Product Versus Process: Representing and Appropriating DIY Projects Online

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ABSTRACT

Despite the growth of online communities for sharing DIY projects, little research has focused on the *methods* by which project documentation is created and utilized – that is, what techniques do designers use to document their work, how do they describe their work to others, and how do readers utilize design documentation in the context of their own projects? Through interviews and surveys with authors and readers of Instructables, we describe differences found in the practices of these two types of users in creating and applying design documentation. Based on the results, we identify design opportunities for members of the HCI community developing tools to better support people sharing creative work online.

Author Keywords

DIY; online communities; design documentation

ACM Classification Keywords

H.5.2. User Interfaces: User Centered Design

INTRODUCTION

The rise of Do-It-Yourself (DIY) culture over the past decade has spread the ideals of personal fabrication and customization for hobbyists and designers alike [11]. This movement has been supported by online communities that help democratize the making process by enabling designers to share their creations and how they made them to a large audience [3, 6, 9]. Shared documentation in turn becomes a resource for others to appropriate in the creation of their own designs.

Prior research has focused on the motivations of users contributing to online DIY communities, finding that users contribute to showcase their technical expertise, craft their online identity, and give back to the community [7, 10, 12, 13]. Rather than focusing on motivation, this paper focuses on the *methods* by which people contribute to and utilize information from these communities. Documentation shared through maker communities is part of a movement towards 'pull'

models of developing resources, in which information is distributed, specialized, and ever-changing in response to shifting needs [5]. As the landscape of tools, materials, and techniques change in the DIY community, user-generated content has become increasingly important as a form of knowledge sharing. Additionally, the generation of design documentation can be beneficial to the authors themselves, as reflection through documentation can be used to identify alternative approaches and understand decision making for both novices and professionals [1, 8]. Thus, an improved understanding of how people create design documentation as well as how readers appropriate it is critical to supporting knowledge distribution in these communities.

This paper presents a case study of how design documentation is created and used by authors and readers of Instructables, one of the oldest DIY online communities (established in 2005). We investigate documentation practices through semi-structured interviews with 5 project authors, who spoke to us about how they documented their process and translated their process into a sharable format. Additionally, to understand the use patterns of Instructables readers, an online survey consisting of multiple choice and open-ended questions was distributed with a total of 230 respondents. The inclusion of authors and readers in this study helps elicit several distinct needs and practices of these two types of participation and is used to establish key design opportunities for supporting both types of creators.
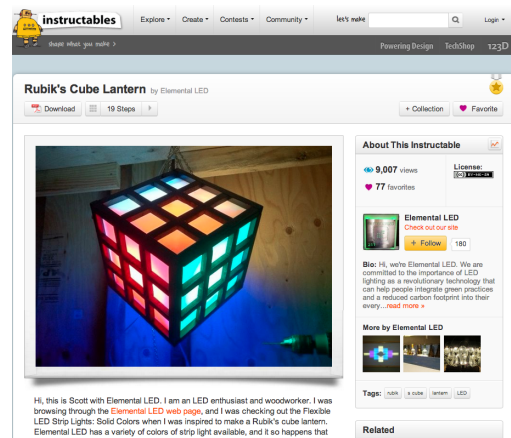

Figure 1: **A sample Instructables project page (http://www.instructables.com/id/Rubiks-Cube-Lantern/)**

METHODOLOGY

A mixed-methods approach employing semi-structured interviews and online surveys was used to identify documentation and appropriation patterns of authors and readers of Instructables. Instructables is a popular DIY community for "passionate people [to] share what they do and how they do it, and learn from and collaborate with others" [6]. It hosts about 65,000 projects in categories such as food, technology, and living. On the site, members share their projects by creating an "Instructable" describing how they built their design, which may include text descriptions, photos, and videos (Figure 1). Feedback can be provided through comments on project pages and forums.

Semi-structured interviews were conducted individually with five members recruited through a forum post on Instructables and e-mails sent to mailing lists at a private university. Each interview was an hour in length, and all but one was conducted in-person; the exception was conducted via Skype. During the interviews, authors discussed aspects of documenting and sharing their projects through the site. The interviews were audio recorded and transcribed, and thematic codes were identified.

To gain a broad understanding of how readers use Instructables documentation, an online survey was distributed through a forum post on the website and through mailing lists at a private university. The survey comprised of multiple-choice and open-ended questions pertaining to ways members use the Instructables site and their experiences recreating and applying Instructables to their own projects.

RESULTS

The insights drawn from authors and readers are presented separately, and their implications are outlined in Discussion.

How Design Documentation Is Created

Interviewed participants ranged from 21 to 43 years old and represented a broad spectrum of experience, authoring anywhere between one and over 100 Instructables. Examples of projects documented by these users included a baby-changing table, musical instruments, and soft circuits.

Documenting a Project

For most of the interviewed authors, documentation and designing are two separate and often conflicting processes. Participant A described this difference as follows:

> I was in the middle of wanting to tinker and solve problems. But I had to break out of that in order to be like, "Oh wait, I have to take a picture," and I don't want to. It's sort of annoying.

Documenting can easily be forgotten in the midst of problem solving. This especially posed a problem if a project could not easily be reverted to an earlier stage. Three out of the five participants had the experience of realizing they forgot to document a step after having completed their design.

To address the issue of forgetting to document particular steps, some designers would completely recreate their design from scratch in order to carefully document each step. For example, Participant D stated that reconstructing a project purely for documentation was a good practice because the author becomes more aware of what needs to be documented the second-time-around. However, recreating a project was only possible for projects that could be easily rebuilt; for larger scale projects, recreating was not practical or feasible.

Translating Documentation to Online Publication

Authors distinguished between designing a product and documenting the most efficient way to recreate it. Participant B would heavily edit out what he considered to be extraneous information: "When I make the Instructable, it's the one goal of you making the thing. So I don't want to cloud it with too many words or too much information." To make the steps of an Instructable as concise as possible, many authors would omit mistakes they made in their process of designing. For example, Participant D felt that a step was only worthwhile to include if it would help someone make something functional: "It's always been about . . . how do I get from point A to point B ignoring all the ways that I could not get from point A to point B." Author C also discussed a similar process of relating to her expected audience: "I can't think I'm doing it for myself. I have to put myself in the mindset of someone approaching it for the first time." For these designers, their documentation was an edited *recipe* conveying just enough process and context for people to replicate their design.

For others, online documentation served as a *story* of how the product was created. For example, Participant A felt that describing his entire process, including mistakes and changes, painted a more realistic picture: "So many people think it's like magic from on high; I had this idea and I made it and it's brilliant and there was no struggle. And that's not really accurate." Participant E also includes mistakes in his documentation: "If you explain where you went wrong, it saves them [readers] from going down the wrong path." However, unless he is able to pinpoint exactly what caused the problem, he would not share his design or ask others for advice: "I have a reputation for knowing an awful lot . . . If I started asking too many people for help, I'll ruin that reputation." Thus, for some authors, incorporating their thought process into their documentation is part of an effort to demystify the design process and prevent readers from making similar mistakes. However, in revealing mistakes, one may risk damaging his reputation in the community.

The process of creating online documentation is a complex process involving several distinct tools. All interviewees delineated the process of sifting through the many photos they took throughout their process, editing and resizing the photos, determining where to host their photos, using a separate editor for writing text, and then finally combining photos with their supplementary text. All five participants begin their documentation by first forming a pictorial timeline of their process and then writing text to supplement the images. Some participants developed techniques for planning ahead of time. For example, Participant E writes out his entire process before he actually starts designing, sometimes even in past-tense as if he had already done it. This process helps organize his thoughts and makes the Instructable "happen in [his] head."

Finally, although creating documentation is a time-consuming process, authors saw it as valuable and necessary for sharing their work. Similar to prior literature on motivation for sharing DIY projects [7, 12], all the authors saw their documentation as a form of participation with the community and a way to preserve their process. As Participant E stated, "If it's on the Internet, people use it. People make it."

How Design Documentation is Used
A total of 230 Instructables users responded to the online survey. The respondents were 25% female and, on average, were between the ages of 22-30, although the reported ages of participants ranged from the below 18 age bracket to above 60 years old. Although the majority of respondents have looked at Instructables projects categorized under *Technology* (90%), over 60% of respondents have viewed Instructables in each of the remaining categories (Workshop, Play, Outside, Living, and Food). On average, respondents use the Instructables website multiple times a week, and 58% have authored at least one Instructable.

Ways of Using Instructables
When asked to rank in order of importance the reasons why they use Instructables, the respondents ranked *Getting ideas for a project* as being the most important reason, followed by *To learn a particular technique* and *To look for projects I want to recreate* (Figure 2). The difference in perceived importance of getting ideas for a project versus looking for projects to recreate was statistically significant ($p < 0.005$).

Further differentiation was noted between authors and non-authors. On average, those who have not authored an Instructable placed greater importance on learning techniques than those who have authored ($p < 0.005$); of people who listed *Learning a technique* as the least important reason for using the site, 70% have authored a project compared to 30% who have not. Perhaps unsurprisingly, respondents who use Instructables more frequently consider *Getting ideas* to be more important than users who visit the site less frequently ($F = 23.8$; $p < 0.01$). Otherwise, there were no statistically significant differences in how readers ranked these three factors based on age, gender, and whether or not they ever recreated an Instructable or applied parts of an Instructable to their own projects. These results suggest that Instructables readers may place greater importance on using the site to get inspired and learn techniques than finding projects to recreate.

Recreating an Instructable
Over half (59%) of respondents have had experience recreating someone else's Instructable. However, many stated that they used the Instructable as a reference rather than a strict guide. For example, one respondent stated, "I never reproduce anything for a 'me too' experience, only for verifying or learning some interesting concept, idea, or technique." One reader even reported trying to recreate projects from memory, only referring to the Instructable if he got stuck.

Modification and personalization are important practices to people who recreated Instructables. Modification can be a necessity arising from differences in resources: "I usually do
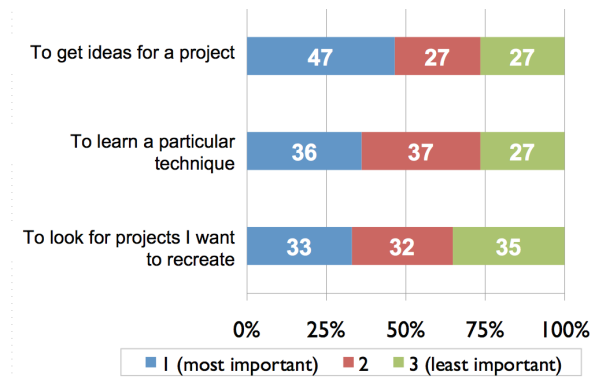

Figure 2: **Responses to the question "Please rank, in order of importance, the reason why you look at Instructable"**

not have all the materials or tools required, so I have to improvise. Sometimes this works out...interestingly. But it also adds some personal touch." Personalization is "the fun part"; one reader stated, "Just replicating seems a little pointless / boring."

Finally, other readers enjoyed improving Instructables they found online. Some spoke of improving the process by modifying particular steps, such as optimizing a circuit diagram or making a step easier and cheaper. However, these modifications could not be easily shared on the site beyond posting a comment on the Instructable page. Participant A from the interviews relayed a similar frustration, feeling it was not worthwhile to contribute his design change because he felt his comment could easily be overlooked.

Applying an Instructable
Readers found various ways to apply techniques from other Instructables to their own projects, with 71% of respondents having experience doing so. Reported methods of applying other people's documentation include repurposing digital design documents such as code or electrical schematics and using methods described within an existing project such as woodworking, cooking, and electronics techniques. Readers also found ways to combine tips from different Instructables in new ways. For example, one reader stated, "Combining elements from more than one Instructable is one of my favorite things to do. The Instructables website is the perfect environment for taking ideas from multiple sources and combining them into something new or improved." Another spoke of his experience transferring techniques from one discipline to another and recalled utilizing a technique outlined in a jewelry tutorial to create a folding pocket knife. These responses indicate that online documentation is combined and repurposed in unique ways to create new personalized projects.

DISCUSSION
Through examining how shared project documentation is created and used by authors and readers, this study suggests several approaches for improving the structure and design of online documentation platforms.

Seamlessly integrating designing and documenting
Current documentation techniques require designers to constantly switch between two modes: designing and documenting, with documenting often interfering with the former. As a result of this burden, some designers are forced to completely recreate their project from scratch to fully document how it was created, a time-consuming process that is especially unreasonable for large projects. Furthermore, designers undergo a convoluted process requiring the use of multiple distinct tools for organizing and assimilating photographs, design files, and notes into publishable documentation. This problem is a unique challenge to documenting physical artifacts compared to digital artifacts, where physical processes are not inherently captured in a digital format [7]. While some authors may make the extra effort to fully document their work, all interviewed authors wished that the process was easier and faster. It is clear that designers require a more seamless way to capture their process. Tools that help authors document their process as they design may prevent designers from missing key steps from their final documentation. Furthermore, tools enabling designers to capture their workflow over time may help mitigate the burden of creating publishable documentation only after the project is complete.

Process-oriented documentation
Many authors approach design documentation with a recipe-making mentality of showing the fewest steps required to recreate a project. However, the surveyed readers considered *Looking for projects to recreate* as the least important reason for using the site. Instead, they customize and personalize, drawing relevant steps from multiple projects to support their designs. Readers often need to make substitutions due to differences in materials and tools. Because of these substitutions, readers could actually benefit from knowing what materials, tools, and techniques were tried by the author before they determined the best one. Online documentation that emphasizes *process over product* can enable readers to make more informed decisions about techniques to use. This is similar to the "component" guides described in [2].

New tools for contributing improvements and remixes
Although readers are remixing and repurposing documentation, ways for them to share their changes are limited. Users typically share changes by way of comments found on the bottom of the page, which can be overlooked, difficult to sift through, and decontexutalized. Systems that enable readers to contribute changes, ranging from materials substitution to process optimization, can help foster a more collaborative community.

CONCLUSION
Through interviewing and surveying users of the DIY community Instructables, this study has surfaced needs and challenges designers face in documenting and sharing their work online. Current tools for documenting design work make capturing disruptive and sharing time-consuming. Makers need better documentation tools designed specifically for their unique workflow. There also appears to be a discrepancy between how authors structure their documentation and what readers look for in seeking out documentation. While many authors structure their documentation as recipes for replicating their exact design, the survey results presented suggest that readers are less interested in recreating and, instead, look for techniques and combine them in the process of personalizing and remixing. Thus, readers may instead benefit from documentation that is more process oriented than product oriented. Additionally, platforms should incorporate easier ways for readers to contribute alternative techniques for developing projects. Finally, while we examined a particular online community in this case study, we see the potential for future work to apply these recommendations more broadly to other online communities for sharing creative content.

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