

Why People Contribute Software Documentation

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ABSTRACT

Software technologies are used by a large population of programmers with diverse backgrounds. To fulfill their need for information, enthusiasts contribute numerous learning resources that vary in style and content, and act as documentation for the corresponding technology. We interviewed 26 volunteer contributors to understand why they create such documentation. We surface five motivations our informants had for contributing documentation, including to overcome issues they had faced with documentation and to capture their own learning. Among other findings, our observations suggest that the unique experience and background of documentation contributors provides the opportunity to create documentation that caters to users who have information needs and preferences similar to that of the contributor.

CCS CONCEPTS

• **Software and its engineering** → **Designing software**; • **Human-centered computing** → **Empirical studies in HCI**.

KEYWORDS

software documentation, documentation creation, human factors

ACM Reference Format:

Deeksha M. Arya, Jin L.C. Guo, and Martin P. Robillard. 2024. Why People Contribute Software Documentation. In *2024 IEEE/ACM 17th International Conference on Cooperative and Human Aspects of Software Engineering (CHASE '24)*, April 14–15, 2024, Lisbon, Portugal. ACM, New York, NY, USA, 6 pages. <https://doi.org/10.1145/3641822.3641881>

1 INTRODUCTION

Documentation is a crucial resource for understanding and using software development technology. Often, creators of the technology provide accompanying official documentation. However, creating documentation is time-consuming [1] and tedious [34], and thus neglected, leading to common issues with documentation such as incompleteness [2]. Yet, enthusiastic programmers and users have begun to contribute to the documentation landscape in different

ways, including with blog articles [37] and video tutorials [14]. Understanding the *internal motivations* [34] of such contributors can provide insight on effective incentives for documenting software.

In the domain of information science, Briet suggests that documentation is a *culture*, and *documentalists* are characterized by their specialized technical understanding and their ability to “organize and direct things and people” [6, 23]. It is no surprise, then, that available documentation can be designed in a variety of ways [5]. As a result, information seekers have multiple options, and must use scents [30, 31] or cues [4, 29] to search for pertinent information [41] that aligns with their preferences [9, 10]. To support this information search process, prior work has focused on improving the efficiency of search [3, 19]. However, it is also important to consider the factors affecting documentation creation when connecting creators and users of learning resources. For example, in prior work, researchers have built tools to support documentation generation [13, 15, 36] based on user needs [16]. Additionally, insights such as how the motivations of bloggers are associated with the tools they used [22] can inform documentation generation.

We investigate the research question: **why do people voluntarily contribute software documentation?** In this paper, we use the term *documentation* to refer to externally contributed learning resources about software technology topics. Such documentation can be contrasted with, for example, official reference documentation or code comments. We performed semi-structured interviews with 26 volunteer documentation contributors during which we asked them to elaborate on why they began contributing documentation. Prior work has elicited categories of motivations for developers to create technical blogs [28] or video screencasts [24]. In this work, we surface five recurring motivations that encouraged our informants, including programmers, educators, and technical writers, to voluntarily contribute software documentation in text, video, or both formats. We find that whereas experience with inadequate documentation is one source of motivation, some informants contributed documentation because it was related to their other pursuits such as content creation. Our findings provide insight about self-motivation for creating documentation and a foundation to further investigate how the motivations of documentation creators influence the documentation they create.

2 RELATED WORK

We discuss prior literature on text and video blogging as an emerging form of documentation, and the motivation for contributing technical documentation online.

2.1 Emerging Formats of Documentation

User-created content in the form of blog articles, videos, etc. have become common sources of technical information. Based on a sample of 770 entries, Vaast and Davidson investigated how tech bloggers

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CHASE '24, April 14–15, 2024, Lisbon, Portugal

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ACM ISBN 979-8-4007-0533-5/24/04...\$15.00

<https://doi.org/10.1145/3641822.3641881>

are emerging as “social actors” and how they claim influence and legitimacy of their content [39].

Pagano and Maalej studied blogging behaviour in open source software communities by performing quantitative analysis and topic modeling of 51,000 blog posts and 5.7 million code commits [27]. They reported that blogs provide a means for developers to informally share information regarding features, dependencies, issues, and releases informally, yet supported with more elements such as images and code snippets.

Chattopadhyay et al. investigated how developers share technical and personal information via video logs (vlogs) [7]. They analyzed 130 Youtube vlogs and surveyed 335 software developers. They reported that most developers found it valuable to present their problem-solving process, irrespective of what their main motivation to vlog was: to develop a personal brand, promote diversity in programming, or raise awareness about programming careers.

Technical blogs have become so popular that they have also been tested as a learning tool [20]. Van der Meij and Van der Meij performed an empirical study compared text based and video based software instruction formats to train 111 fifth and sixth grade students. Participants who had seen at least one video had a greater success rate on tasks [40].

2.2 Motivation for Documenting

Personal blogs have been found to be sources of therapeutic reflection and experience sharing [11, 42]. Li elicited seven reasons why adults blog, from a questionnaire filled by 288 bloggers [22]. They determined that *self-documentation*, *self-expression*, and *socialization* were statistically correlated. They performed multiple regressions to determine whether motivations could be used to predict different aspects of the blog including, for example, the types of topics, the expected readership, and the use of hyperlinks.

Shmerlin et al. conducted interviews with five software developers and a questionnaire with ten developers to understand the motivations of developers to document their code [34]. They reported that participants indicated the increased code comprehensibility, structure, and quality as what they enjoyed most about documenting, while acknowledging that it is difficult and takes a lot of time. McArthur discussed four common prejudices against documentation, one of which is that programmers would rather program than write documentation [25].

Still, developers have begun to contribute documentation in non-traditional formats such as via technical blogs. Parnin et al. analysed 93 blog posts on IDE plugin development, mobile, or web development and 435 comments within them to understand the challenges of blogging development information [28]. Additionally, from a survey with thirty bloggers, they reported four types of technical blogging motivations. MacLeod et al. studied screencast documentation wherein developers record their screen and explain how the corresponding technology works [24]. They analyzed 20 Youtube videos and interviewed ten screencast creators to understand how the videos can be used to document code. They also reported five reasons *why* developers create the screencasts.

Whereas prior literature has focused on developers’ motivations to create either text or video content, our informants include both text and video documentation creators who are not necessarily

developers. Additionally, as part of the interview, we encouraged informants to elaborate in detail about how they *began* contributing documentation. As a result, we report five recurring motivations that subsume motivations from the categorizations of Parnin et al. and MacLeod et al. (see Section 4).

3 STUDY DESIGN

We conducted semi-structured interviews, which we subsequently analysed using card-sorting [18] to surface documentation contribution motivations.

3.1 Informant Recruitment

We targeted people who regularly create blog articles or YouTube videos about a technology. A preliminary search on popular blogging websites such as medium.com, hashnode.dev, and netlify.app, revealed that contacting bloggers would be difficult due to lack of a standard blogger-user interaction interface. Instead, we recruited the first participant via personal contacts, and used different techniques to subsequently identify documentation contributors:

Github: We used the Github API to retrieve repositories that were in the language English, and contained both the name of the technology (Java, Python, C++, Ruby, or SQL) and the word ‘tutorial’ in either the name, description, or README of the repository.

YouTube: For each of Java and Python, we manually searched for the following queries in the search engine DuckDuckGo, in the video tab, in incognito Chrome browser:

- (1) <technology> tutorial
- (2) <technology> programming tutorial
- (3) <technology> development tutorial

and retrieved each of the search results from the first three pages of the results of each query.¹

For each of the Github and YouTube search results, one author manually determined if the contributor is an individual, i.e. not a community of creators or a company. Furthermore, the author identified whether the contributor regularly and recently contributed documentation related to the working and usage of a software technology, irrespective of the technology they were documenting. For example, we retained contributors who created documentation for Javascript despite our queries not including this technology.

WriteTheDocs: WriteTheDocs “is a global community of people who care about documentation”.² The community has a Slack workspace in which technical bloggers often introduce themselves in the channel *intros*, and share their recent work in the channel *community-showcase*. Between January and April 2023, we monitored both of these channels: we reached out to bloggers who had created a post in the past two months about the working and usage of software, and had created at least three blog posts in total so far.

We recruited a total of 26 informants, which meets basic expectations of adequacy [12].³ Table 1 shows the details of the informants. The study protocol was approved by the Ethics Review Board of McGill University.

¹We used the common term ‘tutorial’ to identify instruction-like learning resources, as opposed to other forms of documentation such as reference documentation.

²<https://www.writethedocs.org>

³Our informant pool is a convenience sample of identified contributors whose contact information was publicly available. Informants were not monetarily compensated for participating in the study.

Table 1: Documentation contributors (informants).

	Recruited from	Type of content	Programming experience ⁺	Documentation experience ⁺	Familiar technologies
P1	Reference	Text	25 yrs	13 yrs	Javascript, Python
P2	Github	Text	40 yrs	10 yrs	C++, Python
P3	Github	Text & Video	25 yrs	6 yrs	Java, Kubernetes
P4	Github	Text	33 yrs	9 yrs	Python
P5	WriteTheDocs	Text	5 yrs	1 yr	Python
P6	Github	Text	24 yrs	6 mos	Python
P7	Github	Text	9 mos	3 wks	NodeJS, Cloud
P8	Github	Text & Video	23 yrs	3 yrs	Python, Rust
P9	WriteTheDocs	Text	4 yrs	2 yrs	Javascript
P10	Youtube	Text & Video	22 yrs	17 yrs	Java, Spring
P11	Youtube	Video	5 yrs	3 yrs	Python, Plotly, Dash
P12	Github	Text	21 yrs	13 yrs	Asp.net, C#, HTML
P13	WriteTheDocs	Text	3 yrs	2 yrs	NodeJS, ReactJS
P14	WriteTheDocs	Video	5 yrs	3 yrs	Git
P15	Github	Text	20 yrs	17 yrs	PHP, Javascript, Python, Go
P16	Github	Text	16 yrs	9 yrs	HTML, CSS, Javascript
P17	Youtube	Video	10 yrs	5 yrs	Python
P18	Youtube	Video	8 yrs	5 yrs	Java
P19	WriteTheDocs	Text	9 yrs	2 yrs	Python, Docker, Git
P20	Github	Text	9 yrs	4 yrs	SQL, C++, Python
P21	Github	Text	12 yrs	4 yrs	Python, GNU/Linux
P22	Github	Text	2 yrs	1 mo	Python, C++
P23	Github	Text	8 yrs	4 yrs	Javascript, Typescript, NodeJS
P24	Github	Text	25 yrs	10 yrs	Javascript, Typescript, web dev.
P25	Youtube	Video	12 yrs	3yrs	C++, Java
P26	Github	Text	10 yrs	7 yrs	C++, Python

⁺ If the informant did not self-report the extent of their programming or documentation experience during the interview, we retrieved this information from their LinkedIn profile or public documentation, respectively.

3.2 Data Collection

We conducted hour-long semi-structured interviews [21] with each of the informants. This study reports on the first part of the interview that focused on understanding *why* they contributed software documentation. We asked informants about their journey into documentation. We asked them to expand upon topics that they would bring up, thus allowing them to steer the conversation according to their experience of documentation creation. This technique helped us understand informants' relevant background.

3.3 Qualitative Analysis

We open-coded the interview transcripts to identify the informants' incentives for contributing documentation online. We noted that informants described multiple reasons for contributing software documentation. We performed card-sorting of our codes [18] to identify these motivations. We identified that some of these motivations corresponded to those described in prior literature. We considered the motivations for sharing programming knowledge from prior work by Parnin et al. [28] and MacLeod et al. [24]. Whereas the former focused on text bloggers, the latter focused on video screen-cast creators. We mapped the motivations we identified among our

informants, comprising of text bloggers and video creators, to the prior categorizations.

4 MOTIVATIONS

Parnin et al. elicited four *benefits* of blogging: *personal branding, evangelism and recruitment, personal knowledge repository*, and *to solicit feedback* [28]. MacLeod et al. reported five motivations that encourage a developer to create screencasts: *to build an online identity, to promote themselves, as a learning exercise, to give back, and as an alternative to blogging* [24]. Although the two studies have a different population of participants, there is a considerable overlap in the motivations. Additionally, our informants described other factors that influenced them to contribute documentation. Table 2 provides an overview of the motivations that capture why our informants chose to contribute software documentation, and their correspondence to motivations reported in prior work.

Professional development. Both Parnin et al. and Macleod et al. described that participants created content to build an online identity, and for potential recruitment. In our study, we note that informants described these two aspects in tandem: informants expressed that creating a digital presence was important as it could act

Table 2: Correspondence of motivations elicited by informants in this study with those reported in prior work.

Motivation	Description	Parnin et al. [28]	Macleod et al. [24]
Professional development	Informants described that they were contributing documentation as a portfolio to demonstrate their knowledge to potential employers and customers.	Personal branding, Evangelism and recruitment [†]	To build an online identity, To promote themselves
Capture learning	In order to understand better the technical aspects of software, informants created documentation about what they were learning. The documentation also acted as a repository of information that the informant could refer to in the future.	Personal knowledge repository	As a learning exercise
Related pursuits	Informants created documentation because they were curious about what it involved and its process, or because they were interested in related aspects. For example, P11 enjoyed teaching and so decided to contribute technical information online.	-	-
Inadequate current documentation	Prior work has described that learners face challenges when consuming software documentation [2, 38]. Informants created documentation to overcome the issues they faced when learning or searching about technical topics.	-	As an alternative to blogging
Evangelism and rewards	Informants created documentation to help others (altruism) or to gain benefits (e.g. monetary compensation).	-	To give back
Other motivations	We observed a variety of other motivations that some informants described. For example, informants were inspired by authoritative people to contribute documentation, or wanted to receive feedback to improve their own knowledge.	Solicit feedback	-

[†] Parnin et al.'s *evangelism and recruitment* refer to educating others about a company's software with the intention to develop their career profile. As a result, despite the overlapping term *evangelism* in our set of motivations, we map *evangelism and recruitment* to *professional development*.

as a portfolio of the informant's knowledge to potential recruiters (P1, P2, P4-P6, P8, P15, P16, P19-P22, P26). The portfolio is helpful when the informant was moving between roles, e.g. from academia to the freelance field (P2), or wanted to surface their knowledge to be considered for a different role (P21). Documentation also provided an opportunity for informants to keep up with technologies of interest that they were not exposed to in their regular employment: P23 took to creating documentation as an opportunity to keep up with backend technologies, something they were passionate about but did not get a chance to work on at their day job.

For some informants, their employers encouraged them to contribute technical digital content (P1, P10, P15, P20). When the contributor represents the company publicly, the created documentation provides evidence for the contributor's authoritativeness: "We're also encouraged to have our own brand and my boss wants me to be out there promoting my brand so that when we're at conferences, people look to me as an authority, like this person does know what they're talking about." [P10] Companies may even suggest where the content should be created: "So part of my job mandate is: yes, people are looking for this content on YouTube, let's put it there." [P15]

Capture learning. Informants indicated that "the best way to learn something is to teach it." [P8], with P11 and P21 also agreeing with this sentiment. P20 elaborated: "For me, it was really helpful when I

learned new things to write them down [...] and that helped me solidify what I learned." [P20]

Public note-taking or *noteblogging* has shown promise in supporting programming education [17, 35], both for the blogger as well as those consuming the notes. Informants described that they could refer to this repository of concise notes in the future, especially after effort-intensive searching for relevant information: "If you have to work hard to find something out by pulling lots of things together, then putting it in one place in your blog is cool. Then the next time I can use those instructions. So it's just notes, but public." [P15] This was prompted by frustrations of forgetting (P24) useful information: "I wanted to have an archive for myself that I could consult. I had the experience where I would run into some problem, spend three hours fixing it, and then I would move on to the next thing. A month later, I would have the same problem and I wouldn't remember how I fixed it, so I'd have to spend another three hours rediscovering the solution." [P16]

Related pursuits. For some informants, creating documentation was the result of two of their worlds coming together, programming and: teaching (P17, P19), video creation (P18, P25), writing (P2, P4). "I wanted to make a YouTube channel because me and my friends from high school would make YouTube videos for video games. [...] I thought, well I have this programming experience [...] and I ended up deciding to make programming tutorials." [P18]

Informants who had struggled while learning programming, looked for how they could leverage their knowledge. P5 expressed that although they were interested in learning about programming, they did not think they would ever get to the level of a full-time programmer. Instead, blogging would allow them to still get an idea of how things work. Similarly, P9 explained: “I just felt like: I’m really struggling with coding. I don’t feel fulfilled when I write code. What about just trying out technical writing?” [P9]

Some informants also described that creating documentation was a means to do things that they enjoyed: “It’s just fun to go and write something and get people to find it.” [P2] However, because this was a voluntary effort, they would continue to do so until they no longer enjoy the process: “I do it [blog] mainly because I enjoy doing it. And I guess for all the time that that’s the case, I’ll continue to do it.” [P12]

In some cases, different motivations intersected to further incentivize documentation creation. P11’s prior teaching experience taught them that documentation was a good way to *capture their learning*: “I was an English teacher in my mid early twenties and I realized that I really have to understand what a verb means, what a noun means in order to be able to teach it. And so I knew that from my teaching experience, that if I would teach, I would learn a lot better.” [P11]

Inadequate current documentation. Prior work has elicited that there may be a number of issues with documentation that hampers the learning of technical concepts [2, 38]. When the documentation was inaccessible to beginners (P4), overwhelming (P5), lacking (P12, P19), or scattered across multiple resources (P23), informants felt the need to fill the gap with relevant documentation. P12 explained: “That’s really how I ended up writing: I found that an awful lot of the documentation online was either nonexistent or quite obtuse. It was difficult to read from a beginner point of view. So I try things and then write an article about it and put it on my blog.” [P12]

Some informants described that existing documentation did not cater to their preferences [4], prompting them to create such documentation: “I was thinking to myself that [...] I will start a blog where I will write content the way I wanted people to write them, when I was still learning.” [P23] “I figured that a lot of people would appreciate recorded video material because that’s what I appreciated. And I saw a gap there: [...] there weren’t a lot of videos specifically on Dash and Plotly.” [P11] Similarly, participants in the study by Macleod et al. described that they chose to create video screencasts as opposed to text blogs, because they preferred consuming videos, themselves [24].

Evangelism and Rewards. Informants felt the need to “give back” [24]: “I had learned a ton of stuff on YouTube throughout my educational journey [...] I definitely benefit a lot from YouTube. So I was like - I’m going to teach people on YouTube.” [P17] To provide access to knowledge in order to help people was motivating: “I wanted my [code] examples to be available for everybody and that’s why I started putting content on GitHub and wherever possible writing articles, so other people can access the content.” [P3]

Although monetary compensation can drive documentation creation (P2, P5, P8, P10, P14, P15, P17, P18, P23), informants explained that it did not always reach their expectations: “I had the ambition of making money from YouTube. I make a small amount [now], but it’s never - I’m never going to be a full time YouTuber.” [P8] Yet, other opportunities and benefits arose that motivated them to continue to contribute documentation. Positive comments from users were rewarding and

encouraging (P3, P7, P12, P13, P18, P23, P25): “[When] I started the YouTube channel, the videos did receive some good feedback and I just decided to continue with a few more topics that I liked. And then this was all coming together and I started doing more and more videos on the channel.” [P25]

Other motivations. A variety of other factors, although less notable, also influenced the decision to contribute documentation. Informants ventured into creating documentation because someone else had advocated for it (P6, P7, P16, P21): “It was from an article; [the author] mentioned technical writing. And also from my program in a bootcamp, a tutor came and talked about it. [...] That’s why I just decided to try and write.” [P7] Some informants also wanted to have a sense of ownership of their work (P10, P18), build a network with experts to obtain feedback [28] and get further opportunities (P26), and ramp up other skills like writing and English (P21).

5 CONCLUSION

We interviewed 26 documentation contributors who voluntarily create text or video documentation about software technologies. With the support of prior literature, we elicit five major motivations for contributing documentation. For example, informants created documentation to capture and solidify their own learning. The motivations provide an understanding of *why* contributors choose to create and contribute documentation despite the availability of existing documentation that accompanies released software, and the effort-intensive task of creating documentation.

We note that a contributor’s background and prior experience, in addition to their perspective of documentation, play a critical role in providing the motivation and context for documentation creation. Whereas developers consider documentation as a product that is a supplementary part of a software package [32], contributors’ motivations indicate an associated value of the documentation for themselves, such as to pursue related interests, and develop and showcase professional skills.

Additionally, as consumers of other documentation, contributors are well-informed to cater to the needs of similarly positioned information seekers. The preferred style of learning influences the documentation a contributor creates [8], which in turn can serve audiences who have similar preferences [9] to the contributor. This indirect interaction is a partial view of Mehlenbacher’s predicted input-output model of documentation creation that suggests that technology creators, documentation writers, and end users are a “triangle of interrelated technology users” [26].

Internal motivation, as observed in documentation contributors, encourages individuals to make an activity more interesting for themselves [33]. In future work, we plan to investigate how contributors’ motivations impact the documentation created. This knowledge can help identify whether certain incentives correlate to qualities of documentation. Furthermore, it can facilitate the connection between contributors and the audience who consumes the information, to support informed and efficient information seeking.

ACKNOWLEDGMENTS

We thank the informants for their valuable insights and the reviewers for their helpful feedback. This work is funded by the Natural Sciences and Engineering Research Council of Canada (NSERC).

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