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# Edits & Credits: Exploring Integration and Attribution in Online Creative Collaboration

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**Abstract**

Attribution allows online reputations to be formed and motivates many contributions to online creative collaboration. Yet, we know little about attribution practices in online creative collaboration and the technologies that shape them. This paper describes a study of online collaborative animation projects, focused on the practices surrounding integration and attribution. We found that both tasks are closely related and often completed by a single person, a process we call "cr-editing." We also identify frustrations with existing practices and systems and propose design considerations for alleviating them. Our findings offer insights into the growing space of online remixing, mashups, and creativity.

**Keywords**

Animation, attribution, authorship, credit, integration

**ACM Classification Keywords**

H.5.3 Information interfaces and presentation (e.g., HCI): Group and Organization Interfaces.

**General Terms**

Management, Design, Human Factors

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## Introduction

Why do people spend their free time editing articles for an online encyclopedia, or fixing bugs in a popular open-source operating system? Studies of *online creative collaboration* projects [14], such as Wikipedia and Linux, have proposed a wide range of motivations to contribute, including learning, political motives, altruism, and, most commonly, increasing one's status within a community [5,8,15]. Yet, one cannot improve his or her online reputation without (1) establishing a persistent identity and (2) ensuring that one's history of contributions to the community is linked to that identity [10]. People must be able to tell who you are and what you have done. In other words, attribution, the act of giving someone credit for his or her actions, is essential to forming these reputations, and therefore to motivating and rewarding high quality efforts.

In traditional creative communities, such as filmmaking and scientific publishing, social norms and professional standards often dictate who is attributed, and in what manner, for their work on a creative product [1,3]. In online creative collaboration projects, these norms and standards may still be in flux, or not yet established. Moreover, they are complicated by the availability of complete digital histories of contributors' past efforts. Online video remixing communities [7] and territoriality in Wikipedia [17] provide two recent examples of human-created expressions of (dis)ownership trumping automated attribution systems, suggesting that there is a need to tease apart the complex relationship between content creators and the attribution systems that support them.

In this paper, we present a qualitative study of attribution practices in online creative collaboration

within the domain of Flash animation. Our results suggest that integration and attribution may be thought of as a single process, *cr-editing*, undertaken by a leader. We also detail the criteria, challenges, and strategies that animators have adopted in relation to the cr-editing process. We conclude with implications for the design of systems to support online creative collaboration.

## Background

The focus for our study is Newgrounds,<sup>1</sup> the largest Flash animation portal on the Web with over 1.8 million registered members and over 160,000 member-uploaded animated movies and games. On the Newgrounds forums, animators organize collaborative animation projects called "collabs." Each collab typically has one leader and two to 50 or more artists (non-leader contributors). Collabs are modularized, with the leader first dividing up the collab into segments, and each artist assuming near-complete control over his or her segment while producing it. When all the segments are finished, the leader assembles them into a single, completed movie or game (integration), metes out authorship credit to the artists (attribution), and publishes the result on Newgrounds. Previous work [14] focused on the pre- and mid-production stages of the collab production process. We extend this work by detailing the integration and attribution processes that occur during the final, post-production stage.

## Methods

We interviewed 17 animators who had experience working on collabs as leaders, artists, or both (see Table 1). Fourteen of these participants were

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<sup>1</sup> <http://www.newgrounds.com/>

Joseph Blanchette (24, US)
Eric Carlson (19, US)
Luis Castanon (27, US)
Michael Frank (19, US)
Tom Fulp (29, US)
James Hole (16, Australia)
Tyler Koch (19, US)
Massimo Maitan (21, Australia)
Anders-Martin Meister (16, US)
Ross O'Donovan (19, Australia)
Kraig Phillips (27, US)
Joseph Rooks (21, US)
Kester Smith (21, UK)
"Sven" (18, Netherlands)
Hans Van Harken (17, Spain)
Robert Westgate (21, UK)
"William" (19, US)

**Table 1.** Interviewee names, ages, and countries of residence. A shaded box indicates the interviewee had collab leader experience. Quotation marks around the interviewee's name indicate a pseudonym.

interviewed via telephone using a semi-structured protocol [16], with the conversations audio-recorded and transcribed (avg. duration: 60 min.). The other 3 participants declined to speak over the phone and were interviewed via email, producing sparser but otherwise consistent data. The participants ranged in age from 16 to 29, represented 6 countries, and all were male. Participants' real names are used with their permission, unless noted otherwise [4].

We recruited participants by posting advertisement threads on the Newgrounds forums and sending private messages to members of collabs in progress. We used a purposeful sampling strategy to attract participants with a wide variety of skills, roles, and experiences. We also used snowball sampling to reach participants who did not frequent the Newgrounds forums.

Our interview guide included general questions about the participants' experiences with collabs, as well as specific questions about integration and attribution with respect to those projects. We analyzed the interview transcripts with respect to these two categories, which we further divided into sub-categories for criteria, challenges, and strategies.

### Findings

Once collab artists submit their completed segments to the leader, he or she is faced with two challenges: integration and attribution. The leader must decide not only which segments will be included in the finished animation, but also who will receive credit for working on the collab. These decisions are intertwined. Artists whose work is not included are unlikely to be credited; likewise, artists who are credited have typically submitted accepted work.

### Integration

#### CRITERIA

Collab leaders typically articulate the integration criteria at the start of the project. The most common criterion that leaders mentioned using in our interviews was quality, as explained by Robert:

*If the [submission] is good enough, it'll be put in.... The one person who decides whether stuff goes in or not is either...the person who created the collab or the person who's putting it together into the Flash.*

Leaders rarely elaborate on their expectations of what a "good enough" contribution entails. Instead, leaders either assume their standards align with the community's, or they create a segment for the collab themselves and post it as a benchmark for quality. Kester described one collab where the leader had "pretty much finished his piece when he started the collab, so he was able to say, 'This is how good mine is, you've got to make one about as good as this.'"

At the opposite end of the spectrum, leaders may eschew any type of integration criteria, instead using a "first-come, first-serve" system in which any artist who claims a segment is guaranteed to have their submission included in the finished animation. Leaders tend to adopt a first-come, first-serve system for collabs that (1) require unusually large numbers of artists, (2) appeal to a niche interest, or (3) are geared towards novice animators. This policy often attracts substantial interest and promotes an inclusive, collaborative feeling within the collab, but the quality of the resulting animation usually suffers. James elaborated on this tradeoff between quality and community:

*If you just do part-by-part, like everyone can join up and do a piece, and everything gets in.... You'll get a lot of pieces and a lot of people will join, but the quality won't necessarily be as high.*

The inclusive integration criteria implies a low threshold for attribution as all contributors are credited whereas a quality based integration criteria can create more reputational value by associating that quality with contributors. In either case, once leaders have settled on their integration criteria and receive the completed segments from artists, they face multiple social, aesthetic, and technical challenges.

#### CHALLENGES

Leaders rarely juxtapose segments arbitrarily in the process of integration. More often, integration is performed with an aesthetic sensitivity in which each segment is positioned in a way that accentuates its best attributes (see Figure 1). For many leaders, successful integration means achieving a favorable equilibrium between variety and continuity. Leaders often strive to maintain variety because it provides visual interest and calls attention to the individuality of the contributing artists. Joseph B. recalled, *"I've seen some collaborations where the styles just kind of looked the same...and there wasn't really a reason to watch."*

On the other hand, variety taken to the extreme is chaotic. Leaders expressed much of the same appreciation for continuity as they did for variety. James observed that variety is *"one of the best parts about collaborations, different people's art styles coming together...but it's still important [that], like, in some way it flows."* This continuity is often much more difficult for leaders to achieve than variety, which

follows naturally from artists' diverse backgrounds and skill sets.

To exacerbate these aesthetic challenges, leaders must also deal with social challenges. Artists feel a strong sense of ownership towards their work. When leaders attempt to integrate artists' contributions, their efforts to improve variety or continuity may be stymied by this ownership. Artists like Anders-Martin insist on leaders seeking permission before making any substantial changes to their contributions, or, better still, asking the artists themselves to make the changes:

*If you don't like something, you just tell the person to change it themselves rather than changing it for them.... How would you feel if someone...changed your work without telling you? It's just...you should at least inform the person.*

From the opposite perspective, leaders often respect artists' feelings of ownership until integration problems arise, such as when an artist's contribution disrupts the continuity of the collab (Joseph R.), or fails to meet the leader's expectations for humor or craftsmanship (Michael, Kester). In these cases, conflict can erupt when leaders disregard the wishes of artists by omitting or substantially altering their work. This conflict may arise partly out of mismatched goals. Leaders are concerned primarily with maximizing the quality of the collab as a whole. Artists, in contrast, prioritize inclusion in the collab and preservation of their artistic integrity. They feel detached from projects whose leaders have excised their contributions *"for the greater good,"* especially since they are unlikely to receive any credit for their cut scenes.



**Figure 1.** "Valentine '29" (2007), led by Hans, tells the story of the 1929 St. Valentine's Day Massacre through five chapters, each animated by a different artist. Hans sought to bring together submissions with diverse, yet complementary styles, as illustrated by the submissions of Luis (top) and Osuka (bottom).

Alternatively, a leader may deem it necessary to change a submission in ways that can leave its creator feeling “*pretty pissed*” (Kester) or “*quite annoyed*” (Tyler). Many artists would just as soon quit a collab as have the leader modify their work beyond recognition. However, quitting in a meaningful way is made difficult by the power differential that exists between leaders and artists. Once leaders have received an artist’s submission files, there is little the artist can do to prevent the leader from using it however he or she pleases. Artists have no community-based recourse for abuse of their contributions.

Leaders also face technical challenges to successful integration. James identifies file size as a serious problem, as Newgrounds restricts uploaded animations to 10 megabytes, and artists frequently submit hand-drawn artwork that hasn’t been optimized. A second common concern involves Flash “symbols,” graphical elements that often cause problems when files from different artists are merged. Luis explained:

*I don’t name any of my stuff when I work on my own, but when I have to work on a group project, I have to go through the trouble of naming all my stuff and labeling it all uniquely so that I don’t run into conflicts when I have somebody else’s stuff coming into and sort of merging with mine.*

More generally, leaders often struggle to make sense of artists’ animation styles when they differ from the leaders’ own. Hans found that integrating nearly “*drove [him] insane*” because “*each artist has a different style... a different format, a different setup,*” even when basic specs are agreed upon. Tom agreed: “*The hard thing for me, working on [collabs], is dealing with other people’s techniques and methods for making stuff.*”

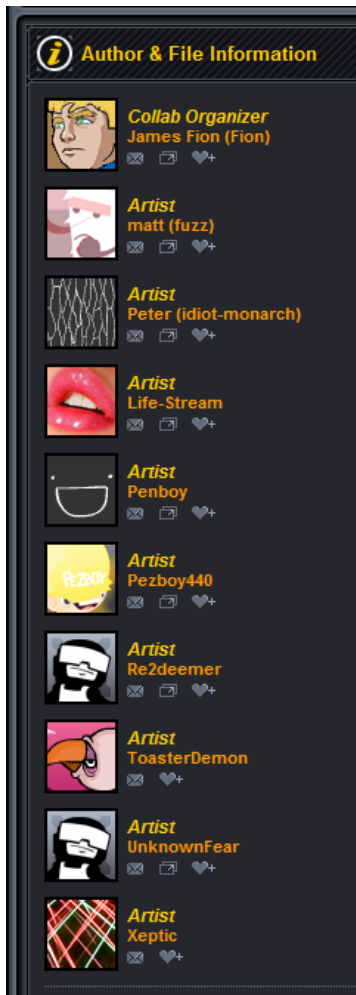
#### STRATEGIES

When any one of these challenges proves to be too frustrating, leaders may respond by excluding that artist’s segment from the final animation and revoking his or her chance at attribution.

One way that leaders promote continuity within their collabs is by taking advantage of the Adobe Flash technology’s affordances for sharing and reuse. Ross led one collab whose participants achieved a consistent visual style by coordinating things like tools, color palettes, and symbols so that elements of an animation frame could be re-used by collaborators. As another approach, leaders may create transitions—short clips linking one animated segment to another—to improve continuity between jarring contributions. For example, when leading the “Retro Collab” (2007), James assigned a start and end color to each contributor so as to ease transitions, but found that as the number of contributors climbed to over 20, he needed to work on the interchanges himself.

When leaders complete the integration process, they often post a link to a pre-release version in the collab thread for artists to inspect for errors and glitches. “*Normally,*” explained Ross, “*you’ll find like fifty problems.*” Massimo described the potential viewer backlash that he circumvents by making available the collab for “bug” testing:

*About two days or three days after that everyone’s got their animation in...I post it on a free hosting site and show it to everybody before I even think about putting it on Newgrounds. Before somebody goes, “S\*\*\*, I didn’t want that to be like that,” or, “You imported my Flash and there’s that little sprite that*



**Figure 2.** As leader of the “Retro Collab” (2007), James coauthored himself and nine others using the Newgrounds MAS. Four others involved with the collab are credited in the less prestigious “Author Comments” (not shown).

*looks absolutely s\*\*\*. So you messed it up for me. It's all your fault.” I usually post it so people can point out any...bugs.*

This process bears similarities to the Wikipedia Featured Article review process [18]. Both begin with an individual nominating a project for review; both leverage the community to simultaneously identify and correct problems; both conclude with some form of final decision. Unlike Wikipedia, however, there is no expectation of consensus. Collab leaders may ignore any suggestions, including the suggestion not to proceed with a release. Also, collab reviewers are typically the artists themselves, rather than a distinct body with a general interest in reviewing, as is common in Wikipedia. These distinctions yield a more informal process than what is required to produce a Featured Article, but one that nevertheless often succeeds in identifying most significant bugs in a pre-release collab.

Once all such bugs are resolved, the leader initiates the process of publishing the finished animation on Newgrounds. A final complication stands between the collab and its public release: the leader must mete out authorship credit to artists.

#### *Attribution*

Newgrounds features a “multi-author system” (MAS) in which multiple contributors may be credited as “coauthors” on a single project (see Figure 2). Among online animation communities, Newgrounds appears to stand alone in offering such a system. When a Newgrounds member submits an animation to the Flash Portal, he or she is automatically granted “first author” status by the MAS. Because, as mentioned earlier, leaders typically submit collabs to Newgrounds, the first

author of a collab is almost always the leader. Only the first author is provided with the ability to add coauthors. James observed that coauthorship “is something that people really strive to get when they participate in collabs, so that it goes under the profile.” Holding coauthor status means that one’s user account is linked to the collab via the technical architecture of Newgrounds. The collab appears on the coauthor’s user profile and influences his or her reputation.

#### CRITERIA

Although most collab participants value coauthorship, it is not always possible to make everyone involved with a collab a coauthor. The MAS allows leaders to credit themselves and up to 9 other contributors; this limitation is not imposed for technical reasons, Tom explained, but rather to curb abuse. When a collab has more than 10 participants, leaders must use some criteria to decide who is granted coauthor status. These vary widely from leader to leader, with the most commonly mentioned criteria including:

- *quality*: artists with the best submissions, as judged by the leader or a vote
- *quantity*: artists with the most accepted submissions
- *attitude*: artists deemed the most helpful or friendly
- *role*: certain roles, such as leaders and artists assigned to create the menu or end credits, are guaranteed credit

Sometimes, leaders define their attribution criteria at the start of a collab; just as often, however, leaders assign coauthors without explicitly stating their criteria.



**Figure 3.** Ross was one of over thirty artists who contributed a scene to Tom’s “Blamformers!” collab (2007), but not among the ten who were coauthored using the Newgrounds MAS. Instead, Ross was credited by having his Newgrounds username, RubberNinja, superimposed over his segment in the finished movie (above, detail). The only way for viewers to find out if Ross was involved with “Blamformers!” is to watch the collab in its entirety.

#### CHALLENGES

The coarse granularity of the MAS provides a major challenge to attribution. Until recently, the system only allowed collab participants to be credited as generic “Authors,” rather than the more specific, meaningful titles seen in the end credits of feature films [1]. As a result, conflicts have arisen when leaders refuse to attribute collaborators using a title they feel is inaccurate. For instance, Tom recounted a story of a collaborator who was refused status as an “Author” since he had contributed only to programming and not to the collab’s story or artwork:

*The original creator, he did the story, he did the artwork, and he created the character. And all the programming for the sequel was done by another user, Bill.<sup>2</sup> They both had to do a lot of work to make this game. When the game was released, the creator didn’t coauthor Bill, and his argument was that Bill wasn’t an author, he was a programmer. And he refused to basically have him listed as a coauthor of the game. That’s not how he saw the relationship.*

In addition to title disputes, many collab participants are frustrated by the MAS’s 10-coauthor maximum. Tyler elaborated on these problems:

*Not a whole lot of collabs are going to have more than ten people.... If they do...no way to make everybody happy that way. Somebody’s going to get screwed on that one.... If you’re part of the project, you definitely deserve the credit for it. If you get screwed out of the credit, that just sucks.*

Although Tyler’s attitude is shared by many collab participants, we spoke to others who are satisfied with

<sup>2</sup> Pseudonym.

a maximum of 10 coauthors. Often, the supplied reason involves the motivating effects of competition. If an artist wants to be included, Kester argued, he or she must make something of value:

*I think it worked better when they had five [coauthors], to be honest.... People are really working to become one of them. If there’s less, then people aren’t really struggling. They don’t need to work as hard to get the coauthor spot.*

Thus, although it may be tempting to assume that simply increasing the MAS’s maximum number of coauthors will resolve many of the aforementioned issues, the reality of the situation is more complex.

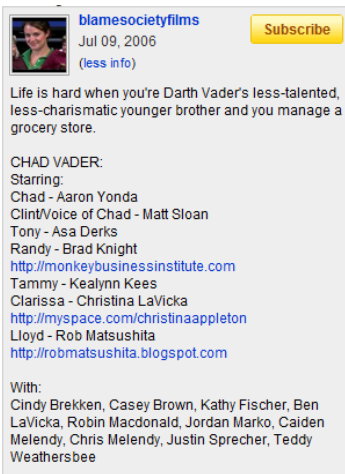
#### STRATEGIES

The Newgrounds community has adapted to the limitations imposed by the MAS by devising alternative forms of attribution. Taken together, these attribution techniques can be conceived of as a hierarchy, with some options more desirable than others. At the top of this hierarchy is coauthorship via the MAS, the most prestigious form of attribution due to the high exposure it offers coauthors (see Figure 2). One step lower in the attribution hierarchy, leaders almost always set up finished animations to display the name of the artist responsible for each segment while that segment plays (see Figure 3). Any artist whose work is accepted in the finished animation will be attributed in this way. Finally, at the lowest level of the hierarchy, leaders often list the names of artists whose work was rejected from the finished animation in the “Author Comments” section—a text box akin to CD liner notes displayed below the finished animation. Although, as James noted, “that’s really all the recognition they’d get,” most artists consider it preferable to none.





**Figure 4.** For the “Clockcrew TV Collab 2” (2007), Joseph R. opted to coauthor only The Clock Crew, a studio account representing fifty artists who collectively drew the 28,800 frames of animation comprising the finished movie.



**Figure 5.** YouTube is one of many online hosts of user-generated content lacking features for attributing multiple users. Here, a group of filmmakers circumvents these limitations by uploading their video with a studio account and crediting individual cast members in the video’s “Description” field. (Image edited for clarity.)

Some leaders, such as Ross and Joseph R., handle attribution challenges in a simpler way: by submitting the collab with a “studio account”, a single user account that is meant to represent all of the collab’s participants (see Figure 4). As Joseph R. explained, “*We coauthor no one, because it’s fair to everyone.*”

## Discussion

Our findings underscore the importance of integration and attribution in online creative collaboration, and illustrate the extent to which these two tasks can be interleaved. In the domain of Flash animation, the burden of managing these challenges usually falls onto the shoulders of one person, the collab leader, who must simultaneously integrate (edit) the materials submitted to him or her by artists, and attribute (credit) those whose contributions are included. Yet, technologies often divide this *cr-editing* process, making the burden on the cr-editor that much more onerous. In the case of the collabs presented here, leaders primarily edit in the Flash authoring software but credit on the Newgrounds website. Designers may consider ways of closing gaps like these, for example, by building APIs for sharing attribution metadata between authoring environments and publication venues, equipping authoring environments with special tools for maintaining attribution metadata during integration, or providing interfaces for lightweight integration within the publication venues.

It may be tempting to view the Newgrounds MAS only in terms of its perceived shortcomings, such as the 10-coauthor maximum or the generic “Author” title. Yet, among the countless online communities that have sprung up to support user-generated content, it is difficult to collect even a handful of examples that

provide any specialized technological support for crediting multiple collaborators on a single project. Instead, many of these websites, at least from an architectural viewpoint, assume that the *uploader* of a piece of content and the *creator* of that content are the same person, and that this person acted alone. This assumption appears both in websites based around content that is usually authored by individuals (e.g., photo sharing on Flickr), and those hosting content that is often collaboratively authored (e.g., movies on YouTube, see Figure 5). From this perspective, while the Newgrounds MAS leaves room for improvement, it nevertheless stands apart by offering even basic collaborative authoring features. While our participants disagreed over specifics, all agreed that the MAS was better than nothing. As online creative collaboration becomes more commonplace, the need for technological support for collaborative authorship is likely to grow. Designers may consider the MAS, and systems like it, as starting points when dealing with online communities whose practices challenge a simplistic definition of creator, (co)author, or uploader.

Even within one domain of online creative collaboration, attitudes surrounding what type of attribution is appropriate can differ markedly. Faced with the limitations of the MAS, some collab participants embraced the 10-coauthor maximum, while others railed against it and developed a hierarchy of attribution alternatives. Over time, the online animation community may reach a consensus about what type of attribution systems it values, just as many offline creative communities have developed social norms and professional standards for attribution [1,3]. One practical suggestion we make to accelerate this process is to design systems which separate attribution and



**Design for cr-editing.** In collabs, and projects like them, integration and attribution can be viewed as a single process, often undertaken by the same person. Designers may consider ways to unify, or streamline the transitions between, technologies for editing and those for crediting.

**Design for collaborative authorship.** Online creative collaboration is increasingly commonplace, while adequate mechanisms for recognizing multiple authors remain rare. Designers may consider ways of better representing the nuanced roles of creator, (co)author, and uploader.

**Design for community values.** Creative communities differ in their attitudes towards the importance of attribution and how it should be expressed. Designers may consider a community's views on copyright (e.g., *droit moral*) and the purpose of attribution (e.g., recognition vs. commendation) when designing tools to help its members with editing and crediting.

**Table 2.** Summary of discussion.

commendation. For example, in Wikipedia, the “history” tab automatically tracks edits to a given article (attribution), but editors can also manually recognize outstanding efforts (commendation) by posting barnstars on each other’s user pages [11]. In the community we studied, these notions were conflated, forcing collab leaders to choose one or the other, and severing meaningful connections between artists and their work.

We also found a connection between the results of our study and the legal concept of *droit moral*, or authorial moral rights, which forms the basis of modern copyright law in some countries [12]. These rights, which include recognition as the creator (attribution), choosing when and how the work is disseminated (disclosure), and prohibition against misrepresenting the creator’s expression (integrity), encompass many of the concerns voiced by our participants. For example, artists wanted to be coauthored for their efforts (attribution), leaders solicited artists for bug testing before publishing the final animation (disclosure), and leaders asked permission before making major changes to artists’ segments (integrity). As the adoption of *droit moral* ideas occurred organically in the strategies employed by leaders, designers may consider them as important principles to incorporate explicitly in future collaborative authoring environments.

### Future Work and Conclusion

We are fascinated to learn the extent to which our findings in this domain generalize to others. Where possible, we have pointed out similarities and differences between collabs and other forms of online creative collaboration that have been studied—mainly, Wikipedia and open-source software (OSS)—and

suggested design opportunities for this domain and those like it (see Table 2). However, little research has addressed online creative collaboration in artistic- or entertainment-oriented domains, and an even smaller fraction of this work deals with integration or attribution. Lacking empirical evidence, we hesitate to speculate about how our findings might apply to other, seemingly-related online contexts (e.g., video remixing, music production).

Alternatively, we propose that a valuable step towards generalizability would be to situate our findings in a broader *theoretical* framework alongside other forms of online creative collaboration. Benkler’s theory of social production [2] provides one promising candidate. Benkler argues that to succeed, social production requires (1) modularization, (2) heterogeneous granularity, and (3) low-cost integration of work. While others have shown that Wikipedia and many OSS projects exemplify all three, we found that low-cost integration continues to elude collabs. In this paper, we proposed three reasons why this may be (aesthetic, social, and technical challenges) and suggested design implications to reduce the cost of integration. Future studies in other contexts may help refine Benkler’s theory and reveal connections between the many different genres of online creative collaboration.

Finally, our study points to the need to understand, and design for, notions of authorship, ownership, and attribution that are rapidly evolving in online creative contexts. Flash animations provide just one example of this phenomenon. Digital artifacts, ranging from original music to fan fiction, can now be collaboratively created, published, deconstructed, remixed, and re-published by groups of people who may never meet or

even explicitly communicate with each other [6,9]. In light of these new creative practices, and the various legal mechanisms used to promote or inhibit them [7,13], attribution provides a starting point for exploring how technological support can help people retain the incentives and recognition that they value. This paper offers an early step towards cataloguing the key challenges and opportunities involved.

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