

An Archive of Their Own: A Case Study of Feminist HCI and Values in Design

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ABSTRACT

Rarely are computing systems developed entirely by members of the communities they serve, particularly when that community is underrepresented in computing. Archive of Our Own (AO3), a fan fiction archive with nearly 750,000 users and over 2 million individual works, was designed and coded primarily by women to meet the needs of the online fandom community. Their design decisions were informed by existing values and norms around issues such as accessibility, inclusivity, and identity. We conducted interviews with 28 users and developers, and with this data we detail the history and design of AO3 using the framework of **feminist HCI** and focusing on the **successful incorporation of values into design**. We conclude with considering examples of complexity in values in design work: the use of design to mitigate tensions in values and to influence value formation or change.

Author Keywords

accessibility; human-centered design; fan fiction; feminist hci; online communities; social norms; values in design

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous

INTRODUCTION

I know we have project managers in our community -- and coders and designers -- can't we do this? Seriously -- we can come up with a site that would be miles better and more attractive to fanfic writers/readers than anything else out there, guys, because we actually USE the stuff.

We need a central archive of our own.

- Naomi, in a blog post dated May 17, 2007

In 2007, in the wake of YouTube's massive success and among the wave of start-ups dedicated to user-generated

content, a group of men created a website intended to monetize content that a community of mostly women had been sharing amongst themselves for free [18,24,27]. FanLib, a for-profit archive for fan fiction (stories based on existing media), was heavily criticized by the existing community of writers, who viewed it as at best tone-deaf to their values and at worst a deliberate attempt to exploit.

The larger community of creators of fanworks¹ have a history that began long before the Internet, and have been online migrants, appropriating new technologies to their needs [15,27]. In 2007, Livejournal was also a hub for this community, but had implemented design and policy decisions that made fanwork creators feel unwelcome [18,25]. In reaction to these changes as well as the controversy surrounding FanLib, some members of the community voiced a desire to avoid both dependence on the online communities they had been using and potential exploitation by new ones. The result was an initiative to create a space to share work that they would have control over: an archive of their own.

Since its launch in 2008, Archive of Our Own (AO3) has grown to amass nearly 750,000 users and over 2 million individual fan fiction works.² Its code is open source, and the archive has been designed, coded, and maintained nearly entirely by the community it serves—a community made up mostly of women. Because the controversy that sparked its existence was surrounding a disconnect with the community's value system, baking these values into the design of the site was a priority. As a result, the design of AO3 is a unique example of building complex values and social norms into technology design.

Moreover, unpacking this value system reveals an underlying commitment to many core feminist values such

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¹ An excerpt from Naomi Novik's testimony before Congress (on the topic of fair use) serves to define fanworks and describe the community [39]: "[B]efore I wrote one word of my first novel, I wrote fan fiction, built online computer games, wrote open source archiving software, and created remix videos. I met hundreds of other artists creating their own work and found an enthusiastic audience who gave feedback and advice and help. We weren't trying to make money off our work. We were gathering around a campfire. We were singing, telling stories with our friends. The campfire was just a bigger campfire, thanks to the Internet, and instead of telling new stories about Robin Hood, we told new stories about Captain Picard, because that is who we saw on our television every week."

² <https://www.archiveofourown.org>

as agency, inclusivity, diversity, and empowerment. These same values, as articulated in Bardzell's agenda for feminist HCI, are also a natural ally to interaction design [2]. Even without this specific design agenda, the developers of AO3 adhered to many of the tenets of feminist HCI as they instilled their value system into the design features of the archive, including nuanced handling of multiple pseudonyms, translations of content into over 20 languages, and a powerful, user-controlled folksonomy tagging and search system.

In order to better understand the history, design, and impact of AO3 on the community of creators it was built to serve, we conducted interviews with 17 users, as well as 11 designers, developers, and staffers. Through our analysis of these stories, as well as trace data such as public blog posts, bug reports, and feature requests, we present AO3 as a case study of feminist HCI in action. We present successful incorporation of designing for existing values, and conclude with examples of additional complexities in this process: the use of design to mitigate tensions in values and to influence value formation or change.

BACKGROUND

Archive of Our Own

In the aftermath of the FanLib controversy [18,24] a significant contingent of the fan fiction community galvanized to create the Organization for Transformative Works (OTW), a "nonprofit organization run by and for fans to provide access to and preserve the history of fanworks and fan cultures,"³ in order to provide a legal entity capable of supporting the creation of a fan fiction archive. Though in addition to AO3 as the major initial project of OTW, committees also formed to start an academic journal, *The Journal of Transformative Works and Cultures*, the Fanlore wiki dedicated to preserving fan history, and a legal advocacy team.

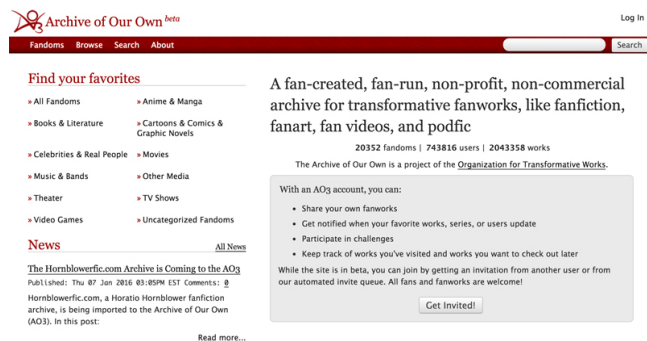


Figure 1. Screenshot of the front page of AO3 (January 2016)

A team of fan coders, coordinators, and designers used community input to create AO3's basic structure, which remains largely unchanged to this day. The website is

written in Ruby on Rails, after a public discussion led to the conclusion that it was easiest to learn for new programmers. The site launched in 2008 and entered Open Beta in 2009.

AO3's code is open source,⁴ and though anyone can submit pull requests, nearly all of the coding is still done by fan volunteers, part of the site's Accessibility, Design & Technology (AD&T) Committee. AD&T consists of the Design, Coders, and Testers subcommittees who are involved in bug management, design implementation, and other coding issues that affect the website.

Another group essential to the functioning and design of the archive are the "tag wranglers." AO3 has a complex tagging and search system infrastructure based on the principles of user-entered folksonomy [29]. Wranglers' main duties involve manually coagulating and connecting all of the new "canonical" tags that users create so that users can freely tag their works however they wish without negatively impacting the site's search potential. For example, tag wranglers would manually connect "mermaid," "merman," and "merfolk" into one "merpeople" meta tag, invisible to users, that allows searching any one of these tags to bring up all the others.

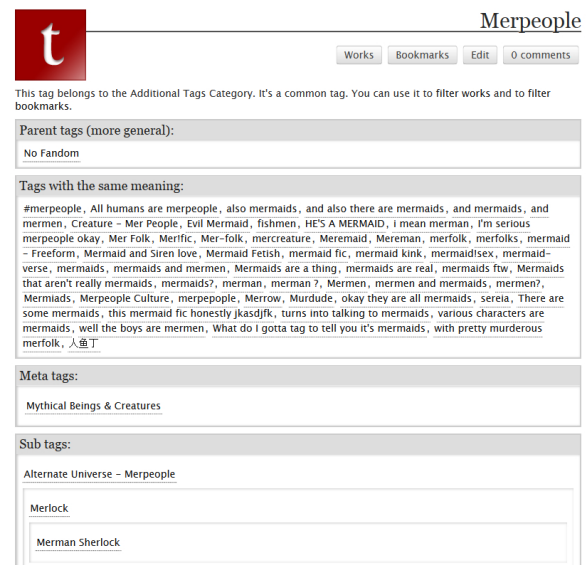


Figure 2. Tag Wrangler view of a tag page on AO3 (retrieved from http://fanlore.org/wiki/AO3_Tag_Wrangling, CC-BY)

Related Work

The history of AO3 suggests a close alignment of design with the existing values and norms of the fan fiction community. One way to look at this would be as an example of value-sensitive design (VSD), "a theoretically grounded approach to the design of technology that accounts for human values in a principled and comprehensive manner throughout the design process" [20]. VSD emphasizes a relationship between values and technology, taking into account all those affected by a

³ <http://transformativeworks.org/>

⁴ <https://github.com/otwcode/otwarchive>

system, even non-users. Though *whose values* is often a concern in VSD, some adopters of VSD as a design philosophy have suggested thinking of it as a method that can be applied to any set of values [3]. Closely considering existing social norms is a way of identifying appropriate values for the community, and could be important for design of both technology and policy. Values and community identification can be critical to elements that predict the success of online communities, such as encouraging commitment and contribution [30]. Our prior work has also suggested that website policies might benefit from closer alignment to norms of user communities [16].

AO3 is also somewhat unique among even examples of VSD, in that it was built by the same community that it serves. Another example of this would be open source software, which is often built to serve some existing need (and judged successful by how well it accomplishes this). This is often called “scratching an itch” [12,36]. Because the “irritations” scratched tend to come from the software community, many open source software projects are tools for developers [36]. However, there are other kinds of irritations. Another example of a successfully “scratched itch” would be Ravelry, an online community for knitters, which was created due to the founder being “frustrated by the lack of organization of online knitting resources” [33]. However, even having a knitter at the design helm is different than open source projects where all of the coding is accomplished by potential users. After all, outside of a community of software developers, most communities with a need would not have the existing expertise to build software for themselves. Statistically, this would be especially true of populations that are predominantly women such as knitters or fan fiction writers, since women are underrepresented in computing, making up somewhere between 1% and 10% of the open source software community [32,37]. This gender divide persists despite values of openness and inclusiveness that would seem to mesh well with feminist values [32].

Feminist Values in HCI and Fandom

Drawing from prior work in feminist methodology and scholarship on feminism and technology, Shaowen Bardzell published an influential 2010 paper introducing an agenda of “feminist HCI”—an idea that the design of interactive systems can be “imbued with sensitivity to the central commitments of feminism” [2]. Lucy Suchman had previously outlined some of these commitments as, for example, questioning of categories (such as male and female or people and technology) and the residing of agency within networks of people and things rather than individuals [35]. Bardzell further articulated important feminist values as including agency, fulfillment, identity, equity, empowerment, and diversity. In laying out how they can be integrated into HCI, she presented an action-based design agenda to the community [2]. A follow-up to this agenda included elaboration of what a feminist HCI methodology would include, such as an empathic

relationship with research participants, researcher self disclosure, and research reflexivity [1]. Subsequently, other researchers and designers have integrated these values and methods into their work [14,19,23].

Just as Bardzell describes feminism as a “natural ally” to interaction design, it is for fandom as well. Beyond simply the demographics of fan creation, which Henry Jenkins calls “an almost exclusively feminine response to mass media texts,” [28], many of the underlying values of the community also correspond to the commitments of feminism. Fandom’s position as a subculture [31] and commitment to a “labor of love” gift economy [9] drives a culture of inclusivity and empowerment. Our prior work studying online fan creation communities also identified social norms that track to a strong value system, and we observed AO3 as being built upon these norms [15,16]. For these reasons, we identified AO3 as an appropriate site for a case study of incorporating values into design.

METHODS

Our data for this study consists of in-depth interviews with AO3 users and designers/coders, as well as examination of early public documentation related to the formation of AO3 and public feature requests and bug reports. Interview participants were recruited in two ways: (1) direct contact with the current AO3 development team, asking for volunteers as well as pointers to past designers, whom we also directly contacted; and (2) a public recruitment post targeted at AO3 users, stating a preference for fan fiction writers who had used both AO3 and other fan fiction archives and communities in the past. This public recruitment message was posted on Tumblr and given appropriate tags (“fan fiction”, “AO3”, etc.). In the message, we encouraged sharing and reblogging. The post was favorited and shared over 700 times on Tumblr, and also passed along on other fan sites and social media. Because we received more volunteers than we had the resources to interview, we first privileged those who had been directly involved with AO3 or OTW (staffers in capacities other than archive development), as well as those who reported having used the archive longer, and then chose randomly from this group. We did not screen for demographics or attitudes/experiences about the archive.

We had a final set of 28 interview participants: 6 developers/designers, 5 staffers (2 on the communications team, 2 tag wranglers, and 1 from the legal committee), and 17 users. These interviews were conducted via phone/Skype (18), in person (2), and over instant message (7). Those participants who chose instant message said they were more comfortable doing so than speaking on the phone, and research has shown that there is not a significant difference in the amount of information conveyed between the two mediums [13]. The interviews were semi-structured, providing us with the flexibility to adjust questioning based on responses [34]. We asked archive users about their history in fandom communities, including which websites

they used and when, and why they moved from and to each different technology. We also asked them to compare and contrast these to AO3, and about specific design features and values related to AO3. When interviewing developers, we focused on the history of the archive's development and design decisions.

Participants ranged in age from 23 to 62. Because we specifically recruited participants with an eye towards writers who have migrated to different fan spaces (meaning they necessarily have been participating longer than some), this age range skewed older than in previous studies of fan fiction writers [15]. With respect to gender, our participants were 24 women, 1 man, and 1 non-identified. This gender makeup is representative of fan creation communities [11,28]. Every AO3/OTW developer and staffer we interviewed identified as female; women have made up the majority but not entirety of the organization and development team. Our participants were predominantly white, and the majority live in the United States with the exception of two in Canada, and one each in Australia, Japan, England, and Germany. Interestingly, four out of six developers interviewed are outside the United States. Our participants have used AO3 for, on average, 5 years, and have used a wide range of technologies for fan fiction previously, including Usenet, Yahoo Groups, Livejournal, fanfiction.net, Tumblr, and fandom-specific archives.

Though typically participant names are anonymized in research publications, there are times when using real names or chosen pseudonyms is appropriate, particularly for creators who deserve credit for their work [6]. Following Bruckman et al.'s advice that allowing participants to indicate *how* they want to be identified is as important as *whether* to identify them [6], we explained the publication process to our participants and gave them a choice of being anonymized or using their chosen name (whether their real name or their fannish pseudonym).

Developers/Designers
A*, Betsy, Lucy*, Maia*, Michele*, Naomi*
User/Staffers
Heidi*, Kirsten*, Maureen, Mira*, mmmdraco*
Users
Abigail, Carolyn, Catie, Chandri*, Cora*, Jamie*, Jessica, Jo, KM*, Krystal, Laura, nonesuch*, Olofa*, Roth*, Sara, Tara, VR*

Table 1. Interview participants, designated as: (1) developers/designers who contributed to code or design of AO3; (2) user/staffers, users who have also been involved in AO3 or OTW in a non-design capacity (such as tag wranglers); (3) users with no official affiliation with AO3 or OTW. * indicates a chosen name rather than anonymization.

After transcription of voice interviews, two independent coders used iterative qualitative coding to identify emergent patterns and themes from this data in the tradition of thematic analysis [4]. We began with an inductive approach but then grouped themes deductively under the framework

of feminist HCI once we identified its relevance. Once every interview was coded and the themes were considered finalized, each transcript was re-coded by the researcher who had not coded it originally. Our final analysis focused on themes deriving from the values of feminism and fandom, as well as design features and philosophies tracking to these values. Feminist values were an emergent theme in our data despite interviewees not having been asked about feminism.

In addition to interviews, we also looked to historical documents about the archive. These included public discussions about its development from blog posts and the public code depository, bug reports, and feature requests. We coded these documents using the same themes as our interviews, and used this data to supplement our knowledge about specific design features and recommendations.

Self Disclosure

We drew from feminist methodologies as described by Bardzell and Bardzell, and as implemented by Dimond et al. in the study of the activist website Hollaback!, in our data collection process [1,14]. Part of this is researcher self-disclosure of their position in the world, goals, and intellectual beliefs. To this end, the first author of this paper has been involved with OTW since 2009 (after AO3 was launched) in a capacity unrelated to design and development, and both the first and second authors have been part of the fan fiction community (whereas the third author offers an outsider's perspective). Making this disclosure to research participants positioned the researchers in an empathic position with respect to the community. However, half of the interviews were conducted by a researcher other than the first author, to minimize any bias due to her involvement with OTW.

AO3 AS FEMINIST HCI

In her design agenda for the HCI community, Bardzell lays out qualities characterizing feminist interaction [2]. These include participation, advocacy, self-disclosure, pluralism, ecology, and embodiment. Though in the interest of focus we will not discuss every one, we saw evidence for each. For example, ecology is relevant in the contextual impact of the archive and how it interacts with other media that writers user, such as social networking sites. However, elements of participation, pluralism, and advocacy were the most prominent in our data, and here we examine how these values are embedded in AO3's design, describing the design features and philosophies that capture each.

Participation

The quality of *participation* in feminist HCI refers to valuing participatory processes in design [2]. This can be instantiated in many different ways, so long as the approach is inclusive and collaborative with users, and demonstrates a respect for different perspectives. Not only has participation been an important part of the functioning and evolution of AO3, but it could be seen as the primary motivation for its creation.

Though not all of the 17 users we interviewed had a sense for the history of AO3, many did; between these and the 11 staffers and site developers we interviewed, a clear picture formed of the circumstances that led to the creation of the site. Science fiction (and fan fiction) author Naomi Novik, was universally acknowledged by our other participants as both the major advocate and developer behind the archive in the early days. In the wake of the FanLib controversy, she wrote a blog post that served as the starting place for AO3 and OTW. The title was “An Archive of One’s Own,” a name that stuck. The impetus was that the community saw FanLib as *not* valuing participation. As she wrote, “They don’t actually care about the fanfic community... They don’t have a single fanfic reader or writer on their board; they don’t even have a single woman on their board.” As one of our interview participants, Naomi described the thinking that led to the creation of AO3:

We need our own site. We need to put up our own front page that basically says, “This is the fannish community, and this is by us, for us, and we support everyone.”

AO3 was not the first fan fiction site built by fans. One of our interview participants, Heidi, in addition to being involved with OTW in a non-development capacity, was also one of the creators of a well-known *Harry Potter* fan fiction archive that launched in 2001. Similar to FanLib and AO3, this site was created largely in response to policy changes at Fanfiction.net, and she described their rationale as being similar: “If they’re going to keep changing the rules, we’re going to build our own place.” Though the difference between AO3 and many smaller, fandom-specific archives over the years (many of which were actually built on open source software that Naomi created in the early 2000s) was one of scale and infrastructure. Being big enough for everyone (not just *Harry Potter* fans, for example) and being willing to protect its users from legal challenge and ensure its continued existence was a large order based on past precedent.

Naomi’s original blog post received over 600 comments. She described the post as “exploding”—not only people chiming in and saying it was a great idea, but also listing features that they would like to see. AO3 was designed and built with a great deal of input from the community. Moreover, it was designed and built by members of the community. This was an important early priority: rather than bringing in outside software developers, they searched for programming and design talent from members of the fan fiction community. When they needed more, they prioritized training them.

Part of it was just the necessity like, “How are we going to get enough people to not just build this thing, but maintain it?” So, from the very beginning, it got, “All right. We’re going to have to sort of teach people internally. We’re going to have to grow our own.” – Naomi

This was not without problems—mostly with respect to maintaining a large enough developer base and not burning out the current ones with the additional burden of training, an issue pointed out by both past and current developers.

We had developers who had like a deep well of kindness, and were available to be kind to people, and teach them, and help them where they could, and keep that rolling. But I don’t think we ever focused enough on support mechanisms and creating an environment where there was an instructive way to learn enough to really sustain that. – Maia

However, as a former software engineer, Naomi was able to articulate why she thought this value was important despite the difficulty in sustainability:

The best platforms are built by people who use those platforms. If you’re not actually using the software service that you provide on the ground floor, it’s not going to be that great. Where things really work is where you’re like “I’m really frustrated that this thing that I want doesn’t exist,” or “These other sites don’t do what I want, so I’m going to make my own.” That’s where the AO3 came from.

As the archive has evolved, the development team has continued to value input from users. They maintain an active feature requests board on Trello, and when they reject feature requests they provide reasoning. For example, a popular request is for a “tag blacklist” feature, and a developer added a note that they are hesitant to implement it due to specific concerns, and included a link to a third party tool that might help serve that function for users. Feature requests from users are also nearly always polite, with good reasoning for the request, and often include appreciation for the work that the developers do on the site.

A current member of the development team told us that communication is a high priority, and making a more conscious effort has improved user experience.

We worked really hard on announcing any site changes in advance, talking to users in comments. We were really conscious of communicating any major changes, or explaining why stuff was happening. You could tell it was having a positive effect. – A

She says that this effect seems to have improved user response, including things like not reacting badly to technical problems. When the archive was down for an evening, instead of complaining on Twitter, users tweeted pictures of kittens at AO3 and wished them well in fixing it.

Many users interviewed compared AO3 to other websites and the way that they handle user input:

The changes that have come about have been for accessibility and smoother operation. I think all those came from people saying, “Hey, we like this. We don’t like this. We don’t use that.” The changes on other websites have come from companies not listening and just being like, “We think this would be better, but we don’t know.” ... Then

those changes are really annoying. AO3 doesn't have that problem because it's user-driven. – Kirsten

Active involvement of users is of course core to user-centered design generally, and can be essential to the success of a technology [38]. One of the examples Bardzell provides is Whirlpool's "World Washer," or "the washing machine that ate my sari" [2,10]. The design was based on a universal idea of clothes washing rather than engagement with target user groups—such as women in South India whose saris were too fragile for the machine. FanLib's universal idea of user-generated content (based upon a false assumption that the fan fiction community would be similar to the YouTube community) caused the site to fail because of a lack of engagement with its target user base. Valuing participation dovetails into another component of feminist HCI, which is the rejection of this kind of universality.

Pluralism

The quality of *pluralism* refers to designing to resist a single, universal point of view [2]. This touches on issues of accessibility, diversity, and inclusivity. A number of interview participants mentioned a culture of inclusivity of fandom as a whole, which heavily impacted early AO3 design. Developer interviewee Lucy characterized the major need that AO3 filled as being a "stable, central, protected place which was accessible to everyone." This priority touches on the importance in feminist HCI on supporting not just women but any marginalized or underrepresented population.

Accessibility

Though design towards inclusivity was a broader mission, a big part of this was accessibility in its traditional sense, designing the website in such a way that it could be used by people with disabilities. One of the key designers in the early stages of the website due to personal experiences with disability worked hard to make the site accessible, and this design philosophy continued.

The whole archive from the ground up was designed with accessibility in mind. Everything we add has to be accessible; otherwise it's not added. We had a few people with assistive technology provide feedback. - Betsy

Several users mentioned an appreciation for the accessibility of the site. Though much of this effort is invisible to the average user, one example feature is the ability to easily change the site skin, and one option is "low vision." User/staffer Mira felt particularly strongly about the positive impact that designing for the visually impaired has had, comparing AO3 to other websites.

My mother has vision problems. There is thought about that built into AO3 in a way that it isn't into other websites. I'm always thinking about disabilities, other ones too... If more places would be like AO3 and consider feedback and these kinds of problems then the Internet would be a better place.

Inclusivity

In addition to ensuring that everyone has the *ability* to use the archive, there was also a broader mission towards making everyone feel *welcome* in using the archive. Staffers and developers expressed this as a key value—not building the site so that it prescribed being a certain type of fan, and instead acknowledging all their potential users. Mira said their definition of fan is "If you think you're a fan, then you are a fan and you're welcome here."

As for any new feature, we always try to garner use cases from as wide a fannish spectrum as we can. A feature shouldn't work better for people in a fandom for an American TV show than for fans of an Argentinian soap or a J-Pop band or an obscure Russian book. - Betsy

Mira, who was not a site developer but had some input into AO3 in its early stages due to her role on the Communications team, explained that she worked hard to prioritize a value that tracks well to pluralism's notion of resisting a universal point of view.

I wanted to make sure that OTW and AO3 was really friendly to the stuff that I would call nontraditional. I'm this nice, middle-class person reading fiction that's written in English to a certain standard, but I didn't want to impose my preferences on the world. So I was always, as many of us were, saying, "Well, you've got to look at others."

Part of realizing this mission was a priority towards translation of material on AO3. Designer Lucy emphasized a sense that fandom is an international community, and making AO3 a "site that could exist in lots of languages" was an acknowledgment of that. Though initial plans to have all workings of the site auto-translated haven't been realized, OTW has a committee dedicated to translation with nearly 150 volunteers translating information by hand. News posts, help pages, comments, and other site content for OTW are AO3 are available in over 20 languages.⁵

Though this team of volunteer translators is not tasked with translating fiction in the archive, there are plenty of users to do this already. AO3 supports most languages, and includes functionality to link story translations to their original. User Roth spoke with enthusiasm about her work being translated into Chinese by a fan, and how great she thought it was that AO3 supported Chinese characters and a number of other languages. As a result, non-English speakers feel more welcome on the site than they might otherwise.

Another feature towards rejecting a universal point of view is the search and tagging system organized by a small army of tag wranglers. Nearly every user we interviewed mentioned this feature as being essential to AO3's success. A robust tagging system was a common feature request in initial conversations about the archive, in large part in response to other sites not meeting their needs. For

⁵ https://archiveofourown.org/admin_posts/3231

example, several of our user interviewees stated that AO3 improved heavily upon Livejournal due to a lack of centralized search features, and also upon Fanfiction.net due to constraints it imposed on tags and search.

It is much, much easier because of the tagging system at AO3 to find exactly what you want to read, whereas, Fanfiction.net was a lot harder. You could choose characters to sort by, but you couldn't sort by relationships or with tags the way you could at AO3. - Roth

Though this was a complex infrastructure and database problem, the rationale behind it wasn't just making search easier, but a conscious embedding of values of inclusivity and agency. By building in folksonomy rather than imposing structure, the *design* of AO3's database makes no judgments about content and what is important to its users. One interviewee contrasted this to Fanfiction.net restricting "pairing" search (representing a romantic relationship) to two characters. AO3 has no such restrictions, allowing tags for threesome (or more) relationships. As one user put it:

The failure of Fanfiction.net is that you could only kind of say, "This has one or two of these things." Archive of Our Own has the ability to say, "Okay, you want something that has all of that, plus it's got lemonade." - Kimberly

The primary interface designer in the early days of AO3 described the rationale in giving users this level of control:

We knew that people called things by different names... If you wanted to write a Buffy/Spike [characters from Buffy the Vampire Slayer] fic, and you really wanted to call it Spuffy, we didn't want to stop you from doing that, even if we disagreed with it. So, thinking about sort of how you manage creating tags for a potentially infinite universe of source texts, and characters inside the source texts, and things that people will want to say about their own work, is where the tagging system came from. - Michele

Users expressed that this instantiation of a value of non-judgment really does help people feel included, particularly in a community that is welcoming towards non-gender-binary and queer fans. Writers have control over how to describe the characters in their stories.

Of course, AO3's design necessitated trade-offs as well, and the most common complaint regarding inclusivity on the archive is that it is largely limited to text. OTW as an organization supports fanworks generally, which includes things like art and video, but AO3 caters to fan fiction writers and readers. As one of the early developers put it:

Because of the limitations of what we could afford and what we could do, we prioritized text-based, and that's what the archive has become... I would love to be able to [host fanart], but it's such a huge amount of work... It means that it's only one part of fandom that can really use the archive. I'm a bit sad for that. - Maia

Developer Lucy also spoke of this trade-off with regret, saying that supporting multimedia was always the plan. Like other developers we interviewed, she spoke of the technical burden: "A lot of the coding expertise went on just keeping the existing stuff running," and that despite wishing that AO3 had been more inclusive to other types of creativity, they decided that it would better to "have it out in the world" with this limitation than not at all. Others felt similarly about the AO3 interface being in English only, despite the manual translation of a lot of the content.

Identity and Self

Closely tied to values of pluralism and inclusivity is a nuanced treatment of identity and self, one of the central commitments of feminism. As Suchman points out, feminist scholars often draw attention to the politics of binary divisions, and a feminist framework necessitates displacing these binaries with specificities of *knowing* subjects in a more nuanced way [35]. Pluralist design as instantiated by feminist HCI foregrounds "constructive engagement with diversity" as well as "embracing the margins both to be more inclusive and to benefit from the marginal" [2], a philosophy that can be challenging for social networking sites that often privilege normative self-presentations rather than fluidity of identity [22,26].

These concepts are particularly important in the fan fiction community, parts of which have been characterized as a "queer female space," in terms of both identities and creative themes [31]. Tagging and search on AO3 supporting any label (or lack of label) for characters in fiction is one way of supporting nuanced identity. Another sensitivity to this value is AO3's treatment of *user* identity as both fluid and user-controlled. This tracks to a highly ingrained fandom value towards respecting anonymity, pseudonymity, and privacy [8]. In discussing this value, Naomi framed it in a pluralist way, an acknowledgment that not everyone has her same view on the world:

I've got a lot of outside endorsement... a lot of fans are not in that position. Some of them, their own families don't know what they do. Some of them were afraid, especially in the early years... Everybody has sort of a horror story about somebody called a person's boss and was like, "You know that this person writes explicit fan fiction on the Internet." There were a lot of people who either were or felt very vulnerable in that way. - Naomi

One way that OTW instantiated a norm to help protect the fans that might feel this type of vulnerability is by having specific rules against "outing" (i.e., linking a real name with a pseudonym) without permission. Additionally, the ability to remain anonymous is part of the design of AO3, including in basic structure. For example, Naomi told us that this is one of the reasons that AO3 does not offer tiered user accounts (i.e., the ability to pay for more features). AO3 does not take credit cards for any reason, so as not to require real names. When OTW takes donations, they do not ask for AO3 usernames. The absence of tiered accounts

also puts every user on equal footing, a decision mirroring the feminist commitment to equality.

Another design mechanism regarding identity is a nuanced handling of pseudonyms. In addition to the importance of allowing pseudonyms at all (a controversial issue with some social networking sites such as Google+ and Facebook [22,31]), AO3 allows users to have *multiple pseudonyms and to link them together*. In other words, the name of a story's author's does not necessarily have to be a user's login username. Naomi said that though some people find this feature "puzzling," it is important because the migration of fandom through different technologies means that people often had to change their pseudonyms—for example, going to a new site and discovering that their username was already taken. Another reason might be that before AO3, there were few centralized fan fiction archives and instead they were separated by fandom—so someone might write by one name in a *Harry Potter* archive and by another name in a *Star Trek* archive. Designers told us that this infrastructure was challenging but necessary:

That was a pain in the neck to represent and draft both a database model and an information design model. But it was sort of a requirement coming in that there might be people who use different pseudonyms in different fan spaces who wanted to combine all of their work in one account. – Michele

Users validated the importance of this feature, and indicated that they find it unique to the other sites that they've used.

The ability to be anon behind a pseud is a long-standing tradition dating back to the 1990s online. Even in fanzines a lot of authors used pseudonyms. Then on LJ some people had a different pseud for each fandom. I'm supporting of how AO3 deals with that, which is basically allowing people to do what they want. If they want to merge pseudonyms they can, or they can have multiple accounts, keep everything separate. – Carolyn

I really appreciate being able to be on AO3 and be reading various fandoms where people maybe have multiple pseudonyms. More often, it makes it easier for me to recognize if something is written by someone I know or I've read a lot of their work and I like it, or I hate it, or whatever. – Catie

Interestingly, this feature caters both to the older generation of fans who have migrated through different technologies and become attached to their usernames, but also to an emerging practice of younger fans, mostly on Tumblr, who treat identity more fluidly:

You get really attached to your username. That's who you are. But newer people... they change their usernames frequently when they write their fics on Tumblr. – Krystal

Even though these attitudes towards identity are somewhat at odds, AO3's design supports them both. This kind of flexibility is important, given the complex strategies that

fans often have toward managing multiple identities. Many participants told us about maintaining multiple email and social media accounts to separate their real lives from their fannish identity, or even multiple fannish identities. Drawing from Goffman's theories of self presentation [21], one way that we can "give" impressions to others is by adopting personas or even splitting personas [7]. AO3 in contrast to most social media sites, provides the option to "own" more than one identity. In sum, pluralism and inclusivity are core to the design of AO3, and these are highly tied to the feminist value of equality. Naomi described AO3's core values like this:

[Fandom is about] what you give to the community. The thing you bring to the potluck is valued, and it's not about whether you can pay to get in the door. Anybody's welcome. I think that those are very good values that were part of the community that had been baked into the archive as well. That's part of what's behind the desire to allow translation, the remixes, an attempt to provide as many features as we can. It was all about making it possible for people to come play.

Advocacy

The quality of *advocacy* in feminist HCI considers both the importance of taking an advocacy position towards positive social change and the risk of designers imposing their own values on users [2]. One user told us that she sees the existence of AO3 as being advocacy in itself. Advocacy in this sense is critical to the feminist commitment to *empowerment*, which is at the core of AO3's mission and design. "Owning the servers" was a rallying cry in the creation of the archive [31]:

It was ours and nobody could cease or desist us. They couldn't wipe the whole thing out. They couldn't make it all disappear. The GeoCities exodus wouldn't happen again, because the servers would belong to us. It wouldn't matter because no one could buy it out from under us. – Chandri

I trust that the people who run [AO3] aren't going to shut it down without warning like the people who ran [a smaller fan fiction archive] did. – KM

This kind of trust was also a common refrain, especially compared to other sites that users mentioned. Despite the fact that most users don't read Terms of Service for the websites they use, even on AO3 [17], our interviewees had a sense of the policies of the site—and perhaps more importantly, a *trust* that the policies would be favorable.

The "mass exodus" from Livejournal, in particular, was due in part to policy changes and in part to design changes. Our interviewees saw both as an indication that the site did not care about their user base. In stark contrast to sites that many of our interview participants described as "corporate," AO3 is run by fans. Bardzell describes the *quality of self-disclosure* in feminist HCI as relating to the ways technology makes visible its effects on its subjects

[2]. Our interviewees feel positively about AO3's transparency, and this contributes to this sense of trust.

I think [AO3] handles everything better [than Livejournal]. Everyone involved in the running and creates on the site has been there because they love it. We're not going to change something because we think this will help advertisement. We're not going to change it because it helps a different feature of our site that doesn't involve fannish activity. It's a labor of love. – Kirsten

LESSONS FROM VALUES IN DESIGN CHALLENGES

AO3 designers said that integrating community values was critical to the design of the archive, and that many of these track to the values that underlie feminist HCI. Moreover, users expressed appreciation for those design features that reflect the community's values. However, a key challenge when considering values in design is thinking about *whose values*. Next, we consider what happens when the community has competing values.

Designing to Reconcile Competing Values

The values embedded in AO3 described so far have not presented much challenge in terms of understanding their place in the community. However, we came across several examples of values that were at odds with each other—and for each of these, a design feature at AO3 helps to mitigate this tension. Some of these were simple—for example, the ability to post anonymous comments on fan fiction coupled with the ability for individual users to turn off *receiving* anonymous comments helps to reconcile the tension between the importance of anonymity in fandom and safety from harassment. However, some were more complex and required more complex solutions.

History vs. Control

Naomi described the experience of attending a machinima conference in the mid-2000s, where many attendees seemed to think that remix videos were a recent invention.

We were all like, "You guys have just completely erased a 30-year history of women vidders." There were lots of people talking about remix, and again, erasing female fans, erasing fan fiction, erasing the fact that women had been basically doing transformative fandom for years, and years, and years before guys suddenly showed up on the scene.

The value of preserving fandom history is at the core of OTW. Many interview participants mentioned experiences with fan fiction archives disappearing, the work gone forever. One intention of AO3 was to provide a stable, permanent archive, and it has design features towards this: the ability for users to download PDFs of stories, so that they have local copies; and "Open Doors," an initiative towards importing stories from smaller archives that might otherwise be abandoned. However, this value can at times be at odds with another important value: that of maintaining control over your own work. As noted with respect to the importance of anonymity, this comes in large part from a

feeling of vulnerability. Naomi explained how this presents a challenge for the preservation of history:

A lot of people wanted the feeling, especially earlier on, that they could just wipe out their fannish identity in an instant if they had to. They wanted to be able to disappear. People would wipe out their fannish identity and just go. Of course, that becomes considerably more difficult on the Internet in practice. Very frequently, you wipe out entire swaths of a community's history with you.

The development team's solution to help mitigate this tension was "orphaning." Writers who felt that they wanted to erase their fan fiction identity could "orphan" works on AO3, leaving them posted there anonymously with no connection to a real person or even to a pseudonym. This is related as well to AO3's "fannish next of kin" feature, in which users can designate someone else to take care of their account in the case of their death, a "stewardship" model of post-mortem management [5]. This similarly provides some control while offering an alternate to deletion.

Inclusivity vs. Safety

User interviewees were by and large extremely positive in their stories and attitudes about the archive. However, one user had a complaint serious enough that she considered stopping her use of the archive. The complaint was one of personal safety; she felt triggered by some of the content that she came across on AO3. However, as discussed earlier, an important formative value of the archive was its inclusiveness. As Naomi put it, in describing the need for an archive "of our own":

We support everyone. We support the slash hiders. We support people writing explicit stuff. We support anybody writing anything that is legal. None of us were willing to give our time, frankly, to a site that didn't have as one of its principles that "This is not my cake, but I will defend to the death your right to post your fanfic."

This was the line drawn by OTW and AO3: that any content was allowed, so long as it was legal. This was in direct response to Livejournal's policies that had led to fandom account deletions (having to do with their definitions of pornography) as well as to Fanfiction.net's notoriously long list of not-allowed content (which included not allowing stories written based on books whose authors were against fan fiction). This user thought that AO3 had gone too far in the other direction, and is too permissive.

Those behind AO3 are sensitive to the fact that their inclusive policy means that there is content on the site that many people may not want to see. One developer said she is glad to not be on the Abuse team, where they have to look at the stories that are reported. However, the difficulty they expressed was in drawing lines: if not at legality, then where? Heidi told us that some fan fiction sites once drew the line at gay relationships. Fanfiction.net does not allow explicit content at all, nor stories based on real people.

Knowing that this tension would exist, and wanting to protect users from being triggered or stumbling across content they did not want to see, AO3 added required warnings for stories. These include graphic violence, major character death, rape, and underage sex. These warnings were chosen based on conventions at the time, what fan fiction writers already tended to warn for when posting stories elsewhere. Warnings are not only required, but are part of a visual display that shows up in search results.

One early concern was that requiring these warnings might necessitate spoilers—for example, telling the reader ahead of time that there was a major character death. Therefore, AO3 added an additional warning tag: “Choose not to use archive warnings.” Seeing this tag in search results essentially means “read at your own risk.” Most interviewees found this to be a solution that did a good job at taking into account different kinds of needs.

I like that it doesn't discourage mature and explicit things from being posted, but that it's easy to filter out so that if you don't want to see them, you won't, and if you really want to see them, it may be easy to find. – Abigail

One user's concern was that despite warnings, stories still show up in search results. Other users also have this complaint, and a “tag blacklist” is a popular feature request. Though the development team has pointed out why this will be difficult to implement, it would be another example of a design feature that could help mitigate these value tensions.

Designing to Influence Values

Interviewee Heidi, who ran a *Harry Potter* archive years ago, described a design and policy decision that was “roundly criticized,” as she put it.

We decided that regardless of the gender of the people snogging or shagging, ratings would be the same. This was a huge deal in 2001. We were called smut-peddlers for allowing slash to be rated G. [Some thought] my goodness, gay people holding hands? That should be rated R!

Heidi went on to acknowledge that societal norms have changed since then, but at the time, their hardline decision to push back was actually a big deal—and they did it in part as an attempt to *influence* norms. They wanted to show that homosexuality was okay, and she quoted one fan fiction writer as saying, “I want the people who read my fics to be exposed to something that's perfectly ordinary.”

Similarly, Naomi described a policy decision of AO3 that was a deliberate attempt to influence a value. Prior work understanding fandom norms towards re-use of content has shown something of a disconnect, with different standards for different types of work [15,16]. Surprisingly, although fan authors themselves are building on others' work, some don't want people to remix their remixes. In Naomi's original blog post, there is some argument between fans about what AO3 should do about this, with suggestions for providing a mechanism for fan writers to give permission

for remixing. Naomi described their ultimate design, and feels that in the time that has followed the creation of AO3, the values of the community have actually shifted to be more accepting of this practice:

We had baked in right from the beginning that you could post a work to the archive that was a remix, or sequel, or translation, or a podfic or whatever, based on another work, another fannish work. As long as you gave credit, you didn't need permission. In fact, we built a system into the archive where it notifies [the original author]. That was because we were coming from a philosophy where what we're doing is fair use. It's legal. We are making transformative work. We don't need permission from the original copyright holder. That's why fanfic is legitimate. But what's sauce for the goose is sauce for the gander... So, I think that's an example, actually, where archive and OTW almost got a little bit ahead of the curve, got a little bit ahead of the broader community's internal values. That was a deliberate concerted decision on our part.

Of course, designing to influence values is a tricky prospect, and has the potential to go very wrong, particularly from a feminist HCI point of view. By making a choice in deliberate opposition to some of their users' wishes, the designers of AO3 exercised power over others in a situation without a level playing field—the developers were empowered through their technical skill to make a choice on behalf of their users. Such a choice is normal operating practice for much software development, but perhaps more surprising in a feminist undertaking. However, the choice to strongly support remixing in the design came out of a desire to privilege the values of openness and sharing over the value of respecting user wishes. This is one way in which applying feminist values is not always straightforward in practice.

CONCLUSION

In this paper, we presented AO3 as an example of embedding values and process from feminist HCI into the design of a system. Though AO3's creators had not been reading about feminist HCI or value-sensitive design in 2007 when they started their project, they prioritized the needs of their own community and were true to their values in the work they undertook. This design philosophy is appealing for many members of the HCI community. This research serves as a concrete and detailed example of what it means to enact feminist HCI in the design of a social computing system. We also hope that in the spirit of the feminist commitment to reflexivity, this work can inform other communities that wish to empower themselves through technology and design.

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REFERENCES

1. Shaowen Bardzell and Jeffrey Bardzell. 2011. Towards a feminist HCI methodology: Social science, feminism, and HCI. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '11), 675–684. <http://doi.org/10.1145/1978942.1979041>
2. Shaowen Bardzell. 2010. Feminist HCI: Taking stock and outlining an agenda for design. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '10), 1301–1310. <http://doi.org/10.1145/1753326.1753521>
3. Alan Borning and Michael Muller. 2012. Next steps for value sensitive design. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '12), 1125–1134. <http://doi.org/10.1145/2207676.2208560>
4. Virginia Braun and Victoria Clarke. 2006. Using thematic analysis in psychology. *Qualitative Research in Psychology* 3, 2: 77–101. <http://doi.org/10.1191/1478088706qp063oa>
5. Jed R. Brubaker, Lynn S. Dombrowski, Anita M. Gilbert, Nafiri Kusumakaulika, and Gillian R. Hayes. 2014. Stewarding a legacy: Responsibilities and relationships in the management of post-mortem data. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '14), 4157–4166. <http://doi.org/10.1145/2556288.2557059>
6. Amy Bruckman, Kurt Luther, and Casey Fiesler. 2015. When should we use real names in published accounts of internet research? In *Digital Research Confidential*, Ezster Hargittai and Christian Sandvig (eds.). MIT Press, Cambridge, MA.
7. Liam Bullingham and Ana C. Vasconcelos. 2013. “The presentation of self in the online world”: Goffman and the study of online identities. *Journal of Information Science* 39, 1: 101–112. <http://doi.org/10.1177/0165551512470051>
8. Kristina Busse and Karen Hellekson. 2012. Identity, ethics, and fan privacy. In *Fan Culture*, Katherine Larsen and Lynn Zubernis (eds.). Cambridge Scholars Publishing, Newcastle, UK, 38–56.
9. Kristina Busse. 2015. Fan Labor and Feminism. *Cinema Journal* 54, 3, 110–115.
10. Apala Lahiri Chavan, Douglas Gorney, Beena Prabhu, and Sarit Arora. 2009. The washing machine that ate my sari--mistakes in cross-cultural design. *Interactions* 16, 1: 26–31. <http://doi.org/10.1145/1456202.1456209>
11. Francesca Coppa and Rebecca Tushnet. 2011. How to suppress women’s remix. *Camera Obscura* 26, 2: 131–139.
12. Kevin Crowston, James Howison, and Hala Annabi. 2006. Information systems success in free and open source software development: Theory and measures. *Software Process Improvement and Practice* 11: 123–148.
13. Jill P. Dimond, Casey Fiesler, Betsy DiSalvo, Jon Pelc, and Amy S. Bruckman. 2012. Qualitative data collection technologies: A comparison of instant messaging, email, and phone. In *Proceedings of the ACM International Conference on Supporting Group Work* (GROUP '12), 277–280. <http://doi.org/10.1145/2389176.2389218>
14. Jill P. Dimond, Michaelanne Dye, Daphne Larose, and Amy S. Bruckman. 2013. Hollaback!: The role of collective storytelling online in a social movement organization. In *Proceedings of the ACM conference on Computer Supported Cooperative Work* (CSCW '13), 477–490. <http://doi.org/10.1145/2441776.2441831>
15. Casey Fiesler and Amy S. Bruckman. 2014. Remixers’ understandings of fair use online. In *Proceedings of the ACM Conference on Computer Supported Cooperative Work & Social Computing* (CSCW '14), 1023–1032. <http://doi.org/10.1145/2531602.2531695>
16. Casey Fiesler, Jessica Feuston, and Amy S. Bruckman. 2015. Understanding copyright law in online creative communities. In *Proceedings of the ACM Conference on Computer Supported Cooperative Work & Social Computing* (CSCW '15), 116–129. <http://doi.org/10.1145/2675133.2675234>
17. Casey Fiesler, Cliff Lampe, and Amy S. Bruckman. 2016. Reality and perception of copyright terms of service for online content creation. In *Proceedings of the ACM Conference on Computer Supported Cooperative Work & Social Computing* (CSCW '16).
18. Monica Flegel. 2015. Legitimacy, validity, and writing for free: Fan fiction, gender, and the limits of (unpaid) creative labor. *The Journal of Popular Culture* 47, 6, 1092–1108.
19. Sarah Fox, Rachel Rose Ulgado, and Daniela K. Rosner. 2015. Hacking culture, not devices: Access and recognition in feminist hackerspaces. In *Proceedings of the ACM Conference on Computer Supported Cooperative Work & Social Computing* (CSCW '15), 56–68. <http://doi.org/10.1145/2675133.2675223>
20. Batya Friedman, Peter H. Kahn, and Alan Borning. 2006. Value Sensitive Design and information systems. In *Human-Computer Interaction in Management Information Systems: Foundations*, Ping Zhang and Dennis F. Galletta (eds.). Routledge, New York, NY, 348–372.
21. Erving Goffman. 1959. *Presentation of Self in Everyday Life*. Anchor Books, New York, NY.
22. Oliver L. Haimson, Jed R. Brubaker, Lynn Dombrowski, and Gillian R. Hayes. 2015. Disclosure, stress, and support during gender transition on

- Facebook. In *Proceedings of the ACM Conference on Computer Supported Cooperative Work & Social Computing (CSCW '15)*, 1176–1190. <http://doi.org/10.1145/2675133.2675152>
23. Aaron Halfaker, R. Stuart Geiger, and Loren G. Terveen. 2014. Snuggle: Designing for efficient socialization and ideological critique. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '14)*, 311–320. <http://doi.org/10.1145/2556288.2557313>
 24. Karen Hellekson. 2009. A fannish field of value: Online fan gift culture. *Cinema Journal* 48, 4: 113–118. <http://doi.org/10.1353/cj.0.0140>
 25. Karen Hellekson. 2015. Making use of: The gift, commerce, and fans. *Cinema Journal* 54, 3: 125–131. <http://doi.org/10.1353/cj.2015.0017>
 26. Nancy A. Van House. 2011. Feminist HCI meets facebook: Performativity and social networking sites. *Interacting with Computers* 23, 5: 422–429. <http://doi.org/10.1016/j.intcom.2011.03.003>
 27. Anne Jamison. 2013. *Fic: Why Fanfiction is Taking Over the World*. Smart Pop, Dallas, TX.
 28. Henry Jenkins. 2006. *Convergence Culture*. New York University Press, New York, NY.
 29. Shannon Fay Johnson. 2014. Fan fiction metadata creation and utilization within fan fiction archives: Three primary models. *Transformative Works and Cultures* 17. <http://doi.org/10.3983/twc.2014.0578>
 30. Robert E. Kraut and Paul Resnick. 2011. *Building Successful Online Communities: Evidence-Based Social Design*. MIT Press, Cambridge, MA.
 31. Alexis Lothian. 2012. Archival anarchies: Online fandom, subcultural conservation, and the transformative work of digital ephemera. *International Journal of Cultural Studies* 16, 6, 541–556. <http://doi.org/10.1177/1367877912459132>
 32. Dawn Nafus. 2012. “Patches don’t have gender”: What is not open in open source software. *New Media & Society* 14, 4: 669–683. <http://doi.org/10.1177/1461444811422887>
 33. Linda Polin, Sheila Pisa, Bonnie Nardi, Sylvie Noel, and Dev Sen. 2015. Mediated search for information: Finding information and help inside and outside ravelry.com. *The 2015 Annual Meeting of the American Educational Research Association*.
 34. Irving Seidman. 1998. *Interviewing as Qualitative Research*. Teachers College Press, New York, NY.
 35. Lucy Suchman. 2009. Agencies in technology design: Feminist reconfigurations. *Online Proceedings of the 5th European Symposium on Gender & ICT*. Retrieved January 7, 2016 from http://www.informatik.uni-bremen.de/soteg/gict2009/proceedings/GICT2009_Suchman.pdf
 36. Dave Thomas and Andy Hunt. 2004. Open Source Ecosystems. *IEEE Software* 21, 6, 89–91.
 37. Bogdan Vasilescu, Daryl Posnett, Baishakhi Ray, Mark G.J. van den Brand, Premkumar Devanbu, and Vladimir Filkov. 2015. Gender and tenure diversity in GitHub teams. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '15)*, 3789–3798. <http://doi.org/10.1145/2702123.2702549>
 38. Karel Vredenburg, Ji-Ye Mao, Paul W. Smith, and Tom Carey. 2002. A survey of user-centered design practice. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '02)*, 471–478. <http://doi.org/10.1145/503457.503460>
 39. Congressional Hearing before the Subcommittee on Courts, Intellectual Property, and the Internet. 2014. The Scope of Fair Use. Retrieved January 7, 2016 from <http://judiciary.house.gov/index.cfm/2014/1/the-scope-of-fair-use>