

# LEADERSHIP AND SUCCESS FACTORS IN ONLINE CREATIVE COLLABORATION

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SOCIAL COMPUTING SYSTEMS HAVE enabled new and wildly successful forms of creative collaboration to take place. Two of the best-known examples are Wikipedia and the open-source software (OSS) movement. Wikipedia, the free online encyclopedia, boasts millions of articles (over 3.6 million just in English) written by thousands of volunteers collaborating via the Internet. The OSS movement, also fueled mainly by volunteer online collaboration, has produced some of the world's most powerful and important software applications, including the Apache HTTP Server, the Linux operating system, and the Mozilla Firefox Web browser. Many Wikipedia articles and OSS projects have been demonstrated to be equal or superior in quality to their commercial competitors. But how is this possible? Why do online collaborations like these succeed, and what lessons can we learn from them?

Questions like these have inspired a growing body of social computing research, including some of our work at Georgia Tech over the past five years. In the mid-2000s, many empirical studies were accumulating to explain how OSS projects succeeded and what motivated their contributors. Around the same time, Wikipedia was exploding in popularity and attracting much academic interest. Studies of these communities sought to understand how volunteers, typically diverse in skill level, experience, and background, used the Internet to organize their creative efforts. We began to wonder about the potential of this phenomenon, whose scope seemed much broader than encyclopedia writing and software development. Perhaps there were compelling examples in other domains waiting to be identified, studied, and contrasted with what we thought we already knew.

We found such an example in a Web site called Newgrounds (http://www.newgrounds.com). Founded in 1995, Newgrounds is one of the oldest online communities of Adobe Flash animation enthusiasts. It is also one of the largest, with over 2.4 million registered users as of April 2011. The heart of the site is its mammoth Flash portal, which hosts more than 190,000 animated movies and games submitted by members and downloadable by anyone with a few minutes to spare. Most submissions are created by individuals, but about a third are collaboratively created projects known as "collabs." Every collab has a "leader" and anywhere from two to 50 or more nonleader members, also called "artists."

Newgrounds, despite its longevity, popularity, and creativity, had not yet been the object of much scholarly attention. Yet collabs intrigued us. On the surface, animated movies seemed



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**Fig. 1** ***Valentine '29,*** **a Flash movie depicting the 1929 Saint Valentine's Day Massacre. Five animators from four countries each animated one chapter of the story, which the leader compiled into a single narrative. The finished animation, hosted on Newgrounds (http://www.newgrounds.com/portal/view/363788), has been viewed over 170,000 times since 2007.**

fundamentally different from encyclopedia articles or software applications. Yet, as we dug deeper, we found surprising similarities. Collabs seemed to embrace many of the key operational principles of Wikipedia and OSS projects: volunteer participation, online collaboration, and creativity. The processes looked similar, but the outputs didn't. We wanted to understand why.

## Leadership and the collab production process

### *Methods*

In our first qualitative study, we focused on understanding the collab production process in general and the challenges for leaders in particular. We conducted in-depth, semistructured interviews with 17 people who had experience with collabs, ten of whom had held leadership roles (Table 1). Participants were male, aged 16 to 29, and lived in the United States (10), United Kingdom (2), Australia (2), Estonia (1), The Netherlands (1), and Spain (1). We interviewed 14 participants over the phone; each interview lasted about an hour on average and was digitally recorded and fully transcribed. The other three participants were interviewed via e-mail.

We supplemented these interviews with two additional data sources: participant-observation notes about the Newgrounds community gathered since 2006 and staff interviews and notes from one author's internship with Newgrounds in 2009. Because this study was exploratory, we performed a bottom-up analysis, allowing themes to emerge from the data.

### *Results*

We found that the collab production process typically occurs in three stages: 1) designing the collab, 2) managing the artists, and 3) integrating the submissions. In the first stage, the leader must lay the foundation for a successful collab. A good collab idea, interviewees told us, has three components: a theme, specs, and structure. A "theme" refers to content guidelines for a collab—what the collab is about. Common themes include a storyline (see Fig. 1), a piece of music (for a music video), or an event (like a Christmas-themed collab).

"Specs" are technical specifications, such as the height and width of the animation, the frame rate, or the oldest acceptable version of Flash to be used. Specs further constrain collab members, but they also reduce the likelihood of incompatibilities later on down the road.

Collab leaders must also structure how people will work together. In traditional collaborations, especially among professional animators, a specialized division of labor is typical; each member of the crew has a clear role and applies specialized skills throughout the project. In contrast, we found that collabs tend to be modularized. Typically, a collab leader splits up the collab into modules and everyone who claims a module has near-total artistic responsibility over it, including animation, background artwork, writing, and even voice acting and music

**Table 1. Interviewee names, ages, and countries of residence. Bold type indicates the interviewee had collab leader experience. Quotation marks indicate a pseudonym.**

| Name | Age | Location |
|---|---|---|
| **Joseph Blanchette** | 24 | United States |
| Eric Carlson | 19 | United States |
| **Luis Castanon** | 27 | United States |
| **Michael Frank** | 19 | United States |
| **Tom Fulp** | 29 | United States |
| **James Hole** | 16 | Australia |
| **Tyler Koch** | 19 | United States |
| **Massimo Maitan** | 21 | Australia |
| Anders-Martin Meister | 16 | Estonia |
| **Ross O'Donovan** | 19 | Australia |
| Kraig Phillips | 27 | United States |
| **Joseph Rooks** | 21 | United States |
| Kester Smith | 21 | United Kingdom |
| "Sven" | 18 | Netherlands |
| **Hans Van Harken** | 17 | Spain |
| Robert Westgate | 21 | United Kingdom |
| "William" | 19 | United States |

choices. This style of collaboration minimizes interdependencies so that artists can work independently and in parallel. Discussion may occur between leaders and artists but rarely between two artists. It is the leader's job, interviewees told us, to monitor the continuity between modules and offer suggestions to avoid incoherence when the modules are assembled at the end.

Having devised a plan, the leader can move onto the second stage of collab production. In this stage, the leader manages the artists who produce the animated content for the collab. The first step of this process is to announce the collab and recruit artists. Most leaders advertise by posting a collab thread on the Newgrounds discussion forums. In the first post of the thread, leaders describe the collab's theme, specs, and structure. If there is little interest, the thread will soon be buried beneath more popular ideas and forgotten. If, however, the leader is successful in attracting artists, the thread itself becomes the center of activity for the collab's lifespan. Most announcements and discussions take place within these threads, which can draw hundreds of replies over a period of months.

Successfully managing these artists requires the leader to play many roles at once. For example, the leader must be a coach, motivating artists to continue working in spite of distractions or conflicts. When this fails, the leader becomes a kind of human resources executive, not only recruiting the initial batch of artists but also replacing ones who drop out. Yet another role is director or CEO: the leader must convey an overarching strategy or vision that unifies countless creative decisions into something greater than the sum of its parts. Compounding these challenges, leaders must balance their own desires with those of the group. Crews are made up of volunteers whose commitment can be precarious and whose priorities almost always favor school or work. In the face of too much pressure or disagreement, many artists will simply leave the collab for ones more favorable to their temperaments.

In the final stage of the collab production process, the leader takes on two additional responsibilities: integration and attribution. Integration refers to the ways that leaders assemble all the bits of work that artists contributed over the course of the collab. Leaders face three types of challenges to successful integration: social, aesthetic, and technical. Socially, leaders must negotiate with artists when changes are required and seek out solutions that please both the group and the individual artists. Aesthetically, leaders must balance the competing goals of variety, seeking out visually interesting, complementary artistic styles, and continuity, ensuring the compilation of work is coherent and greater than the sum of its parts. And from a technical perspective, leaders must deal with the problems that arise when compiling files and digital assets created by artists with very different techniques.

WIKIPEDIA ARTICLES AND OSS APPLICATIONS LACK A NOTION OF COMPLETION; THEY ARE NEVER FINISHED, ONLY ABANDONED. COLLAB MEMBERS, IN CONTRAST, SEEK TO RELEASE THEIR MOVIE ONCE—WHEN IT'S COMPLETED, AND ONLY THEN.

In addition to integration, leaders must also consider attribution, the ways that collab members are granted or denied credit for these contributions. Attribution criteria vary widely: some leaders value quality (best submissions), quantity (most submissions), attitude (artists who are most helpful), role (artists with specific responsibilities), or still others. A major challenge to attribution centers around describing and recognizing members' contributions in collabs with more than a few artists. The Newgrounds multi-author system allows up to ten coauthors to be listed for each submission, yet many collabs involve far more than ten artists. Despite this limitation, Newgrounds compares favorably with many online hosts, which credit only one user, the uploader, per video.

### *Discussion*

As mentioned earlier, we can identify clear similarities between collabs, Wikipedia, and OSS projects. All are examples of what we call online creative collaboration, meaning projects in which people meet and communicate primarily over the Internet to organize their creative efforts. Yet there are also important differences that help articulate the boundaries of this broad phenomenon. One difference is the notion of completion. Wikipedia articles and OSS applications lack a notion of completion; they are never finished, only abandoned. Collab members, in contrast, seek to release their movie once—when it's completed and only then. This "all-or-nothing" mentality increases the pressure borne by everyone. Another key difference is subjectivity. Many would agree that a Wikipedia article should be factually accurate and free of spelling errors, or that an OSS application should run efficiently and lack noticeable bugs. Deciding what a main character should look like or how a story should end in a collab is considerably more subjective and, consequently, more contentious. Originality is a third difference worth noting. Wikipedia policies prohibit original research, and studies have shown that few OSS projects are sources of radical innovation. Collab members, however, strive for originality above all else; if a collab idea has already been tried it is unlikely to attract serious interest.

Another conclusion from the study is that leaders are both centrally important to a collab's success and heavily overburdened. While collabs may have dozens of artists, few have more than one leader. Yet that leader assumes the lion's share of responsibilities from start to finish. We suggest that a lack of adequate technological support makes the leader's job more difficult. Discussion forums are well suited for conversation but poorly equipped for organizing complex multimedia projects like collabs. As a result, leaders spend large quantities of time on tedious tasks like manually updating lists of crew members. It also seems possible that this lack of appropriate coordination tools limits the creative potential of collabs. Modularized divisions of labor make sense when interdependence is not desired—but what if it was? Better technological support could result in more collaborative structures, new leadership styles, and more interesting creative products.

## Success factors in collabs versus open-source software

Our first study outlined the collab production process and established that many leaders were overburdened. We

**Table 2. Comparison of first post attributes for completed versus failed collabs.**

| Variable | Completed Collabs | | | Failed Collabs | | |
|---|---|---|---|---|---|---|
| | M | SD | N | M | SD | N |
| Theme | 0.94 | 0.24 | 112 | 0.73 | 0.45 | 780 |
| Specs | 3.74 | 1.70 | 112 | 2.03 | 2.02 | 780 |
| Authorship | 0.29 | 0.53 | 112 | 0.11 | 0.41 | 780 |
| Restrictions | 0.63 | 0.99 | 112 | 0.40 | 0.81 | 780 |
| Gatekeeping | 0.39 | 0.61 | 112 | 0.25 | 0.54 | 780 |
| Communication | 0.83 | 0.90 | 112 | 0.52 | 0.79 | 780 |

now understood the problems and issues facing collab members. In our next study, we sought to examine the other side of the coin: what makes collabs successful?

### *Methods*

We took a mixed-methods approach to this study. The first part of this study again made use of the interview/participant-observation data described previously. We reanalyzed this data looking for success factors identified by participants. The second part of our study quantitatively evaluated these success factors. To do this, we collected three additional types of data: 1) the text of the first post in ≈900 forum threads where collabs were organized; 2) attributes of collab leaders, such as their previous collab experience, forum activity, and length of time in the community; and 3) collab activity dynamics, such as the posting frequency of collab leaders and artists.

We performed five types of analysis on these data. First, we performed a content analysis on the text of the first posts in collab threads, looking for evidence of planning and structure. To do this, two judges analyzed a sample of first posts to generate a coding scheme with 44 planning/structural elements grouped into six broad categories. We then ran a pilot study in which both judges coded the same set of 50 first posts, yielding acceptable inter-rater reliability scores. Following this, each judge then coded half of the ≈900 first posts for the 44 items. The two judges also categorized each collab into a success or failure—where success, as defined by collab members themselves, is the completion of an animation.

OF THE SIX CATEGORIES OF PLANNING/ STRUCTURAL ELEMENTS IDENTIFIED FROM OUR PRELIMINARY CONTENT ANALYSIS, ALL OF THEM WERE MORE PROMINENT IN SUCCESSFUL COLLABS.

The remaining three analyses were Mann-Whitney U tests (a.k.a. Mann-Whitney-Wilcoxon tests). We ran U tests comparing the number and types of planning/structural elements found in successful collab thread first posts versus failed ones. We also ran U tests comparing leader attributes (e.g., previous collab experience) in successful collabs versus failed ones. Finally, we ran U tests comparing activity dynamics (e.g., posting frequency) in successful collabs versus failed ones.

**Table 3. Comparison of leader attributes for completed versus failed collabs.**

| Variable | Completed Collabs | | | Failed Collabs | | |
|---|---|---|---|---|---|---|
| | M | SD | N | M | SD | N |
| Past collabs | 2.80 | 3.71 | 112 | 1.70 | 3.61 | 778 |
| Past solo projects | 5.42 | 5.93 | 112 | 3.35 | 5.70 | 780 |
| Awards won | 1.60 | 3.88 | 112 | 0.60 | 1.93 | 780 |
| Forum posts | 986 | 1623 | 112 | 586 | 1320 | 780 |
| Batting average | 3.17 | 0.43 | 91 | 2.92 | 0.57 | 518 |

The final component of this study was to compare and contrast these results with what is known about OSS development. To enable these comparisons and contrasts, we conducted an extensive literature review on success factors and success definitions in OSS. This literature review formed the basis of the theoretical implications we proposed in our paper.

### *Results*

We found that participants were able to identify three categories of success factors: planning and structure, reputation and experience, and communication and dedication. Within these categories, we were able to draw out five predictions from the qualitative results to evaluate quantitatively. The five predictions were:

- P1: Collabs with initial planning and structure, especially specs (technical specifications), are more likely to be successful.
- P2: Collab members who are well known in the community are more likely to lead successful collabs.
- P3: Collab members who have experience with Flash and past collabs are more likely to lead successful collabs.
- P4: Collabs whose members frequently communicate are more likely to be successful.
- P5: Collabs whose leaders frequently communicate are more likely to be successful.

Our quantitative results generally supported all five of these predictions. Of the six categories of planning/structural elements identified from our preliminary content analysis, all of them were more prominent in successful collabs. Specifically, successful collabs were more likely to have a clear theme (content guidelines), more technical specifications, more criteria spelling out who gets "coauthor" credit, more restrictions on adult-oriented content, more gatekeeping rules governing who can join the collab, and more communication preferences provided by the leader (P1; see Table 2). We also found that collab leaders who were better known in their communities—meaning they had won more awards, been more active in the discussion forums in general, and had higher-rated animation submissions—were more likely to lead successful collabs (P2; see Table 3). The same was true of leaders who were experienced, meaning they had completed solo (individual) projects and had previously participated

in collabs (P3; see Table 3). Finally, we found that frequent communication (large quantities of sustained forum posts), by both leaders and artists, were strongly associated with successful collabs—both groups posted three times as often in collabs that were eventually successful (P4 and P5; see Table 4). In addition to providing data-driven evidence in support of these predictions, we also found that more than 80% of collabs were unsuccessful, meaning they did not lead to a completed animation. This number aligns with prior research on success rates among open-source software projects.

### *Discussion*

The results of this study suggest a number of theoretical implications. We focused on the similarities and differences between success factors in collabs and those in OSS, drawing on our literature review to shed light on the latter. With respect to planning and structure, we found that successful collabs tend to embrace up-front, centralized planning over the evolution and iteration typical of OSS projects. In terms of reputation and experience, our results suggest that both successful collabs and successful OSS projects tend to be run by leaders who have proven technical competency and a record of past successes in their respective communities. In addition, OSS developers emphasize the importance of leaders' "soft skills," such as charm and charisma. Finally, with respect to communication and dedication, our findings indicate that frequent communication among leaders and members is good practice in both collabs and OSS projects. However, collab leaders hold their positions for the duration of the collab, whereas OSS project leaders' authority is vulnerable to forking. In other words, if members of an OSS project lose confidence in their leader, they are free to copy the code base to a new project with a new leader.

The results of this study and the previous one hint at potentially generalizable principles of online creative collaboration—principles that transcend movies, encyclopedias, software, and other domains. One potential principle is the importance of effective leaders with certain traits and behaviors: solid reputations, technical competence, and soft skills. Another potential principle is the importance of frequent communication by both leaders and members. A third potential principle deals with complexity: smaller, simpler projects (e.g., collabs) are better served by modularization and planning, while larger, more complex projects (e.g., OSS) lend themselves to evolutionary, improvisational approaches. Until more research is conducted in other domains, these potential principles should only be considered suggestions or hypotheses to be tested.

**Table 4. Comparison of activity dynamics in completed versus failed collab threads.**

| Variable | Completed Collabs | | | Failed Collabs | | |
|---|---|---|---|---|---|---|
| | M | SD | N | M | SD | N |
| Posts per day (all members) | 24.22 | 30.51 | 109 | 7.28 | 11.3 | 182 |
| Posts per day (only leaders) | 4.24 | 4.92 | 109 | 1.86 | 3.04 | 182 |

## Pipeline: supporting and transforming online leadership

The results of these studies helped form the next phase of our research. We have developed Pipeline (see Fig. 2), a software platform for supporting and transforming leadership in online creative collaboration. With Pipeline, we hope to complement and extend our research to date with a more design-oriented, experimental approach. We also hope to develop a sustainable community of users and release Pipeline as open-source software.

Pipeline provides a set of Web-based collaboration tools geared toward open-ended, creative multimedia projects like collabs or video projects. Like many collaboration toolsets, Pipeline allows users to create projects, invite members, participate in discussions, and manage files. Unlike other tools, however, Pipeline supports a wide range of leadership styles, from democratic to benevolent dictator. To encourage riskier (but potentially more innovative) collaborations,

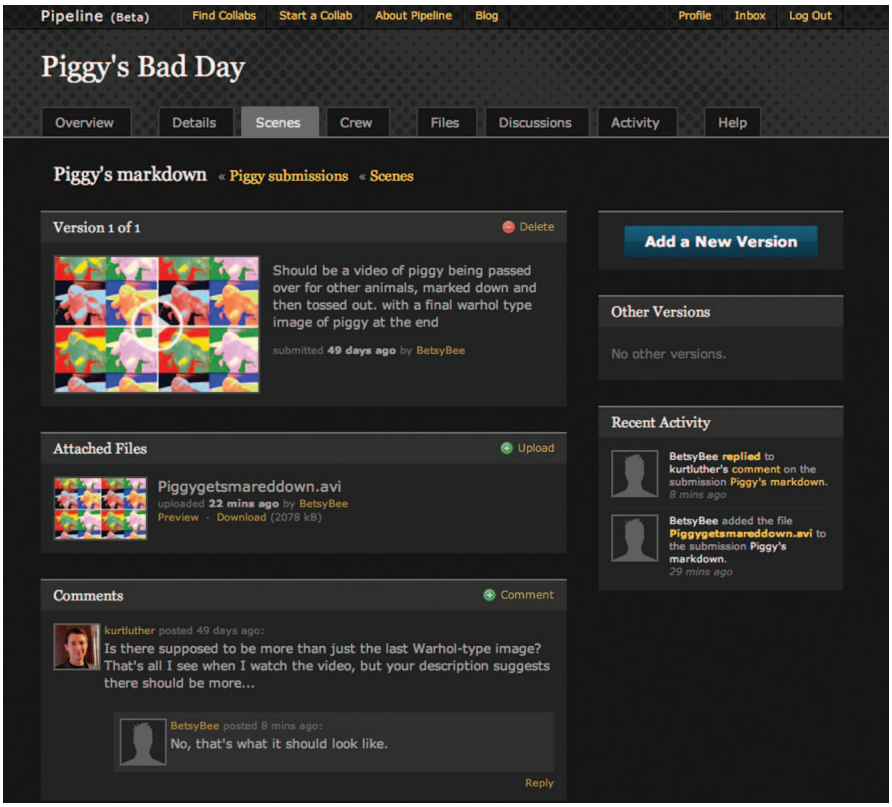


**Fig. 2 Pipeline is a software platform for organizing collaborative multimedia projects. It is being developed at Georgia Tech as a vehicle for exploring how different leadership styles effect the process and outcome of online creative collaboration. This screenshot depicts two users discussing a recent submission to a video project called "Piggy's Bad Day."**

Pipeline provides a history of user activity and one-click "undo" functionality, similar to Wikipedia. Our goal is to explore the effect of different leadership styles on the process and outcome of online collaboration by studying Pipeline use among real animators and filmmakers. To this end, we are organizing a series of contest-experiments in which some participants are assigned to use a certain leadership style for a Pipeline project.

We are excited about the potential of Pipeline, but the opportunities for researching online creative collaboration are practically limitless. Leadership is just one facet to be explored, albeit an important one. We look forward to learning about many other exciting studies and deployments of social computing systems in the future.


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## Read more about it


- K. Luther, K. Caine, K. Ziegler, and A. Bruckman, "Why it works (when it works): Success factors in online creative collaboration," in *GROUP'10: Proc. ACM Conf. Supporting Group Work*. New York, NY: ACM Press, 2010, pp. 1–10.
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# Gamesman solutions

## Solution #1

FOOTSTOOL is a Morse Code palindrome:

..-. --- --- - ... - --- --- .-..

## Solution #2

19. Convert the number to binary, add one for every zero, and add two for every 1.

For example, 13 becomes 1101, which has 1 zero (1) and 3 ones (6), which totals 7.

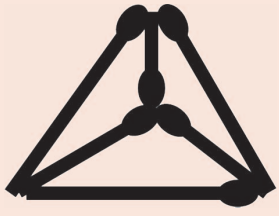
9304 becomes 10010001011000, which has 9 zeros (9) and 5 ones (10), which totals 19.

## Solution #3

Take the chicken over first. Go back and bring the grain next, but instead of leaving the chicken with the grain, come back with the chicken. Leave the chicken on the first side and take the fox with you. Leave it on the other side with the grain. Finally, go back over and get the chicken and bring it over.

## Solution #4

The solution is to think in 3 dimensions, rather than 2, and make a pyramid.



## Solution #5

Bono (1 min) and The Edge (2 min) walk across first bringing the total to 2 min. Then Bono (1) walks the flashlight back, totaling 3 min. Adam (5) and Larry (10) walk across, totaling 13 min. The Edge (2) walks the light back, totaling 15 min. The Edge (2) and Bono (1) walk across, totaling the answer, 17 min.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