

Are Good Questions Scarce in Domain Specific Q&A

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Abstract: This paper explores domain specific Question and Answer (Q&A) and the issue of information scarcity. Many Q&A forums use a point-based reputation system as a method to signal expert users and to gamify the experience for users. This has been used in Q&A networks such as Stack Exchange, which we look at in this paper. As time progresses, we find that the rate of reputation-valuable Q&A exchanges decreases, thus challenging the efficacy of the reputation system. In addition, we observe a shift in domain specific systems where answers start out as the scarce resource, but are eventually replaced by questions.

Introduction: Online communities that focus on the creation of content are increasingly relying on voting reputation systems to manage and encourage stability. This is clearly beneficial for any system that seeks to have a large scale of users and content, as the costs and effort of managing the community has been mitigated by the actions of the crowd. In addition, the prospect of earning points through the reputation system can act as an important incentive to participate and keep participating in Q&A activities [1, 6].

These advantages were important in the decision for the computer programming community of Stack Overflow (SO), the original Q&A site of the Stack Exchange network, to implement a reputation system that is based on community votes [2]. The design choices that were made by the SO founders credited with the community's growth and were lauded by researchers interested in design [3]. In SO's scheme, answers are considered more valuable and

scarce when compared to questions. Receiving a vote on an answer is 10 points compared to 5 points for a question. Because of this, the top users on SO earn most of their points from answering questions, and are incredibly adept at targeting valuable questions [1]. The success of this model was then used to create a network of over 70 domain specific Q&A sites for Stack Exchange.

While the overall design of SO seems to have encouraged a vibrant community, there are some potential flaws in the paradigm of answer supremacy. When the community is new, all questions that could be asked are available to be asked. As the site ages, however, there is a possibility that the amount of valuable questions becomes rapidly smaller. In this paper, we take a look at the idea of critical mass and examine if the value of a good question and answer is decelerating.

Stack Overflow and Critical Mass: As of January 2015, SO has accumulated over 3.8 million registered users, who have asked 8.6 million questions and have provided 15 million answers. These statistics were obtained in approximately 6.5 years. The current growth rate of SO is encouraging from a stability point of view. In each of the past two years, SO has added 1 million new users and 2 million new questions. The percentage of questions receiving an answer have started to dip, however, with the most recent year seeing a 3% drop to 74%. The reputation pyramid of SO is very steep. Less than 0.40% of the users control half of the 500 million points that have been created. Close to 70% of all users have less than 10 points. This may seem like a

natural problem, but it is possible that this system does not have a bias against skilled users, as long as there is a room for competition. The question that arises is whether the critical mass of the community is allowing new contributions to be relatively valuable.

When a community is new, reaching critical mass is an important moment of stability [5]. The type of stability that is reached however can have long-term effects on the efficacy of community rules. Critical Mass Theory [4] identifies three common ways in which critical mass can occur: accelerating, in which initial actions are less valuable than later actions; decelerating, which is the inverse of accelerating; and, linear. Since S0 has had the same reputation rules since its inception, the format is seems to be intended to be linear.

Methodology and Preliminary Results: In order to measure the value of contributions, it is necessary to determine users who can be compared fairly. One way of doing this is by users who had success with similar types of contributions. For instance, comparing users who earned the same amount of points in the same amount of time in different years would allow us to gauge realistic differences. In this research arc, compared yearly user class groups this way, and compared residual votes.

Early results indicate that the relative value of a Q&A exchange is rapidly decelerating each year. To illustrate this, we present a *typical* case; two users, A and B, had similar success in two different years. A joined in 2008 and earned 11,000 points in that year. B joined in 2012 and earned the same amount. Table 1 shows the basic data of the users.

The residual voting rates in 2013 are much higher for A. Answers given in 2008 and 2009 received almost three times the amount of votes compared to answers given in 2012. Despite B's relative success against more

competitors, his answers on questions are much less valuable than A's. Our preliminary results indicate that this true across all of the Stack Exchange sites, indicating that there is a strong decelerating curve.

	2008 User A	2012 User B
Ans.	135	505
Best Answer Rate	41 (30.37%)	258 (51.08%)
Residual vote rate of first 12 months answers	87	31

Table 1:Case Study Data of Users

Discussion and Future Work: If valuable questions and exchanges are decelerating, this poses long-term problems for domain specific Q&A. If the value paradigm were shifting towards question scarcity, a reevaluation of site structure would seem necessary. Work is being performed on simulating how changes to the reputation system would affect critical mass and reputation distribution.

References:

[1] Anderson, A. et al. Discovering value from community activity on focused question answering sites. KDD 2012.
 [2] Ford, H. Online reputation: it's contextual. Ethnography Matters 2012.
 [3] Mamykina, L. et al. Design lessons from the fastest q&a site in the west. CHI 2011.
 [4] Oliver, P. et al. A theory of the critical mass. Am. J. of Sociology 1985.
 [5] Solomon, J. et al. Critical Mass of What? Exploring Community Grown in Wikiprojects. ICWSM 2013.
 [6] Vasilescu, B. et al. How social Q&A sites are changing knowledge sharing in open source software communities. CSCW 2014.

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