sites listed above, and “snowball sampling,” seeking a variety of participants. In total, we interviewed 17 animators, 14 by telephone and 3 by email. Participants included successful and unsuccessful project leaders, as well as Flash artists who had contributed to—but never led—collaborative projects. They represented a range of nationalities (6 countries), experiences (novice to expert), and ages (16 to 29), but all were male. Because we were interviewing Flash artists who typically expect to be credited for

their work, we felt it was appropriate to offer participants the option of receiving such credit [7]. At the written request of our participants, all names used in this paper are real names.

RESULTS: CHALLENGES FOR LEADERS

Designing the Project

A collaborative project, or “collab,” begins when an experienced member of an online animation community conceives an idea for a collaborative project. This member typically assumes the role of “leader,” creating an informal hierarchical structure [21] for the duration of the collab production process. One of the leader’s first duties involves acting as the designer for the project. Acting as a designer presents two tasks for collab leaders. First, the leader must structure his or her collab idea in a way that is feasible and comprehensible to other members. Second, the leader must propose this structure to the community and convince others to join. We describe these tasks in the next sections.

Structuring the Project

The division of labor in collabs is typically modularized. Specifically, it is the leader’s task to divide up a collab into animated segments, or “modules,” each of which can be claimed and animated by a different artist working independently from, and in parallel with, others. Massimo Maitan contrasted this modularized approach with the specialized, team-based or role-based approach more typical of professional animation studios:

Every author on Newgrounds likes to make their own thing. You wouldn't be able to give one person a job of storyboarding and one person a job of animating it and one person a job of recording the sound. It just wouldn't work. People have to do their own thing on Newgrounds, so it's a lot easier to just let them do their piece of animation and take a whole month to do it.

Such feelings of ownership preclude a highly specialized approach to collaboration. They also provide several implications for collab leadership. In support of Parnas’ [31] proposition that modularization reduces communication needs by decreasing the social dependences involved, we found that communication in collabs often flows vertically (between artists and the leader) but rarely flows horizontally (between artists):

They [the artists] didn't really have contact with the other members that much; it was just mainly through me. So I just have to get along with the other animators, but they really didn't have to get along with each other. (Joseph Blanchette)

One result of this vertical communication pattern is that collabs tend to feel more “collaborative” for leaders than artists, who, in contrast, tend to feel isolated:

I felt like I was working with people when I was running it. But when I was just creating a part, it just felt like, you know, just do your part and then turn it in and wait for everybody else to finish their parts. Kind of like working at an office, almost. Just turn in your report, and that's it. (Michael Frank)

¹ For privacy reasons, we do not identify these communities here.

Artists' limited communication with one another, coupled with their strong feelings of ownership over their contributions, creates an interesting challenge for the leader. As Grinter notes, "decomposition implies recomposition" [18, p. 393]; eventually, the leader must try to compile artists' submissions into an entertaining and meaningful whole. But how can this "extreme" form of modularization lead to a coherent result that people outside of the collab would enjoy watching? We identified two strategies leaders employ when structuring their projects to foster coherency among artists' contributions: specifications ("specs") and themes.

First, leaders generate a set of *technical specifications*, or "specs," for the collab that describe how the artists' submissions must be formatted. Common specs include dimensions, frames per second (fps), background color, duration, and version of the Adobe Flash software. They ensure that the leader can compile artwork submitted by multiple animators with unique computer setups and working styles without running into compatibility issues:

I think that you need to be really specific in terms of the technical requirements that you want from each person, such as, like, the frame rates, and the really technical stuff, because those will just...you have to give people really concrete boundaries in terms of how to put their movie together—not the creative part, but the technical aspects of it—in order for it to succeed to begin with. (Luis Castanon)

Leaders choose some specs with a particular aesthetic consideration in mind. For example, an animation drawn in the traditional, frame-by-frame-style at 24 fps better simulates the illusion of motion than one drawn at 12 fps, but requires twice as much work on the part of the artist. Other specs are conventionalized more arbitrarily. For example, because the default workspace size in Adobe Flash is 550 × 400 pixels, leaders typically choose it for the "dimensions" spec unless they have a compelling reason not to. As Becker explains:

Many of the things artists...do in coordinating their activities are chosen from among a range of possible ways of accomplishing the same thing, any one of which would be acceptable as long as everyone used it. [4, p. 56]

Second, the leader provides a *theme*, the content guidelines for a collab. Common themes include a story, a piece of music, a visual element, and an event, such as a holiday. For example, the "Valentine '29" (2007) collab's theme was the story of the infamous St. Valentine's Day Massacre of 1929 in which seven Chicago gangsters were murdered. The collab leader, Hans Van Harken, required all contributions to illustrate aspects of this historical event:

[For "Valentine '29."] we got one story and we split that story into chapters, each artist making a chapter, making it a continuous story with different styles in each chapter. I just thought it'd be cool because it's just, like, if you get key scenes in a story and each scene is developed by a different viewpoint, you really get like five different viewpoints out of one thing.

Themes, such as this story, provide the crucial unifying glue that binds together artworks from a variety of animators which may otherwise appear nonsensical or even random. Effective themes, like TODO lists in OSS projects [19], exploit tensions between individuality and conformity, freedom and restriction. On the one hand, themes are similar to specs in that they place constraints on animators and limit their creative freedom. On the other hand, these same constraints are held constant across all artworks submitted to the collab; each artist deals with them in a different way. In this sense, themes provide structure and focus for animators, allaying "blank page syndrome," and challenging them to express their personalities within the confines of the theme. In James Hole's words, "*If you give limitations to the artists, and they try to work inside this box, they can do really good [work].*" Successful results display creativity at the individual level while the theme's common restriction creates connections between artworks and invites comparisons and contrasts. Robert Westgate summarizes the relationship between innovation and convention:

If people are more free, people will come up with a huge range of ideas, and people won't get bored over the course of the Flash. But at the same time, they've got to be restrictive enough so that when the Flash is put together, it works.

Themes can describe a linear, continuous, or nonlinear arrangement of artists' contributions in the final animation. In a *linear* arrangement, the leader defines the relationships between segments before any animation work has begun. These arrangements lend themselves well to collabs with temporally-oriented themes, such as the story in "Valentine '29." In a *continuous* arrangement, the relationship between artists' contributions is determined in an improvisational fashion. These collabs, such as "The Red Line" (2007), resemble the 19th century Surrealist game "exquisite corpse" in which players passed around partially-obscured drawings for others to continue [1]. In a *nonlinear* arrangement, the leader decides on the relationships between artists' submissions only after he or she receives them all. Unlike linear arrangements, nonlinear arrangements are usually based on a conceptual theme, such as *Halo 2* spoofs or Mother's Day, rather than a temporal one.

Once the leader has decided upon the specs, themes, and arrangements that structure his or her collab, the next step is to propose this collab to the community.

Proposing the Project

A leader proposes a project by posting a "collab thread" in the community's discussion forums. From that point on, the collab thread is the locus of all activity. Artists ask questions, make comments, and share their works-in-progress via replies to the thread; likewise, the leader provides feedback and announces project updates there. To share files, collab participants often post links to external file hosting sites in the collab thread. In other words, collab participants "keep it public" via discussion forums much in the same way as OSS developers do so on mailing lists [19].

While OSS developers use mailing lists to maintain group awareness [19], they heavily employ bug tracking systems and revision control systems to support asset management and coordination [20,12]. Collab threads serve all of these purposes. To promote group awareness, many collab leaders shoulder the burden of posting regular progress updates in the collab thread. At certain points in the production process, such as when artists are signing up and need to be made aware of which parts are claimed and which are available, leaders must post these updates almost continuously. This “informational awareness” [11] is not ideal because leaders must expend additional effort to supply it. When they do not, artists are unaware of the collab’s status.

When a collab thread is posted lacking a clear explanation of its theme, arrangement, and specs, it is unlikely to survive. Artists often prefer a well-planned, clearly explained collab to spontaneity and revision. Luis observes, “*The more groundwork the person who’s hosting it has done usually decides how well the actual project...how well it does.*” Joseph Rooks offers a specific example from leading “The Clockcrew TV Collab 2” (2007):

People all had these different ideas and sometimes the ideas conflict with one another... Before I decided to announce [the collab] to the community I had to sit down and decide how I wanted to approach this myself, because I have a habit of diving in and announcing everything ahead of time and everyone’s just going crazy and I’m all confused about how I want to approach it. Everyone’s just left waiting for me to make my decisions.

By working out many of the potential issues beforehand, Joseph R. eliminates potential conflicts that may stall the project later on. In this way, “front loading” collab proposals with detailed plans not only helps artists know what to expect, but also provides solutions to likely problems before they arise. As a result, artists can avoid some of the difficulties of distributed teamwork [21] and spend more time working on content.

Managing the Artists

A common goal for collab participants is the swift release of their project. However, a collab is released only if animators deem it completed. Animators are not interested in releasing a mostly-finished animation and audiences are not interested in watching one. As Tyler Koch explains, “*The last thing I want to do is put out a project before it’s finished, unless I absolutely have to.*” For Joseph R., leading “The Clockcrew TV Collab 2” in secret until its release was an important part of the fun:

I had kept the movie above top secret the entire year and a half. No one shared their parts, no matter how frustrated they got, except maybe with a few friends... I think the secrecy contributes to the excitement when the movie actually came out and made it more enjoyable for everyone.

Leaders maintain control over their collabs unless they choose to relinquish it. In Massimo’s words, “*You’re the one who starts it, so you get to pick what happens.*” Hence,

many leaders feel responsible for ensuring the successful completion of their collabs, as Joseph R. explains:

A lot of people start collaborations and never finish them, because they—what a lot of people don’t understand is that when you start a collaboration, you have to hold the collab’s hand all the way through and guide it through every step of the way. You can’t just give people a theme and a few rules and say, “This is the deadline,” and expect it to get done.

This sense of responsibility compels leaders to assume a management role in their collabs, by recruiting, directing, motivating, keeping, and replacing artists as they deem necessary. The following sections detail the leaders’ specific duties for each of these managerial activities.

Recruiting Artists

Once leaders have posted their collab threads, they must then recruit artists. The simplest way to recruit is on a “*first come, first serve*” (Anders-Martin Meister, Tyler) basis, but as James Hole explains, the tradeoff is one of quantity—and a richer sense of collaboration—over quality:

If...everyone can join up and do a piece, and everything gets in, that’ll end up—you’ll get a lot of pieces and a lot of people will join, but the quality won’t necessarily be as high. But it’s more group-active, that sort of way. So...if you do it like, with everyone makes a part but you might not necessarily get in, the quality of the outcome is better but cooperation, the group work, isn’t as strong.

Alternatively, some leaders restrict admittance to artists with quantifiable success in the community. The Newgrounds Batting Average (BA), a measure of the average rating of an artist’s best three submitted animations, enables this form of gatekeeping. However, as Ross O’Donovan warns, metrics such as the Batting Average poorly account for many artists whose history of contributions belies their present talent:

When someone’s arranging a collaboration, they would try to keep in mind...not necessarily the batting average you see on Newgrounds, because there are people who are really talented artists, except they’re lazy, or they get a kick out of making crappy submissions to Newgrounds because they think it’s funny.

As a third option for recruiting artists, leaders may arrange a tryout competition and award slots in the collab to the contest’s winners. But tryouts make heavy demands of artists, particular those who do not make the final cut. They also tend to be emotionally taxing for leaders:

Rejecting people is always hard, especially when you know they spent at least a few hours working on something to participate in your vision for creating something and then you rejected them after they did it. It doesn’t feel right. (Tom Fulp)

The hardest part was just being selective about who joins... Just having to reject people, that’s pretty much it. Like expel them from school, or something like that. (Michael)

Finally, some leaders sidestep the admissions process altogether by recruiting artists whose work they respect or with

whom they have existing relationships. When this happens, a policy of active pursuit often yields the best results. For Kraig Phillips, such “badgering” is often essential for securing his involvement: “All the other collabs I’ve joined [besides two] I’ve done so because I was personally and repeatedly asked to join.” Joseph R. provides a leader’s complementary viewpoint on this style of recruitment:

Waiting for people to sign up versus actively pursuing particular people you want to participate is going to make a difference in the quality of the animation. Because if you’re just waiting around for people to come to you, you’re going to get the people who are bored, people who have the free time. But if you go asking people who are well-known animators who might be interested, but they might be sitting on the fence and don’t want to jump in, going after people and being persuasive really helps to shape your project in the way you want it to be shaped.

Leaders, in summary, adopt several strategies for recruiting artists, including “first-come, first serve,” Batting Average restrictions, tryouts, and badgering. Once an adequate number of artists have been recruited, the leader’s next task is to provide creative direction for artists while they produce their animations.

Directing Artists

Creative direction poses two major challenges for leaders. First, because leaders derive their authority from artists, leaders must find a balance between exercising this authority and leveraging the creativity of individual artists. Artists rebuff leaders who strip them of their artistic freedom and relegate their contributions to “mere” implementation:

If you’re collaborating, you gotta make everybody feel like they’re a part of it. You’ve got to make sure—you’ve got to make them feel like it’s all their movie. Because if it’s not, then they won’t want to work on it. (Tyler)

To keep artists involved, many leaders adopt an egalitarian attitude to their role in the collab production process:

I just led ‘em. They did the rest. (Massimo)

I don’t think of it as a position of power. I think of it as a position that enables me to...give them things to participate in. (Joseph R.)

When taken to the extreme, however, such egalitarianism can adversely affect the quality of the finished animation. Joseph B. provides one such account from his experience leading “The Matrix Has You.” (2004) collab:

There was one problem...where me and one of the animators didn’t quite see eye-to-eye on the way the movie should be made. We’d keep going back and forth about how scenes could have changed. I would give my suggestions, but ultimately, I said, “I want this to be your movie, primarily. So I want to give you suggestions on what I would do, but if you don’t agree with it, I’m not going to force you to do them.” So, ultimately, the movie turned out not as good as I would have hoped, but you look at the movie and you can tell that it’s something that that animator did and it was in his style.

More generally, when collabs fail, leaders are often blamed for underutilizing their authority:

Collaborations fail because people get an idea in their head and they can’t accurately convey their vision to the people they want to participate. The collaboration doesn’t appear very appealing because the person doesn’t seem organized, and they don’t seem to have a strong artistic vision of where they want to go with it. (Joseph R.)

There have been collaborations that have been, just, you know, haven’t really taken off the ground. Just haven’t really gone anywhere, or they’ve been abandoned...It’s just common because some people who aren’t up to the task actually arranging the collaborations when they think they can. (Ross)

A second consequence of a collab leader’s creative direction is that it often develops into a deeply-felt, personal commitment to his or her collab. In Tyler’s words, “The person that starts [a collab] is the one that finishes it, because it’s their idea.” When leaders desert their collabs, Luis explains, it is difficult to install a new leader while upholding the original leader’s vision:

I’ve seen a couple of collaborative efforts where somebody has tried to take it over because the person quit or something, and it just doesn’t work out as well, because it’s hard for anybody to sort of look through the eyes of what somebody else had in mind. It always comes out different and not really as faithful to what the original person probably had in mind.

The evidence suggests that collabs can rarely weather the loss of their leaders. In Luis’s words, “If the person hosting it loses interest, it sort of all falls apart.” An exception, reported by Hans, occurs when an artist and leader coordinate the transfer of power prior to the leader’s exit:

I asked the author if I could just take care of the project. He was about to leave the collab, and I said, “No, no, man, here, just let me take care of it. Don’t worry about it.” I thought his idea had potential. I saw it [as] really possible and original.

When leaders lose motivation and drop out, collabs are unlikely to succeed. In the next sections, we discuss artists’ loss of motivation and dropouts and how leaders work to avoid these situations.

Motivating Artists

Most artists are amateurs, volunteers, or both, meaning their commitments to collabs are subordinate to higher priorities, such as full-time employment, schoolwork, or family life:

The largest problem is this isn’t our job. We’re all just hobbyists. Any little real life thing that pulls us away from it will. It’s tough to make sure everybody gets their work done and make sure everybody’s still involved. If we were all getting paid for it, it’d be [different]. We’re not, so nobody takes it really all that seriously. (Tyler)

Although leaders are often amateurs and volunteers as well, they tend to have stronger incentives to complete a collab. Accordingly, leaders take on the role of motivating artists. The leader’s aptitude at motivating artists is often directly attributed with the outcome of the collab:

I think it's all down to who's running it, whether or not it gets finished. It's how much enthusiasm they have for the project, I think, is a major part. If they really care then they'll find people to do the pieces. Their enthusiasm will make other people want to continue and want to finish their pieces. I think definitely their own desire to finish it and make it as good as it can be is going to be a big factor. (Kester Smith)

It can be difficult for leaders to determine how much pressure to apply to artists who are not producing results quickly enough. Leaders, such as Joseph B., recognize that because collab participants are volunteers, they have little authority to coerce artists:

You really don't have much control over the other people, when you get right down to it. If they don't do it, then it won't get done... But ultimately, I don't want to force them to do it. If they don't want to, I just find someone else.

On the one hand, if leaders apply too much pressure, artists may feel rushed and submit artwork of inferior quality. As Tyler explains, “For a lot of Flash artists, especially me, you have to be in the mood to do it or else everything is going to be crap.” Artists may instead simply quit the collab out of frustration. On the other hand, if leaders do not pressure artists at all, the project can be delayed for weeks or even months while the leader seeks out an adequate replacement. Tyler sums up this dilemma:

I don't want to rush people, but I don't want to give them more time than they [need]—I don't want them to be lazy about it, either.

Replacing Artists

Even when leaders are patient, animators may still drop out. “Some people are simply trying something out” (Massimo). In this case, it is the responsibility of the leader to quickly find replacements in order to keep the collab moving forward. For Kester, such dropouts are an opportunity for the leader to reflect on his or her dedication to the collab:

You actually have to go out and look for replacements. If you really care about a project, you go out and find other people to fill up those spaces and get it done. And if you don't care about it, then you're just going to be like, “Oh, it's not working. I just give up.”

For other leaders, dropouts are inevitable and part of the leader's job description. From this point of view, finding replacements for dropouts is preferable to the alternative:

[Leaders will] just let it go and let people do whatever they want, instead of really pressing them for it...either because they don't realize how vital communication is, or they think if they keep pressing people and pressing people for the parts that they promised, maybe the fear is that the person will drop out and they'll be out a part and they'll have to find a replacement... When you have someone just promising a part, it's better to press them and have them drop out, so that you can replace them, than to let them go until the deadline and find out that they haven't done anything... (Joseph R.)

Joseph R.'s remark illustrates how leaders may use their authority to remove obstacles to their collabs' progress,

even when doing so is awkward. “Pressing [is] something that you might not feel comfortable doing at first,” advises Joseph R., “but it's a part of making it work.” To avoid this awkwardness, Anders-Martin envisioned a system that would automatically replace artists who fail to make a collab's internal deadlines:

If people don't submit updates to their collab parts to the program, like every week, or whatever the timeline—time limit, they would be removed from the list, and someone who's reserved a part, like when someone drops out, would get it instead. It would do it automatically.

Leaders are not the only collab participants who act to mitigate the effects of dropouts and steer the collab towards completion. As an artist, Kester created multiple animations for “The Bunny Suicide Collab” (2007), with mixed results:

I only went into [the collab] because it had just been hanging around for ages. I thought, I'm just going to make a piece to get rid of it. So I made them a piece pretty quickly, and they're like, “Oh, great, good, we only have a few more to get.” They were still there months later. So I came back and had another look, and I was like, “What the hell's going on? They were like, “Yep, we just need four more pieces.” So I made them another one...and it stayed there for even longer. It stayed there even after I made them two bits. It actually took more than a year from when it was originally started, I think, to when it was actually finished.

Thus, leaders must work actively to keep progress moving forward on a collab, by constantly motivating artists and swiftly replacing those who drop out. Motivated artists may lighten the leader's workload and take some responsibility in this process by claiming remaining animated segments that stand in the way of the collab's completion.

Completing the Project

When leaders receive all of the animated segments from artists that are necessary to complete the collab, they must compile these segments into a single animation. If the leader chose a linear or continuous arrangement for the collab's theme, then the sequence in which artists' contributions must be arranged is already apparent. If, however, the leader chose a nonlinear arrangement, the leader may either use his or her judgment to compose a sequence, or eschew a sequence altogether in favor of a nonlinear, “menu”-based collab interface similar to “Scene Selection” menus on DVD movies. Once this decision has been made, leaders integrate artists' contributions into a final animation, being sensitive to the ownership concerns of artists and maintaining an aesthetically pleasing balance between variety and continuity. In the final phase of the collab production, leaders submit the completed animation to Newgrounds for online hosting.

In summary, collab leaders must often shoulder many burdens and assume myriad roles—from creative director to competent animator—in their efforts to design, manage, and complete successful projects. They provide an extreme example of Butler *et al.*'s observation that “technical re-

sponsibility in online groups goes hand in hand with social responsibility” [9]. For many collab leaders, saddled with domain-specific challenges and lacking adequate technological support, these dual responsibilities can be overwhelming, and the collab may consequently fail.

DISCUSSION

By examining our findings with respect to the available research, we have identified four themes that highlight the challenges that collab leaders face. These are completion, originality, subjectivity, and ownership.

Completion

Collabs require us to unpack the meaning of a “release” and understand the relationship between release types, quality assurance, and leadership challenges. Collabs operate on a strict *single release* policy because artists typically want to release only “finished” work. For a collab to be finished, the leader must secure participation from potentially dozens of volunteers. Should the leader fail to recruit, motivate, direct, and replace these artists, the collab will be neither completed nor released, meaning that all of the effort invested will be in vain. In this sense, collabs resemble film productions in that completion is both an event in itself (the “screening”) and an all-or-nothing affair.

OSS projects and Wikipedia articles are never completed, only abandoned. They continue as long as people are interested in contributing to them. OSS projects, following Raymond’s [33] advice to release early and often, are characterized by *frequent releases* to identify bugs more quickly. Bugs not caught in the current release can be fixed for the next one, reducing the pressure on leaders. Active OSS projects may appoint a release manager to coordinate these frequent—sometimes daily [35]—releases [14,27]. In Wikipedia, no leader stands between an editor’s contributions and their public release. Changes take effect instantly, making quality control a persistent challenge [32].

Thus, as we move from continuous release (Wikipedia) to frequent release (OSS projects) to single release (film and animation), the burden on the leaders increases. In a single release project, the leader must strive for perfection because the first release is the only release. In projects with more frequent releases, such as OSS projects and Wikipedia, leaders instead coordinate the iterative improvement of already-released projects.

Originality

In online animation communities, originality is both the paramount goal of most collab projects and the metric by which it is evaluated. Asked what constitutes a “good collab idea,” the responses of our participants were remarkably consistent. For example, Joseph R. asserts, “*It’s gotta be something original... The best ones are usually something different, something that’s not really been done before.*” However, as Becker [4] explains, originality is risky, effortful, and otherwise challenging to artistic collaboration because it prevents artists from taking advantage of familiar

work practices and patterns of social interaction. For example, Becker describes the work of Henry Partch, who spends a year training musicians to play the instruments and learn the notation he has invented; in contrast, a professional symphony using conventional instruments and notation can learn to play the same amount of music in a day [3]. Many collab leaders and artists, as amateur volunteers, lack the time or experience to pull off highly original collabs. Even if collab leaders are experienced artists, the pool of qualified artists from which they can draw is small. As a result, highly original projects are rarely attempted:

More original ideas, they’re popping up less and less because they just don’t get done. Everyone has their own lives to deal with. When you tread into unknown ground, things take longer to do. It takes longer to learn things and they just don’t get done. (Tyler)

Specifications, themes, arrangements, and the integration process provide tools with which collab leaders can manage originality and convention, although this management process places a considerable burden on the leader. Other forms of online creative collaboration succeed by sidestepping the issue of originality altogether. For example, Klinecicz observes that very few OSS developers attempt innovative projects, possibly because “[b]reakthrough projects tend to be more difficult to understand and adopt for potential users” [22]. On Wikipedia, original research is prohibited by policy [43,6]. To summarize, the more original a project is, the more difficult it is for everyone involved to work on it.

Subjectivity

Most real-world design problems lack one “correct” solution. Rather, multiple solutions are possible, each with its own advantages and disadvantages [41]. More open-ended or “ill-defined” problems are more difficult to solve [41]. Animated moviemaking is an especially open-ended problem because artistic expression is fundamentally subjective; no animation style is definitively more “correct” than another. Thus, disagreement among artists seems inevitable. Collab leaders manage this challenge by supplying creative direction for the project; artists accept their authority until it is abused. Creative direction provides decisive answers to the many questions that arise during collab production:

There are so many questions to be asked about, you know, “What don’t you want us to do? What’s the format? Do you want a picture of a TV frame around my part or is that something that you’ll handle in post-production?” Just being there to answer the questions is really important in something [so] complex. (Joseph R.)

In other online collaborations, the goals and solutions are more well-defined. Many OSS projects seek to provide free alternatives to existing commercial products; the goal is to replicate their functionality [22]. Wikipedia articles borrow in the familiar format and formal tone of a reference work [13]. The comparatively straightforward goals and solutions of these projects constrain the space of possibilities, limiting the need for creative direction.

Additionally, these projects embrace policies of objectivity as a substitute for a leader's creative direction. In many OSS projects, "[m]embers try to make their behavior logically plausible and technologically superior options are always chosen in decision-making" while "emotional or authoritative factors are precluded in...communication" [46, p. 335]. Similarly, Wikipedia editors are required to embrace a "neutral point of view" (NPOV) rather than writing in a "personally invested tone" [44]. By promoting facts and logic over opinions and emotion, OSS developers and Wikipedia editors are guided by a set of shared beliefs that mitigates the need for a creative director's decisions.

Ownership

Strong feelings of ownership among collab artists constrain how the leader may work with their submissions. In the integration phase of the collab production process, leaders must grapple not only with technical and aesthetic considerations, but also social ones as they attempt to create a coherent finished animation. Norms in online animation communities prohibit the leader from changing artists' work without first seeking permission or, alternatively, asking artists to make more substantial modifications themselves. Both of these processes are time-consuming and inefficient. As most communication within collabs takes place over asynchronous discussion forums, it may take hours or days before a request made by the leader is received by an artist.

Other online creative collaborations operate in a more open fashion. In "pure" OSS projects—*i.e.*, projects where "every developer...and contributor is a volunteer" [10, p. 99]—the available evidence suggests that ownership of code modules is uncommon. For example, case studies have shown that more than one developer contributes to most code modules in FreeBSD [10], Apache [19,27,26], Subversion [19], NetBSD [19], and SugarCRM [39]. Through online revision control systems such as CVS and bug tracking systems such as Bugzilla, OSS developers are able to quickly iterate on each others' contributions, promoting rapid improvements. Yamauchi and others [46] identify a "bias for action" over coordination in OSS projects, meaning that developers are likely to contribute to a project module before expressing any commitment to it.

In Wikipedia, article ownership is prohibited in theory and uncommon in practice. According to Wikipedia's "Ownership of articles" policy: "If you create or edit an article, know that others will edit it, and within reason you should not prevent them from doing so" [45]. Quantitative measures confirm that this policy is generally obeyed and enforced by Wikipedia editors. In the English Wikipedia, only 7.5% of articles have a single editor, while about 50% of articles have over seven distinct editors and about 5% have more than fifty [8]. Because articles can be edited by anyone without prior approval, most acts of vandalism can be corrected within minutes [32] and articles can be updated to reflect recent events almost in real time. Thus, OSS projects

and Wikipedia's open formats promote an efficiency that collab leaders are unable to replicate.

CONCLUSION

The success of online creative collaboration has been counted among the biggest surprises of the 21st century [24,5]. Wikipedia and OSS currently provide the canonical examples. These projects are increasingly understood (via research) and technologically supported (via customized system designs, *e.g.*, Bugzilla, CVS, MediaWiki). Flash collabs are an edge case that speaks to the breadth of possibilities for online creative collaboration. This phenomenon encompasses not only software development and encyclopedia writing, but also more open-ended domains, such as animated moviemaking.

In this paper, we described how different domains in online creative collaboration pose different challenges for leaders and require different forms of technological support. We used four themes—completion, originality, subjectivity, and ownership—to provide a straightforward way to think about some key differences. These themes are not the only ones or necessarily even the best ones. There is more theoretical and empirical work to be done on this topic in the future.

Finally, Flash collabs exemplify a compelling opportunity for CSCW researchers and practitioners to consider system designs to support forms of online creative collaboration that are different from Wikipedia and OSS projects. This paper offers a first step in this promising new direction.

ACKNOWLEDGMENTS

We wish to thank Kelly Caine, Pam Griffith, Beki Grinter, Shruthi Panicker, Sarita Yardi, the NSF (Grant # 0326325), our anonymous reviewers, and especially our participants.

REFERENCES

1. Adamowicz, E. *Surrealist Collage in Text and Image: Dissecting the Exquisite Corpse*. Cambridge University Press, 1998.
2. http://www.alexa.com/data/details/traffic_details/newgrounds.com.
3. Becker, H.S. Art as Collective Action. *Amer. Sociol. Rev.* 39, 6 (1974), 767-776.
4. Becker, H.S. *Art Worlds*. University of California Press, 1984.
5. Benkler, Y. *The Wealth of Networks*. Yale University Press, 2006.
6. Beschastnikh, I., Kriplean, T., and McDonald, D.W. Wikipedian Self-Governance in Action: Motivating the Policy Lens. In *Proc. ICWSM 2008*, AAAI Press (2008).
7. Bruckman, A. Studying the amateur artist: A perspective on disguising data collected in human subjects research on the Internet. *Ethics and Inf. Technol.* 4, 3 (2002), 217-231.
8. Buriol, L.S., Castillo, C., Donato, D., Leonardi, S. and Millozzi, S. Temporal Analysis of the Wikigraph. In *Proc. WI 2006*, IEEE Press (2006), 45-51.

9. Butler, B.S., Sproull, L., Kiesler, S. and Kraut, R.E. Community effort in online groups: Who does the work and why? In *Leadership at a Distance*, S. Weisband, ed., Lawrence Erlbaum Associates, 2008, 171-193.
10. Dinh-Trong, T. and Bieman, J.M. Open source software development: a case study of FreeBSD. In *Proc. METRICS 2004*, IEEE Press (2004), 96-105.
11. Dourish, P. and Bellotti, V. Awareness and coordination in shared workspaces. In *Proc. CSCW 1992*, ACM Press (1992), 107-114.
12. Ellis, J.B., Wahid, S., Danis, C. and Kellogg, W.A. Task and social visualization in software development: evaluation of a prototype. In *Proc. CHI 2007*, ACM Press (2007), 577-586.
13. Emigh, W. and Herring, S.C. Collaborative Authoring on the Web: A Genre Analysis of Online Encyclopedias. In *Proc. HICSS 2005*, IEEE Press (2005), 99.1.
14. Erenkrantz, J.R. Release Management within Open Source Projects. In *Proc. ICSE Workshop on Open Source Software Engineering 2003*, IEEE Press (2003).
15. Fielding, R.T. Shared leadership in the Apache project. *Commun. ACM* 42, 4 (1999), 42-43.
16. Forte, A. and Bruckman, A. Scaling Consensus: Increasing Decentralization in Wikipedia Governance. In *Proc. HICSS 2008*, IEEE Press (2008), 157.
17. Giles, J. Internet encyclopaedias go head to head. *Nature* 438, 7070 (2005), 900-901.
18. Grinter, R.E. Recomposition: putting it all back together again. In *Proc. CSCW 1998*, ACM Press (1998), 393-402.
19. Gutwin, C., Penner, R., and Schneider, K. Group awareness in distributed software development. In *Proc. CSCW 2004*, ACM Press (2004), 72-81.
20. Halverson, C.A., Ellis, J.B., Danis, C. and Kellogg, W.A. Designing task visualizations to support the coordination of work in software development. In *Proc. CSCW 2006*, ACM Press (2006), 39-48.
21. Hinds, P. and McGrath, C. Structures that work: social structure, work structure and coordination ease in geographically distributed teams. In *Proc. CSCW 2006*, ACM Press (2006), 343-352.
22. Klinecicz, K. *Innovativeness of open source software*. MIT Working Papers (2005), <http://opensource.mit.edu/papers/klinecicz.pdf>.
23. von Krogh, G., Spaeth, S., and Lakhani, K.R. Community, joining, and specialization in open source software innovation: a case study. *Research Policy* 32, 7 (2003), 1217-1241.
24. Lessig, L. *Code: Version 2.0*. Basic Books, 2006.
25. Lombard, M., Snyder-Duch, J., and Bracken, C.C. Content Analysis in Mass Communication: Assessment and Reporting of Intercoder Reliability. *Human Comm. Research* 28, 4 (2002), 587-604.
26. Mockus, A., Fielding, R.T., and Herbsleb, J. A case study of open source software development: the Apache server. In *Proc. ICSE 2000*, IEEE Press (2000), 263-272.
27. Mockus, A., Fielding, R.T., and Herbsleb, J.D. Two case studies of open source software development: Apache and Mozilla. *ACM Trans. Softw. Eng. Methodol.* 11, 3 (2002), 309-346.
28. Nakakoji, K., Yamamoto, Y., Nishinaka, Y., Kishida, K. and Ye, Y. Evolution patterns of open-source software systems and communities. In *Proc. IWPSE 2002*, ACM Press (2002), 76-85.
29. <http://marketshare.hitslink.com/report.aspx?qprid=0>.
30. <http://www.newgrounds.com/>.
31. Parnas, D.L. On the criteria to be used in decomposing systems into modules. *Commun. ACM* 15, 12 (1972), 1053-1058.
32. Priedhorsky, R., Chen, J., Lam, S. (T.) K., Panciera, K., Terveen, L. and Riedl, J. Creating, destroying, and restoring value in Wikipedia. In *Proc. GROUP 2007*, ACM Press (2007), 259-268.
33. Raymond, E.S. *The Cathedral & the Bazaar*. O'Reilly Media, 2001.
34. Reagle, J.M. Do as I do: authorial leadership in Wikipedia. In *Proc. WikiSym 2007*, ACM Press (2007), 143-156.
35. Reis, C.R. and de Mattos Fortes, R.P. An overview of the software engineering process and tools in the Mozilla project. In *Proc. OSSDW 2002*, 2002, 155-175.
36. Sandusky, R.J. and Gasser, L. Negotiation and the coordination of information and activity in distributed software problem management. In *Proc. GROUP 2005*, ACM Press (2005), 187-196.
37. Seidman, I. *Interviewing as Qualitative Research*. Teachers College Press, 2006.
38. Shah, S.K. Motivation, Governance, and the Viability of Hybrid Forms in Open Source Software Development. *Manage. Sci.* 52, 7 (2006), 1000-1014.
39. de Souza, C., Froehlich, J., and Dourish, P. Seeking the source: software source code as a social and technical artifact. In *Proc. GROUP 2005*, ACM Press (2005), 197-206.
40. Strauss, A.C. and Corbin, J.M. *Basics of Qualitative Research*. Sage Publications, 1998.
41. Terry, M., Mynatt, E.D., Nakakoji, K. and Yamamoto, Y. Variation in element and action: supporting simultaneous development of alternative solutions. In *Proc. CHI 2004*, ACM Press (2004), 711-718.
42. Weber, S. *The Success of Open Source*. Harvard UP, 2004.
43. http://en.wikipedia.org/wiki/Wikipedia:No_original_research.
44. http://en.wikipedia.org/wiki/Wikipedia:Neutral_point_of_view.
45. http://en.wikipedia.org/wiki/Wikipedia:Ownership_of_articles.
46. Yamauchi, Y., Yokozawa, M., Shinohara, T. and Ishida, T. Collaboration with Lean Media: how open-source software succeeds. In *Proc. CSCW 2000*, ACM Press (2000), 329-338.