

# The Exchange in StackExchange: Divergences between Stack Overflow and its Culturally Diverse Participants

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StackExchange is a network of Question & Answer (Q&A) sites that support collaborative knowledge exchange on a variety of topics. Prior research found a significant imbalance between those who contribute content to Q&A sites (predominantly people from Western countries) and those who passively use the site (the so-called “lurkers”). One possible explanation for such participation differences between countries could be a mismatch between culturally related preferences of some users and the values ingrained in the design of the site. To examine this hypothesis, we conducted a value-sensitive analysis of the design of the StackExchange site Stack Overflow and contrasted our findings with those of participants from societies with varying cultural backgrounds using a series of focus groups and interviews. Our results reveal tensions between collectivist values, such as the openness for social interactions, and the performance-oriented, individualist values embedded in Stack Overflow’s design and community guidelines. This finding confirms that socio-technical sites like Stack Overflow reflect the inherent values of their designers, knowledge that can be leveraged to foster participation equity.

CCS Concepts: • **Human-centered computing** → **Empirical studies in collaborative and social computing**; Empirical studies in HCI; • **Social and professional topics** → *Cultural characteristics*;

Additional Key Words and Phrases: Stack Overflow; Question & Answer sites; Cross-cultural studies; Online collaboration; Value-Sensitive Design

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## 1 INTRODUCTION

Question & Answer (Q&A) sites, such as Stack Overflow and others of the StackExchange network, support the collaboration between site participants to exchange expertise on a variety of topics [2]. While these and other collaborative efforts rely on the contributions of volunteers who post and

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answer questions, many of the participants do not actively contribute [53, 60]. In particular, a series of research shows that activity levels vary widely between national and cultural groups [13, 34, 54, 62, 66]. This variation may lead to an over-representation of the view of certain groups, and to systems that fall short of incorporating diverse views in the knowledge they generate.

One possible explanation for such engagement differences between countries is a mismatch between participant values and the values embedded in collaborative systems [47, 69]. Values are deeply ingrained in culture, leading to numerous differences in social procedures [33], such as the extent to which people are concerned with harmony [1], emphasize individual achievements [1], or prefer to share responsibility [43].

In this paper, we investigate the hypothesis of mismatching values in Stack Overflow, examining if there are tensions between the values embedded in Stack Overflow's design and its social conventions, such as productivity and reputation [42], and those of Stack Overflow users with diverse national and cultural backgrounds. Our work therefore builds on the premise that technology is not value-neutral [19, 69] – even if incorporating specific values might not have been intended [20, 79]. Using a value-sensitive analysis inspired by Friedman [17] and Borning and Muller [8], we first conducted a conceptual investigation of the values embedded in Stack Overflow. We complemented this approach with a series of interviews with Stack Overflow users from the US, Indian and China, aiming to find diverse values and perspectives on how people use Q&A sites.

Our findings show that Stack Overflow promotes a collaboration model focused on individualist values, such as efficient and to-the-point interactions between participants. Such values are often misaligned with collectivist values expressed by several of our interviewees, who desire less goal-oriented and more social interactions. We found that Stack Overflow participants who conveyed mostly individualist values (most of our US participants) are not as affected by the design mismatch as users with mostly collectivist values (primarily expressed by our Indian and Chinese participants). These results suggest that value tensions systematically hinder engagement and contributions from people who prefer more conversational, social interactions and less focus on reputation and efficiency.

Our work makes the following contributions:

**1. Empirical:** Our findings suggest that Stack Overflow's design choices and community guidelines promote values that might prevent engagement and content contribution from certain groups. For instance, our Chinese and Indian participants mostly cited the lack of social interaction on Stack Overflow as a reason for not connecting with the community. At the same time, our US interviewees were predominantly comfortable with their peripheral participation as content consumers. While these results cannot be generalized to specific national cultures, they do reveal that a more individualist mindset may be more aligned with Stack Overflow's design. The individualist values embedded in StackOverflow are one possible reason for the varying activity levels across countries that were previously found [13, 34, 54, 62, 66].

**2. Pragmatic:** We provide several design implications for more inclusive Q&A communities, such as by reintroducing social interactions and emphasizing in-group relationships; and by building more relatable user identities rather than using impersonal reputation scores.

**3. Methodological:** This work increases the understanding of previously found quantitative differences between countries [54] through the lens of value-sensitive design. It therefore adds to a growing literature that marries two methodological approaches – quantitative and qualitative analyses – to uncover and explain phenomena as a single approach would not allow (see [49] for a discussion).

The screenshot shows a Stack Overflow question page. The question is "How can I remove duplicate rows?" and has 1030 views and 35 answers. The top answer, by user 'John Saunders', has 143k votes and provides a SQL solution using a CTE and window functions to identify and delete duplicate rows. The SQL code is as follows:

```

DELETE FROM MyTable
LEFT OUTER JOIN (
  SELECT ROWID as RowID, Col1, Col2, Col3
  FROM MyTable
  GROUP BY Col1, Col2, Col3
) as KeepRows ON
MyTable.RowID = KeepRows.RowID
WHERE
  KeepRows.RowID IS NULL

```

The page also features a 'Jobs near you' sidebar with several job listings, including 'Web Developer growth opportunity', 'Senior .NET Developer', and 'Team Lead - Full Stack Developer'. There are also 'Linked' questions listed at the bottom right.

Fig. 1. An example question page from Stack Overflow.

## 2 RELATED WORK

### 2.1 Online Question & Answer sites

Question & Answer sites enable its participants to solve problems by collaboratively creating questions and answers. The central goal is typically facilitated by mechanisms to identify content worthiness, such as voting, content revision, and user reputation. Examples of these sites are *Yahoo! Answers* and *Quora*, two general purpose sites, and the *StackExchange network*, which hosts several independent Q&A sites with topics varying from Statistics to Games to Anime. Stack Overflow, focused on software development resources, is the largest community in the StackExchange network based on the number of participants and posts [74]. Participants on Stack Overflow can pose questions and answer those of others (see Figure 1). Questions and answers can be up-voted, down-voted, commented on, edited, or flagged in case of content that requires moderators' attention. Any of these activities are typically seen as contributions [54]. Participants are able to perform some of these activities once they have created an account, with others requiring a minimum reputation score. Reputation is gained receiving votes on posted contributions. Users can access information about each other through links to their profiles.

Rosenbaum and Shachaf [64] describe Q&A sites as online Communities of Practice [78] where different roles and levels of participation are needed to fully support expertise sharing and collaborative knowledge creation. In such environments, people are expected to enter the community through a process of 'legitimate peripheral participation' [38, 50, 60] – such as by content exploration. This process is also interpreted as 'lurking' but required for learning about the site and developing the confidence to contribute [53]. Online peer-production technologies, such as online Q&A sites, are 'structural resources'; they shape interactions but are also shaped by participants' appropriation processes [2]. For instance, Gazan [24] argues that a successful design of online peer-production technologies must take into account both the technical dimension and related social factors, such as usability, motivation to participate, and communication norms. Our work builds on this notion by showing how Stack Overflow's design and guidelines shape interactions and how the process of participants' acculturation might be dominated by individualist values.

## 2.2 Participation in Q&A Sites

Q&A sites are visited by diverse people; for example, Stack Overflow is accessed by 40 million people per month from every country in the world [61, 75]. Given this diversity, it is perhaps unsurprising that there are large differences in how and how much people participate on these sites. A study of Stack Overflow revealed that most participants (94%) contribute very little and that the number of highly active contributors decreases exponentially [42]. Some Stack Overflow users start with many contributions but contribute less over time, while others build highly active profiles with time [55]. These findings are common in social media and are the basis for the well studied “long-tail” distribution [27, 52, 56]. Furtado and colleagues [21] identified ten distinctive activity profiles by analyzing five Q&A sites from the StackExchange network. They distinguish between the experts (participants who focus on few but high quality posts) and the activists (those with higher numbers of posts) and show that the sum of the contributions made by site participants with low-activity (the majority) can be as high (or higher) than the contribution made by activists. In a study of Naver Knowledge-iN [51], the largest Q&A community in South Korea, researchers also showed that intermittent participation is the norm even among the most active contributors. In Yahoo! Answers, contributors of technical topics were found to have more accepted answers when they specialize in fewer topics [3].

Prior work has also analyzed the relationship between participation behavior in online environments and the country participants are from [7, 13, 59, 66, 82]. For instance, results show that Westerners and Easterners differ in how they tag movies [13], communicate in online forums [59], and share in social networks [7]. In Q&A sites, Western and industrialized nations tend to engage in larger proportions and dominate the knowledge production [34, 54, 66] in comparison to other countries. Researchers have attributed some of these differences between countries to variations in national culture [28, 34, 62, 71].

## 2.3 Culture and Human Values

The importance of considering culture and human values in technology design has been recognized before [6, 17, 65, 69]. This literature argues that technology experience can and should be further studied and improved by using theoretical frames that consider human social and emotional lenses. Some methods that support such type of analyses are available, for instance, by employing cultural and human values to examine the interpretation and appropriation processes of technology use [18, 44, 58]. These procedures can vary widely from an in-depth qualitative analysis of how human values (e.g., for privacy) are considered by a group of people, to comparative studies of engagement trends across nations using large-scale datasets.

The study of culture and human values is a long endeavor of fields like Anthropology [25] and Sociology [57], and we will not be able to do justice to the nuanced and complex concepts produced by these fields. In this paper, we understand *human values* as what is relevant or desirable to a person and guides their actions and decisions [18]. Humans acquire their basic values at an early age as part of a process of unconscious learning about our environment [29]. These values change into stable shared ideals and the most fundamental ones will build up the structure of a cultural group [57]. We define *culture* as a shared set of underlying assumptions and values that result in collective norms and attitudes [12] that scaffold institutions of society [29]. These concepts have been found to influence social procedures [33, 57] and lead to differences in how people interact with each other – both offline (see, e.g., [43]) and online (see, e.g., [63]).

A cultural group that shares such set of underlying assumptions and values can comprise societies within a country (e.g., people speaking the same language), or subgroups of people between different geopolitical regions (e.g., practitioners of the same religion). Although not all people from a country

share the same culture [29], they often show similarities and adhere to a *national culture* to some degree [12, 48], making countries a relevant unit of analysis to uncover cultural trends. For instance, there is empirical evidence that the concept of ‘national culture’ is stable if variations of cultural values within and across countries are analyzed [48]. Because we aim to study such variations in human values, we sample from distinct national groups to increase the chances of obtaining diverse perspectives of online collaboration.

To enable quantitative comparisons between national cultures, researchers such as Hofstede [29], Inglehart [31], and Schwartz [67] have defined *cultural dimensions* (see [44] for a discussion). At its core, cultural dimensions are comparative statistical analyses of national surveys on human values. Despite criticism whether these dimensions can capture the dynamic and intangible nature of culture [14, 32], these theoretical frameworks help to assess culture-related behavioral tendencies in many contexts such as participant preferences in online environments [23]. One of the most prominent of these dimensions is *Individualism vs. Collectivism*. Defined by Hofstede [29], it describes the extent to which people see themselves as autonomous individuals as opposed to perceiving themselves as parts of groups. Other researchers have defined separate theoretical frames that encompass very similar concepts and social trends [31, 77]. For instance, Triandis and colleagues have proposed a specialization of the Individualism–Collectivism dimension that emphasizes how it is influenced by people’s willingness to accept inequalities in society [72, 77]. Vertical groups are those that accept and cherish differences among individuals while horizontal ones prefer equality.

Moreover, the *Individualism vs. Collectivism* has been identified as the most significant in the study of cross-national variations in online communities [23]. Regarding Q&A activities, Yang and colleagues [81] found that collectivist people place more importance on their social ties and social capital when answering questions in online networks than individualist users. Previous research also shows that Stack Overflow participants from collectivist nations are less likely to answer questions and revise content than users from individualist societies [54]. Based on this work, we use Individualism vs. Collectivism as a theoretical lens for our investigation of Stack Overflow.

### 3 OVERVIEW OF METHOD AND GOALS

Cross-cultural studies showed that people from collectivist societies are less likely to contribute than individualists to Q&A sites designed by US companies, such as Yahoo! Answers and Stack Overflow [34, 54, 66]. To further understand these prior results, **we aim to examine whether there is a mismatch between the values embedded in the design of the Q&A site Stack Overflow and those of participants from societies that are more or less collectivist**. To increase our chances of finding diverse perspectives among Stack Overflow users, we interviewed people from the US, China, and India. Our goal was to gather diverse viewpoints of people from countries that are more or less individualist and collectivist. However, it is important to note that our study is not intended to generalize behaviors and preferences to specific countries. For example, people can have a collectivist mindset if they are from predominantly collectivist national cultures, but not everyone from such countries will adhere to collectivist values. Hence, our methodology does not allow making inferences at a country level.

Our analysis was inspired by the Value Sensitive Design (VSD) tripartite methodology [18], composed of investigations on a conceptual, empirical, and technical level. Because we use cross-national comparisons as a starting point for identifying value tensions [47] we decided to use improvements to VSD proposed by Borning and Muller [8] to temper positions on universal values and strengthen the voice of participants. This means that we opted not to use a predefined set of human values in our analysis as this would restrain the focus on exploration and diversity of this research. Instead, we derived the values and their definitions from the collected data, framed by

the theoretical background on cultural and collaboration studies, as part of the iterative coding and analysis process [26]. The first author and a research assistant separately annotated samples of the data collected in each study with codes that answered questions such as ‘*What is important to this person when saying this?*’ and ‘*What is the fundamental need behind this comment?*’ Three authors collaboratively revised the annotations to reconcile differences in terminology and to agree on a set of values that captured stakeholders’ perspectives and that was diverse enough to support our analysis on value tensions. This revision process happened again every time the coders felt the set of values needed to be changed. The researchers involved in this process are from North America, Latin America, and Europe, adding diverse cultural perspectives to this analysis process.

#### 4 WHAT VALUES ARE EMBEDDED IN STACK OVERFLOW’S DESIGN?

Our first analysis aims to characterize the values of the Stack Overflow site, meaning the principles and standards that guided the design of its functionalities and policies.

##### 4.1 Methods

We started our analysis with two sets of public materials about the site and its goals, branching out to additional materials that are mentioned on these two sites. The first material is Stack Overflow’s site tour for new users (see <https://stackoverflow.com/tour>), which is a web page meant to inform newcomers about how the Q&A site should be used and what tools are available. We analyze this page to capture how Stack Overflow developers and designers present the site to their users. The second seed material is a set of blog posts discussing the platform design written by company employees (see <https://stackoverflow.blog/>). Posts were chosen based on titles and categories that provided insights into how designers have imagined and built the site.

##### 4.2 Results

Our analysis surfaced a number of values embedded in the site design and social protocols and shows that the site follows a performance-oriented model for collaboration that emphasizes productivity based on reputation. This finding is in line with the result by Mamykina et al. [42] where Stack Overflow creators consider the ‘productive competition’ design choice to be crucial to the site’s success. We extend their work by analyzing the site’s published material and presenting a nuanced view of what is relevant to Stack Overflow when presenting itself to its public. In the following, we list the most prominent values that this analysis revealed:

**Productivity:** This value appears throughout the company blog and its official site tour. The tour welcomes newcomers with the banner “*Ask Questions, Get Answers, No Distractions*” and proclaims itself as a site for professional and enthusiast programmers. The tours’ language throughout maintains an emphasis on focused, no-frills and high-quality content, declaring that it’s not a social discussion forum: “*there’s no chit-chat.*”

The productivity focus is reinforced in a help page answering the question ‘*What should I do when someone answers my question?*’ (<https://stackoverflow.com/help/someone-answers>): question askers are directed to ‘vote’ and ‘accept’ answers based on helpfulness. The page ends with the message:

*Please do not add a comment on your question or on an answer to say ‘Thank you’. Comments are meant for requesting clarification, leaving constructive criticism, or adding relevant but minor additional information – not for socializing. If you want to say ‘thank you,’ vote on or accept that person’s answer, or simply pay it forward by providing a great answer to someone else’s question.*

Even the Chat tool (<https://chat.stackoverflow.com/faq>) that could be regarded as a more open-ended social environment is presented as a less structured place to have professional conversations on site topics:

*This site is an extension of Stack Overflow, so discussion should more or less revolve around the same topics you'd find at Stack Overflow – but in an interactive, less strictly Q&A focused way. Do have fun, but please keep it professional...*

**Niceness:** Instructions for appropriate behavior on Stack Overflow often refer to an overarching rule: “Be nice!”. The help page entitled *What kind of behavior is expected of users?* (<https://stackoverflow.com/help/behavior>) reads:

*“Be nice! (...) remember that we’re all here to learn, together. Be welcoming and patient, especially with those who may not know everything you do. Oh, and bring your sense of humor. Just in case.”*

This concept is considered so important that a dedicated help page exists to define it (<https://stackoverflow.com/help/be-nice>). The definition prescribes “no rudeness, be welcoming, and don’t be a jerk”. The same page states their pride of the results of such behavior in the community:

*We’re proud to be a large, user-driven space on the internet where name-calling, harassment, and other online nastiness are almost non-existent. It’s up to all of us to keep it that way.*

**Quality:** We have also found a focus on content quality in several materials created by Stack Overflow designers. For instance, in a post about badges for editors, they mention the ability to improve the quality of questions over time as a defining feature of the site (<https://stackoverflow.blog/2014/10/07/new-editing-badges-and-enhancements-to-suggested-edits/>):

*(...) a pattern that sets Stack Exchange apart from the forums and message boards that came before it: answering and editing questions, the ability to (...) re-write the question such that it can be found and understood by future readers.*

In another blog post describing the site’s view on content moderation (<https://stackoverflow.blog/2009/05/18/a-theory-of-moderation/>), one of the site founders externalizes how improving the quality of content is expected from moderators: “A lot of the moderation work is extremely mundane, almost janitorial”, commenting that users with enough reputation should delete spams, close off-topic and cull bad posts. In the same post, users with no moderation privilege are also called to action:

*If you see anything in the system that is evil, weird, or in any way exceptional and deserving of moderator attention for any reason... flag it!*

The voting system is also an obvious part of the quality control in a Q&A system. In Stack Overflow, voting is meant to highlight high-quality posts, as described in the site’s tour: “Good answers are voted up and rise to the top.” Another consequence of the voting system is related to how votes are accumulated and presented throughout the site, engendering the two values we discuss next.

**Reputation:** Reputation is explained at the ‘Top users’ page, which is a list of the top contributors in each StackExchange site (<https://stackexchange.com/leagues>):

*When your fellow users vote up your questions and answers on a StackExchange site, you generate reputation. Reputation is a rough measure of: how much the community trusts you, your communication skills, the quality and relevancy of your questions and answers.*

This definition conveys that reputations are summarized in a numerical score based on votes, which is then used to define users’ identities and privileges, as outlined in the site’s tour:

*As you earn reputation, you'll unlock new privileges like the ability to vote, comment, and even edit other people's posts. At the highest levels, you'll have access to special moderation tools.*

A user's identity on StackExchange sites is heavily defined by their reputation: every time a user name is shown it is associated with their score and sometimes a badge count and an avatar image.

**Ranking:** The focus on reputation influences how the community sees itself and reports on its successes, which are often based on rankings. For example, when visiting the site's list of users (<https://stackoverflow.com/users>) the default listing option is by reputation for different time periods. The page on site tags (<https://stackoverflow.com/tags>) presents by default a list sorted by popularity and each tag can be further explored through a rank of top questions or contributors. This practice surfaces even through playful promotional events such as the *Winter Bash* (<http://winterbash2015.stackexchange.com>), in which users complete specific challenges in order to win hats for their avatars. At the conclusion of the event, the site compiles a leaderboard where they award and recognize individual users for completing certain challenges. Although the recognition of members through their achievements is part of the process of legitimate peripheral participation [38], it is surprising that a collaborative site lacks collective work reports and cues indicating mutual interest.

In summary, some of Stack Overflow's core values that we identified, namely productivity and reputation, are closely aligned with an individualist worldview [29, 40, 77], which is strongly associated with a focus on personal achievements. We expect that an environment based on such individualist values may be less suitable for participants with a predominantly collectivist worldview, who tend to emphasize affiliations and collective goals.

## 5 WHAT ARE THE VALUES OF STACK OVERFLOW USERS?

Our second study has two goals: (1) to understand how participants' values and their perception of Stack Overflow differs, and (2) to identify which aspects of Stack Overflow's design might clash with participants' values, which we suspect could lead to lower engagement.

### 5.1 Methods

To elicit a variety of values and differing perceptions of Stack Overflow, we conducted interviews with 25 of its users who were originally from China, India, and the United States. Sixteen of these interviewees participated in focus groups, and nine were interviewed individually. We started with focus groups for three reasons: first, it allows us to elicit deep insights quickly [36] and gain a variety of impressions on Stack Overflow usage. Second, we use focus groups as a tool to highlight opinions related to cultural traits as participants were of the same nationality. Finally, it allowed us to incorporate collaborative design sessions intending to inspire the design of tools that better fit participants' needs. The additional individual interviews complemented and validated impressions gathered with the focus groups, removing the influence that a participant may have on the opinion of others.

*5.1.1 Participants.* We recruited participants through email lists and public board posts at the University of Washington in the US. The call asked for Stack Overflow users who were from China, India, or the United States and have spent the majority of their early education in their countries of origin. The restriction for interviewees being from one university is intended to control for education level and other socio-cultural factors. We interviewed participants from three countries to increase our chances to assess diverse perspectives on Q&A sites, as some fundamental values that define societies are broadly shared and unconsciously assimilated by their individuals [29]. The three chosen countries were also found to vary in social organization characteristics that are



Table 1. Overview of focus group and individual interview participants (left and right table respectively). *Nationality* is encoded as (A)merican, (C)hinese, (I)ndian, (A/K) American with Korean heritage, and (A/C) American with Chinese heritage. The *site use frequency* is encoded as (D)aily, (W)eekly, and (M)onthly.

Partic. Code	Focus Group	Nationality	Gender	Site Use Freq.
P1-A	1	A	M	W
P2-A	1	A/K	F	W
P3-A	1	A	M	W
P4-A	2	A	F	W
P5-A	2	A	M	M
P6-I	3	I	M	W
P7-I	3	I	M	D
P8-I	3	I	M	W
P9-C	4	C	M	W
P10-C	4	C	F	D
P11-C	4	C	M	D
P12-I	5	I	F	W
P13-I	5	I	M	W
P14-I	5	I	M	W
P15-C	6	C	F	D
P16-C	6	C	M	W

Partic. Code	Nationality	Gender	Site Use Freq.
P17-A	A	M	D
P18-C	C	F	W
P19-I	I	F	M
P20-C	C	M	D
P21-A	A	F	W
P22-C	C	M	D
P23-I	I	M	W
P24-I	I	M	W
P25-A	A/C	F	W

relevant to this work [29, 31, 67]. In particular, they have very different positions on Hofstede’s Individualism vs. Collectivism scale and in Inglehart’s World Value Survey. For instance, China is reported to be a predominantly collectivist society with an individualism score of 20 (on a scale ranging from 6 to 91), India is in the middle with a score of 48, and the United States is the most individualist country with a score of 91. Previous work also has shown that users from these countries have highly distinct engagement levels in Stack Overflow, and that these levels are correlated with their individualism indexes [54].

Twenty-five people matched our screening requirements. The ample majority of those selected are young adult graduate students (three were undergraduate students and one a post-doctoral researcher), and 36% of them are female. Sixteen of them participated in nationally homogeneous focus groups: two groups with American participants, two with Chinese participants, and two with Indian participants (see details in Table 1). The remaining nine participants were interviewed individually (three per country). Two participants reported being, and are listed as, Americans although they are second-generation Korean (P2-A) and Chinese (P25-A). Since all our participants currently lived in the US, they are certainly not representative of their country. However, as we will later see, they do represent diverse perspectives and values, which often, but not always, overlap with tendencies of their national cultures that prior work identified.

**5.1.2 Procedure.** The first author facilitated all individual and group interviews accompanied by a note taker in the first three focus groups to allow for debriefing and procedure improvements. Each focus group session took 90 minutes; and individual interviews took thirty minutes. All were audio recorded.

After an introduction to the purpose of the study, the moderator presented printouts of three central Stack Overflow pages: (1) the site’s front page showing a list of questions; (2) an example of a question and answer page (see Figure 1); and (3) a user profile page, listing user contributions and

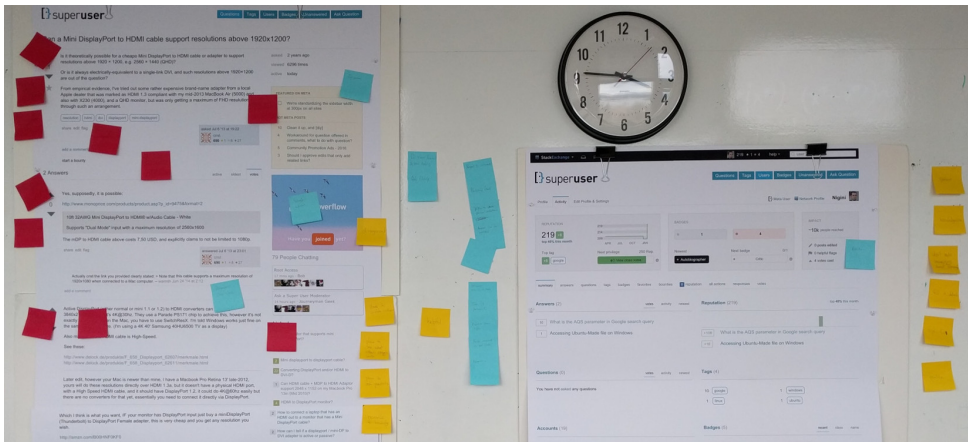


Fig. 2. Posters and sticky notes used in focus group sessions.

other personal information. While all participants were required to have used the platform before, this helped to remind interviewees and ensured they shared an understanding of the site design.

In the focus group sessions, to prevent the perspectives of one participant from guiding the whole conversation, our interview started with one general question for which participants were asked to answer individually using sticky notes (see Figure 2). Participants then presented these notes to the group while placing them on the three posters.

All interview sessions followed the same protocol, starting with a conversation about internet use followed by a prompt for comparing sites from different countries. The second part raised questions related to what is a Q&A site and how do interviewees use it. A conversation around characteristics of Q&A site users and possible interactions among them followed that. Finally, the fourth part of the protocol asked questions about participant goals and site affordances. The focus group protocol included an extra section where we led participants through the design of a new Q&A experience.

**5.1.3 Analysis.** Audio recordings of the interviews were transcribed and coded with an iterative coding approach. Our research interest in cultural values and their influence on participation behavior in Q&A sites influenced the creation of the initial codes used. As recommended by [26, 46], we additionally incorporated codes that emerged from the data. The first author and a research assistant separately coded two transcriptions and revised each others' work iteratively to jointly decide on a final set of codes. The dictionary and sample coded data were then discussed with another author to uncover potential cultural biases in the interpretation of quotes and to generate coding agreement. All interviews were then coded using the final dictionary, which includes three main categories: (1) roles and identity, (2) site experience, and (3) human values. A summary of the codes can be found at <http://publications.nigini.me>. Our results are based on a thematic analysis [9], which broadly followed four research questions:

- (1) What are the goals of participants when using Stack Overflow (and other Q&A sites)?
- (2) What are the reasons for and against contributing content?
- (3) What role do social interactions play?
- (4) Do site participants feel they are part of a community?

Due to the different cultural perspectives and the value-sensitive analysis of the data, the results should be considered with the caveat that identified values are not universally defined, and thus

each participant may have a different concept and experience of those values. For example, when presenting results related to *having fun*, some participants will consider it to be the opposite of a *utilitarian use* of the site, while others might not perceive these values as incompatible. We therefore present the quotes and comment on its context.

## 5.2 Results

Our analysis of the focus groups and individual interviews shows that both datasets tell the same story about three relevant aspects of participants' Q&A experiences:

- Are participants motivated to engage with the site for *enjoyment* or for *utilitarian* purposes?
- Do participants prefer to contribute *alone* or to collaborate and contribute *with others*?
- Do participants feel that content is provided *for free* – without an expectation of a return contribution – or do they feel a *duty to contribute*?

**5.2.1 Participants' Goals.** When describing how they use Stack Overflow and other Q&A sites, our analysis revealed diverse goals that revolved around two reference points: a **utilitarian** view and a preference for **enjoyment**. These two goals are sometimes put as conflicting, but other times complementary. Moreover, all of our participants identified themselves as **problem solvers**, meaning they predominantly use Stack Overflow to find an answer to a specific problem.

Participants described that they usually access Stack Overflow through an external search engine when searching for a solution to a specific problem. Hence, most of the time, our participants only have contact with threads of questions and answers related to their searches and had rarely used the front page and user profile pages. As a result of this focus on finding solutions to their problems, our participants tended to only acknowledge the creation of answers to questions as contributions to the site. An exception to that is they recognized voting as an important feedback to help searching for content.

A prominent value shared across all interviews was **efficiency** in finding needed information. P7-I, for example, emphasized that a good user is “*someone who gives very targeted answers, because I don't want to waste my time reading lots of words.*” [P7-I] Similarly, P4-A felt that questions and answers on Stack Overflow must be well-phrased to allow for easy reading:

*The whole exchange works better when the question and the answer are clear.* [P4-A]

While all participants valued the efficiency of Stack Overflow, the majority also recognized that they or other users consider more than the utilitarian use of Q&A sites. For instance, P16-C told us about how he uses Q&A sites to **relax**:

*First, I use Q&A sites for searching for accurate and correct answers. Second one is to read and relax – I think this is not the case on Stack Overflow. Third one is socialize with those who have similar interests. Last one is keep in touch with old friends by commenting every so often.* [P16-C]

He emphasized that not all of these goals can be achieved on Stack Overflow, a view that was common among participants. Several also supported his view of using Q&A sites for personal enjoyment through **socializing** and **content exploration**. Participant P9-C, for example, talked about using the Q&A site Quora to follow topics and people if he thought the content was interesting. He also mentioned that another important motivator for him is to see what other people are up to. The participants in the same focus group agreed and commented on that. The value of **curiosity** was a recurrent one for Chinese participants, as the following comment about Zhihu (a Chinese Q&A site similar to Quora) exemplifies:

*(...) in Zhihu I can also follow topics or people or questions. On the front page, what I can see is the news or posts [... I'm interested in].* [P18-C]

Such comparisons between Stack Overflow and other platforms were frequently made by Chinese and Indian participants who use more **socially open** sites for Q&A activities. The Indian participants in our third focus group, for instance, talked about how Facebook groups can be more social because “*if I ask a question and someone answers, and [if] I want to follow them, I just click on the profile, send them a friend request or send them a message and follow up*” [P7-I]. In addition, P15-C described that for her, Stack Overflow is less **fun** and **personal** than other platforms such as Zhihu, where “*the top answers are both informative and fun*” [P15-C].

All these comparisons are generally related to the **enjoyment** some participants search for in their Q&A experience. One agreed way of having fun in Stack Overflow is by using **humor** to break up the technical focus of the site. P6-I mentioned having “*good moments*” because “*people have written funny answers*” [P6-I]. P4-A described a famous thread of answers as one of the most interesting experiences she had when using Stack Overflow:

*Classic answer about parsing HTML with regular expressions. (...) [answerers] started out just repeating “you cannot do this” with slightly different phrasing. And as it continued they started introducing other weird glitch characters (...) It turned into this apocalyptic nightmare scenario (...) it was really funny. [P4-A]*

Several other participants highlighted the usefulness of humor, although for different reasons. For example, P2-A told us that humorous answers are helpful “*because it shows the author is actually into answering and makes it easier to read*” [P2-A]. P14-I was more cautious about funny answers, mentioning that humor can also have negative consequences: “*I appreciate humor but not at the expense of my time*” [P14-I].

**5.2.2 Reasons Against and For Contributing.** The second question guiding our analysis asks what reasons participants might have for and against contributing.

The values expressed in discussions throughout the interviews can be interpreted by how participants feel about using openly available content: does this use imply a **duty** to give back to the community who created the content, or is it **free** of this extra burden? Some other values related to this debate are the **usefulness** of content, levels of **expertise** and pure lack of **interest to participate**.

When talking about contributions, participants tended to focus on contributions in the form of answering questions. Only P4-A and P17-A had previously answered questions on Stack Overflow, but several others had contributed by voting on content and less frequently by asking questions. The majority of our interviewees remembered having contributed to other Q&A environments, such as forums and social network groups focused on technology, health, outdoor activities and education, and to other Q&A platforms like Quora and Zhihu. When asked what motivated her to contribute to Stack Overflow, P4-A told us about her desire to create resources that are **useful** to people. But she also said:

***Entertainment** and light-hearted **competition**: (...) when I’m working on one [answer] I feel like, a little bit of competition to have the right answer first. [P4-A]*

P11-C told us that he sometimes answers questions on Quora. He felt that it is challenging to know whether the answer is going to be perceived as useful and whether he had enough **expertise** in the area in which the question was posted, “*but I answered it anyway and it got an upvote!*” [P11-C]. He felt his knowledge was appreciated and confirmed when it received an upvote. Similarly, P13-I reported that contributing content could boost one’s self-esteem:

*If I had a profile, and had a number of votes, that would mean that (...) I’m pretty good about something! (...) you feel good to yourself, to solve people’s problems. [P13-I]*

The lack of **expertise** and lack of **confidence** was a common factor discouraging participants from contributing to Stack Overflow. For example, P6-I cited his skill level not being “*up to the mark of someone who [can] answer*” while P20-C felt as being part of “*a group of people who does not know how to code.*”

A small number of participants also felt a sense of **duty** for contributing and saw it as a way of giving back to the community. For example, P13-I said:

*I created a profile just to [vote]. I'm getting these resources online and for free, the least I can do is tell people what was helpful for me and was not helpful. [P13-I]*

These comments were typical among our Indian participants who frequently mentioned that using the site for free means that they should be contributing. A compelling case was that of P23-I, who, even though was concerned about his privacy and digital footprint, created a “*dummy account*” to “*try to answer*” and vote.

Still related to the idea of perceiving contributing as a **duty**, P3-A described himself as a “*lurker*”, as someone who consumes content but does not actively contribute to content generation. Similarly, P14-I stated that “*if you're busy and choose not to answer that, you're not a good user of Stack Overflow.*” [P14-I].

In contrast, P1-A demonstrates to be more comfortable with using existing content as a novice with no knowledge to contribute, and told the group: “*I'm a lurker: going for a specific need and I either find an answer or don't*” [P1-A]. In the same way, P17-A, although an occasional contributor, stated that: “*I'm using a big internet thing built by a community. (...) I feel like I'm freelancing (...) taking advantage of this community. (...) 90% of people probably just look at it, right?*” [P17-A].

A small group of participants focused on the lack of having an account as a reason for not contributing. Speaking for others in his groups, P9-C said:

*We don't even have an account (...) so we're not very active in commenting or posting our questions. We just use this to go through the answers and find the best answer. [P9-C]*

The discussions in this group suggest participants lack interest in being part of the Stack Overflow community. For example, participant P11-C described how he perceives Stack Overflow's voting feature useful for finding information, before adding “*but I don't even have an account, so I don't vote. (laughs)*” [P11-C]. In this same group, participants P9-C and P10-C added to the idea of being an outsider of American Q&A sites because they can't speak freely: “*in Chinese Quora you can express your mood*” [P9-C] and “*we can say [mean things] in the Chinese Quora, but in the US even if we mean it we can't say it.*” [P10-C]. Such conversations around Q&A experiences in different sites were very common among our Chinese interviewees, and they generally expressed an unmet desire for **social openness** when using American sites. For example, while P16-C commented that “*I think Zhihu is more personal than Quora (...) there are more personal questions.*” [P16-C]; P15-C added “*Yeah, it's more about having a conversation than getting an answer that is right.*” [P15-C]. Interviewee P20-C, in turn, compared his experience on Quora and Zhihu to Stack Overflow by saying that “*you can blend in your personal feelings*” [P20-C].

**5.2.3 The Role of Social Interactions.** Our third question aimed at revealing values related to social interactions on Q&A sites. We discovered that participants' preferences vary widely on the ‘alone vs together’ continuum. Participants ranged from preferring not to have social contact to others on Q&A sites to desiring it or even considering it to be essential. For instance, several of our participants described contacting other users to further discuss a topic or to socialize. P6-I told us about his desire to connect with other people on Stack Overflow, as well as about the difficulties he had encountered when he tried to do so:

*The ideal user is someone who is willing to chat. I tried to contact a couple of people and ask them for their email and stuff, but people are not willing to do that. [P6-I]*

Another participant, P9-C, described how he has interacted with many people on Zhihu by sending them direct messages through the platform. He mentioned that he often contacts people who he felt shared a common interest:

*And if I want more detailed answers from him or I had some related questions to ask him, then I'll try to message him and we can become friends! [P9-C]*

Comparing Stack Overflow, Quora, and Zhihu, our Chinese participants described how there are many more discussions on Zhihu, but they did not feel this would be accepted on the American sites. P9-C said:

*In China (...) if you don't like him you can quarrel with him and post your thoughts (...) In Zhihu you can express your mood. [P9-C]*

In response, P11-C remarked: *"The **exchange!** There are more exchanges!"* [P11-C].

A less common perspective on exchange is the one of **self-validation**, as presented by P18-C in using Zhihu to explore questions on graduate school: *"I just feel like those people have similar experiences to me, and sometimes I just feel like it's interesting to see other people are also fighting for life or struggling for life"* [P18-C].

Instead of accepting discussions, participants felt that questions and answers on Stack Overflow have to get straight to the point, so as to not waste other people's time. Stack Overflow was perceived as not designed for fun and **enjoyment** but for **efficiency**:

*That's actually one of the reasons why I use Q&A sites: to relax and have fun, right? (...) [In Stack Overflow there is] no fun mode. [P15-C]*

In line with this, a couple of participants felt that social interactions on Stack Overflow were replaced with the voting functionality. For example, even though P4-A did not feel the need to be thanked, she said:

*Some of the guidelines are a bit excessive: You're not supposed to thank people for answering your question. It doesn't bother me if someone says thank you. [P4-A]*

Interviewee P12-I recalled she was thanked by the asker of a question she answered in a web forum. She found that *"such **interactions** make the site more useful."* [P12-I]. Agreeing with her, P13-I added: *"These types of interactions are definitely good (...) like you said you feel good and you're more inclined to go out and do it again."* [P13-I].

Recognizing other users was another theme that emerged from our analysis. Participants frequently reported that they do not always rely on votes to find suitable answers. They additionally notice the contributors behind answers that they found useful. Recognizing contributors in Q&A situations was frequently described as helpful for finding good and trustworthy answers. P1-A, for example, told us:

*If there's a particular user that had good answers I'd tend to [notice them]. On other questions I'd see their answer first and give it preference. [P1-A]*

For a few participants, this recognition leads to the interest to following the site user, as described by P19-I when using a forum for questions on studying abroad: *"(...) they keep going there to answer questions. So you identify those people, and follow them and maybe the kind of questions they answered."* [P19-I]. In another case, P8-I described how he values the *personal touch* in Facebook groups because it is easier to recognize the person who contributed helpful answers. He said that people are *"not anonymous, so you actually get to know them (...) and then it sort of has a more personal touch there!"* [P8-I]. Rather than relying on answers with the highest number of votes, he mentioned how he preferred knowing that someone was an **expert**:

*I can always browse through the answers and say “ok, this particular answer is from this chap who I know is an expert”, so I’d probably stick to his answer (...) [P8-I]*

When discussing participation on the site, all groups eventually highlighted the importance of **politeness** in their interactions. For example, P23-I described the ‘nightmare’ Q&A site user as inconsiderate and rude people “*who do answer [questions] but in a way that discriminates [the asker]*” [P23-I]. The counterpart comment came from P7-I when answering our question on “How do you define a Stack Overflow dream user?”:

*A dream user is someone who respects the fact that there are users that are novices, and gives them a proper answer instead of making fun of them or trolling them. [P7-I]*

**5.2.4 Being Part of the Community.** In the last part of our interviews, we asked participants if they perceived themselves as part of a community when using Stack Overflow. The general answer was no regardless of whether they had contributed or if they value social or individual participation. Participants described different reasons for why, explaining them mainly by referring to the general higher focus on **content** instead of **people**. For example, P5-A mentioned a common reason for not feeling part of the community among our interviewees who are passive users of Stack Overflow:

*If I had started by asking questions maybe I would feel more a part of it. [P5-A]*

However, even those participants who had contributed content in the past did not feel that they were part of the community. They often felt they would need to get to know other users, as stated by P4-A and P16-C:

*I don’t feel like I know the people in [a specific site category] that much. We don’t interact or chat or anything. [P4-A]*

*I think the problem is that we don’t know each other in the Q&A sites, we only know their answers. [P16-C]*

Participant P15-C went further to describe that it is not only about knowing or chatting with each other but also feeling like you are having **personal interactions**:

*[In a Facebook group] I feel like part of a community partly because every member of this community reacts like a real person towards me.” [P15-C]*

Interviewee P21-A gave an even more restrictive perspective on building communities:

*I don’t tend to build communities with people that I don’t know; online. I tend to build those kinds of relationships in person. [P21-A]*

A less common perspective on community in our data is the one based on **affinity** with similar opinions and knowledge needs, which was expressed by P1-A, P10-C, and P20-C:

*If I [search for a question and it] comes up there is a sense that someone had this question before: part of community because of a shared experience (...) [P1-A]*

*[I feel] part of a group, because I think the way I search these sites actually reflects what I think. (...) I would expect that someone like me already asked the question. [P20-C]*

*Sometimes you view answers and you totally agree. This types of moments you feel like a community! [P10-C]*

## 6 DISCUSSION

A key result from our interviews is that some users of Q&A sites look for more than efficiency when seeking information: they also desire enjoyment and social contact. These values are misaligned with Stack Overflow’s design and community guidelines, which promote productivity and prohibit any kind of small-talk or off-topic conversations. Our analysis suggests that the design of Stack Overflow follows individualist values that tend to give more importance to efficiency and saving

time [40, 77]. The relationship between individualism and efficiency was explained by Levine [40] who argued that individualist societies focus on personal achievements, which requires a greater focus on time, in comparison to collectivists who focus more on social affiliation. Levine found a high correlation between societies with a higher *Pace of Life*, where time seems to play an essential role, and individualist societies. Another perspective is presented by Triandis [77] who argues that a major antecedent for individualism is affluence, which Levine also relates to faster pace of life. Stack Overflow's community has appropriated such individualist values by providing guidelines for contributing targeted questions and answers; however, the lack of social interactions beyond such efficiency-focused knowledge exchange means that users who value enjoyment and social contact may not engage with the site.

The tendency to create CSCW systems that support strictly transactional interactions and ignore peoples' social needs has been criticized before [76]. Burke and colleagues, for example, particularized types of bonding [11] and emotional impact [10] of responses to social posts. To the extent that the efficient protocols of Stack Overflow discourage these kinds of responses, the site may reduce the aggregate social capital [11] that builds around it. Our findings suggest that this reduction in social-capital construction may have a differential effect on people from different cultural backgrounds: The collectivist values we uncovered showed that social interactions can be a prerequisite to further engaging with Q&A sites, in line with prior findings in different domains (e.g., [4, 41]). Similar to prior work [71], our results also showed that Asians with predominantly collectivist values sometimes choose tools that better support a 'social agenda' even in situations that are task focused. In particular, our Chinese participants told us that they usually choose to participate in more social Q&A sites such as Quora or their local Zhihu over Stack Overflow. They preferred tools that allowed them to establish a shared context and bonds, in line with the tendency of polychronic cultures to "switch back and forth from one activity to another" and to focus more on relationships [39, p. 201].

Our results also show that Stack Overflow users highly value those who contribute to the site. However, most of our participants described themselves as unable to contribute due to a lack of expertise and self-confidence, both of which were exacerbated by feeling like an outsider to the community. Our findings suggest that this feeling may be reinforced by Stack Overflow's strong emphasis on a user's reputation, displayed as a score everywhere the user name is shown. This inevitably crafts a user identity around a quantitative measure that highlights differences among users, creating a clear separation between experts and outsiders. This reputation-focused design of users' identity is likely to impact engagement and contribution to some groups of participants more than others. Triandis' classification of the United States as a vertical-individualism [72, 77] society can partially explain why Americans are more comfortable with the site, as they would tend to be more accustomed navigating environments that focus on competition and differentiating themselves from others. Having the confidence that one can provide a good contribution is a perception of self-efficacy [5], which depends on prior experiences and culture [68]. People with high self-efficacy tend to set themselves challenging goals and even self-select into challenging situations – such as when they decide to answer a question on Stack Overflow. Since our participants perceived contributing to Stack Overflow as a challenge, it is likely that fostering contributions requires strategies for developing high self-efficacy levels. The kind of strategy that achieves this will be dependent on cultural values [45, 68, 80].

Our study also revealed diverging values when participants were justifying why they had not contributed to Stack Overflow before. The American participants mostly agreed that "good users" of Stack Overflow should contribute content, but they felt comfortable only consuming the content given that it is already there. Our Indian participants, in contrast, tended to feel that it is their duty to contribute. Their conversations focused on guilt and the emotional burden of not contributing.



They expressed strong collectivist values, suggesting that their highest goal should be to contribute to a group and community, yet their focus on efficiency and productivity were more aligned with individualist traits. One explanation for this could be that collectivist and individualist values are often thought to co-exist in Indian society [73]. India is in the middle of Hofstede's Collectivism-Individualism dimension [29] and has also shifted from survival towards more self-expression in Inglehart's cultural dimensions [31]. Another possible interpretation is Triandis' classification of India as a vertical-collectivist society [77], which suggests that even though Indians tend to strongly consider social ties, they tend to simultaneously be interested in comparing and distinguishing themselves from others (a sign of being more vertical/hierarchical).

Interestingly, our Chinese participants did not mention a sense of guilt for not contributing. Instead, the discussions revealed that they were comfortable with their lack of contributions which can be interpreted as they do not perceive Stack Overflow as their community. For them, the main reason for feeling disconnected from Stack Overflow's community seems to be the lack of personal interactions and debates, which is commonly seen on the local sites that they use, such as Zhihu. Seemingly in contrast to this freedom of arguing with others, we found that Stack Overflow's guidelines promote niceness as a fundamental community value. Although all our interviewees appreciated that users mostly followed this guideline, Chinese participants did not perceive niceness as contradictory to their need for debates and quarreling. One interpretation for this is that quarreling shows a sense of intimacy, which might be acceptable and desired in one's 'in-group' (i.e., among known peers). At first thought, the discussions between users seem at odds with collectivist characteristics such as face-saving and preserving harmony that are usually associated with Chinese culture [1], but these personal discussions could actually form the social glue in Chinese communities.

Note that only one of our participants revealed that being a non-native speaker is an obstacle to understanding and writing humorous messages. Prior work has indeed found that the communication of emotions is shaped by language and culture [22], but that cultural differences in communication style and emotional management are more relevant than language fluency to understand communication difficulties [70]. While Wikipedia and StackExchange have only adapted the language of their site in the past, we believe that any approach addressing participation differences in collaborative systems needs to address differences in both language and culture.

In summary, the topic of social interactions emerged as the most prominent difference between values in our analysis. The lack of social interactions impacted the experience of some of our participants, inhibiting their motivations and goals for using Stack Overflow, possible content contributions to the site, and their feeling of being part of the community. Knowing that the lack of support for social interactions has such far-reaching consequences is essential for Q&A platforms and other CSCW systems to foster more equal participation and contributions from people with various cultural values. In the next section, we will discuss how we believe Q&A sites could become more inclusive.

## 6.1 Design Implications and Future Work

Our findings have two main implications for the design of Q&A sites. First, our result that a lack of social interactions is perceived as a major obstacle to feeling part of the community suggests that these missing social interactions ultimately prevent participants with collectivist values from contributing. To make individualists and collectivists feel part of the community, Q&A sites will need to reintroduce social interactions and emphasize in-group relationships, while maintaining possibilities to efficiently find information, as valued by more goal-oriented individualists.

**Design Implication 1: Emphasize that users are part of the community.** Q&A sites could use the already existent concept of category of content ('tag' in Stack Overflow) to define sub-communities. In fact, previous work has shown that controlling the size of (sub-)communities can improve users' sense of being part of a group [37, p. 63]. Social interactions between group members could be supported by direct communication channels, something that is already organically happening in the Chat environment recently created by Stack Overflow. A general feeling of belonging could be more strongly evoked by listing collaborations between group members and promoting the creation of a common goal. For example, prior work has suggested to use the concept of "team performance" to motivate contributions by collectivist gamers [35]. A similar strategy could be to emphasize how well a group performs relative to others (rather than how well an individual performs relative to others).

Another design alternative to improve sociability could be establish a separate "chat" or "social" page for each question or content category. People seeking social interactions could use that page, while remaining tied to the technical discussion that gave rise to the social interactions. There is a partial analogy to Wikipedia, where discussions and disagreements are relegated to "talk" pages, while the formally agreed content appears on the standard pages. Such 'tag-communities' and 'social pages' are unlikely to alienate users with more individualist values; a universally inclusive Q&A site design could therefore be possible.

Second, our findings showed that Stack Overflow's impersonal focus on reputation scores and rankings is often misaligned with collectivist values, and thus, with people who prefer personal interactions and less anonymity.

**Design Implication 2: Promote bond-based attachment.** The emphasis on scores and the downplaying of users' personal attributes on Stack Overflow resembles an identity-based group attachment model [30] in which the focus is on the goals of the site instead of on interpersonal relationships. Similar to Stack Overflow, identity-based group attachment is also embedded in Wikipedia's design with its "policies that discourage interpersonal ties, [and] a user interface that makes direct, private exchanges between community members difficult" [15, p. 2]. In contrast, many social network platforms encourage interpersonal ties among their members, promoting a bond-based attachment that is preferred by collectivist users [16]. Q&A sites could develop collective work cues throughout the site. For instance, instead of being associated with individual scores, user names could be linked to common interests with the page reader or personal mottos, a design that is adopted by Quora. Another possibility would be to lessen the direct association between contributors and contribution, and presenting contributors as a group that are working together to solve a proposed problem, similar to the design of GitHub.

Designing for users with seemingly opposing values of course risks disadvantaging a subgroup of users. However, prior work found that both identity and bond-based attachment increased overall commitment [15]. Promoting a more bond-based attachment is therefore likely to be appreciated by collectivist users (and might lead to a more active participation), and unlikely to harm users with predominantly individualist values.

## 7 CONCLUSION

Our main findings show that Stack Overflow's design and guidelines follow individualist values, such as productivity and reputation scores, which can be misaligned with the values of collectivist users. In particular, our results showed that a lack of social interaction on Stack Overflow, valued by our collectivist participants, can inhibit their feeling of belonging and prevent them from contributing to the community. Our work suggests that collaborative systems designed with individualist values in mind can systematically discourage engagement of those with collectivist values. We are excited to build on this work in the future by studying people from additional countries and cultures and

by designing culturally-inclusive Q&A sites that equally encourage contributions from people with diverse cultural backgrounds.

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