

Encouraging Contributions to Online Communities with Personalization and Incentives

F. Maxwell Harper

GroupLens Research, University of Minnesota
Minneapolis, MN 55455, USA
harper@cs.umn.edu

Abstract. Increasingly, online systems depend on user contributions such as posts, ratings, tags, and comments. Many of these systems wish to encourage broader participation or the contribution of higher quality content. In this doctoral consortium paper, I present past work and propose future work on understanding user motivations to contribute online and on the use of personalization technology and incentives to shape participation.

Keywords: Incentives, personalization, online communities.

1 Promoting Contributions with Incentives

As of December, 2006, six of the ten most popular Web sites in the United States¹ simply could not exist without user-contributed content. These sites – Myspace, EBay, YouTube, Craigslist, Wikipedia, and Facebook – leverage content created by users to create fantastically large and varied social spaces, marketplaces, and repositories of information. Amazon, also in the top ten sites, relies on user reviews, lists, ratings, and tags to enrich the site and help users make purchase decisions. User contributions also are driving the proliferation of online discussions, wikis, and blogs.

The user-centric paradigm of content creation on the Internet (a major component of what is sometimes called Web 2.0) makes new, powerful types of content possible, but also leaves sites vulnerable to the whims of their users. Successful sites manage to attract diverse, committed, or many users. The content these users create cannot be replicated by marketing departments or editorial staff. But success is far from guaranteed. Sites must now compete for users' time and effort. As a result, some communities that rely on user contributions simply die from lack of participation.

Sites' success also depends on the quality of what users contribute. The online encyclopedia Wikipedia is an example of a site that maintains high quality standards. One study found that science articles in the free Wikipedia and the commercially produced Encyclopaedia Britannica contain similar numbers of errors [8]. Other sites struggle with quality. For example, both Yahoo! Answers and Slashdot have worked to elevate the quality of discourse through the design of incentives that reward high-quality contributions.

¹ Top sites as measured in terms of total traffic by alexa.com.

Because of online systems' dependence on user contributions, it has become useful to develop tools that encourage users to participate in particular ways. Increasingly, Web sites are using one class of tools, *designed incentives*, to this end. Designed incentives are mechanisms built into a software interface that encourage, reward, or persuade users. An example of a designed incentive is the awarding of "points" and "levels" to users who participate in Yahoo! Answers.

Designed incentives are a manifestation of Web sites' desire to shape user contributions – often to encourage members to contribute, or to discourage low-quality content. What sorts of designed incentives are there in online systems? Which incentives work, and why? Can we exploit personalization technology to offer different incentives to different individuals for greater overall effect? In this paper, I report on related work and a research agenda to begin to answer these questions.

2 Related Work on Incentives

There is a substantial amount of work from the social sciences on the use and effectiveness of incentives for encouraging workers to be more productive. Clark and Wilson defined incentives, saying "organizations distribute incentives to individuals in order to induce them to contribute activity" and classified incentives as material, solidary, status, and purposive [4][14]. While their work examined incentives in the context of organizations, their taxonomy can be mapped to incentives in online systems to provide an analytic framework for examining system designs. Other work has looked at the effect of monetary incentives (e.g. [5]), finding that they tend to dampen people's intrinsic motivations to act. Systems such as Google Answers and MetaCafe have tied financial incentives to user contributions, and it is an open research question whether these financial rewards in fact lead to greater contributions. Oliver [12] argues that rewards and punishments have fundamental differences not just in how they motivate users, but in the resulting effects on people's propensity towards collective action. It is an interesting question whether her thesis holds when collective action consists of contributions to an online system.

To date, little work has been done on understanding online incentives in practice. An ACM GROUP 2005 workshop ("Sustaining Community: The role and design of incentive mechanisms in online systems") produced a report [7] on the role of incentives in eight online systems, and proposed a tentative framework for understanding these incentives. This work provides a nice start to understanding online incentives, but could be broadened by looking at sites across the Internet.

More work has been done to understand the effect of designed incentives on user behavior in online systems. Cheng and Vassileva conducted a series of studies in Comtella, a system built for sharing links to research papers. Comtella offers a distributed moderation interface, and allows users to receive explicit status points in the community. They found that many users acted to check their status in the system, and that users who checked their status more frequently were more inclined to act to increase their status [3]. They also found that a combination of persuasive messages and reputation-based incentives increased the amount of work users would contribute, and caused users to use the system more extensively and log in more frequently

with no apparent downturn in overall system quality [2]. Beenen et al. found that goal-setting and reminding users of their uniqueness in an email message helped them to rate more movies in an online recommendation system [1]. Rashid et al. found that users are more likely to provide ratings when they can see their potential for improving recommendation quality [13].

3 Research Directions

In this section, I lay out my past and future research agenda. To date, I have studied user motivations to contribute to online communities, and I have evaluated several personalized interfaces designed to promote participation. I propose to carry this work forward by examining the use of designed incentives such as leaderboards or user status displays. I am interested in understanding whether (and why) designed incentives work, and evaluating the potential for improving these incentives through the use of personalization algorithms.

3.1 Completed Work and Work in Progress

A user must have some intrinsic or extrinsic motivation to contribute content to an online community; designed incentives may capitalize on this motivation. For example, if a user tags articles in order to help other users, an effective incentive might provide a display of how many times that user's tags have been viewed or clicked by others. To investigate user motivations to contribute to MovieLens (www.movielens.org), an online movie recommendation system, we built an economic model of the costs and benefits of rating movies [10]. Based on a survey we conducted, we found that users differ greatly in their motivations to contribute to the system. Some respondents indicated that they contribute because of the fun of rating movies, some contribute to help the system, and others contribute to get better movie recommendations. Thus, we believe that user preferences could be modeled to build interfaces or incentives that are personalized for greater effectiveness.

We followed this work by testing the idea that personalization can increase user motivation to contribute. As an experimental platform, we introduced online discussion forums into MovieLens, augmented with an entity recognition system that allows us to track which movies are mentioned in which conversational threads [6]. The augmented discussion forums allowed us to build and test a number of personalization algorithms based on users' histories of movie ratings and forum use. The goal of these algorithms was to entice members to read or write forum messages. We found that some personalization algorithms had strong positive effects, while others did not. For example, compared with baseline algorithms, an algorithm displaying the presence of a potentially contentious message nearly tripled user interest, while an algorithm designed to display familiar member names or movie names had little effect [9].

We have also investigated the use of social comparisons to motivate participation in MovieLens. Just as sites like Amazon display a list of "Top Reviewers", or discussion forums display the number of posts an author has contributed, we showed

members how many movies they had rated compared with others in the system. To deliver this information, we sent email messages to members with personalized information about how many movies they had rated compared with other members. We found that these messages did boost ratings activity, but potentially at the cost of lowering activity in other areas of the system [11]. Members who were below average rated the most to catch up to the norm; we speculate that interfaces that continue to show users that they have the potential for improvement may be very successful at eliciting contributions.

Finally, we have begun a study of member contributions in question and answer sites such as Google Answers, Yahoo! Answers, and AllExperts. These sites vary in their incentives to ask or answer questions, which has led to very different patterns of use. In this research, we hope to determine how well the different sites provide answers to different types of questions (e.g. questions seeking advice vs. questions seeking facts), and how the design of the site's incentives plays into their success or failure.

3.2 Future Work

In future work, I hope to continue to study interfaces that broaden participation or improve the quality of user contributions to online communities. I am especially interested in studying the use of designed incentives such as leaderboards, user status indicators, or mechanisms that allow members to earn access to system privileges. Designed incentives such as these are built purely to shape user contributions, and are becoming increasingly important in the design of online communities.

There are many aspects of designed incentives that remain poorly understood. One of my goals is to analyze and taxonomize incentives in practice and in theory. I think that understanding incentives in practice will provide researchers with a useful context for developing new types of incentives and for building personalization algorithms that adapt incentives to particular people or groups of people. This research can and should build on the extensive background in understanding organizational incentives (e.g. [4]), and the work from the ACM GROUP 2005 workshop on incentives [7]. I imagine building a framework based on social science theory relevant to the study of online incentives, then filling the framework with case studies found in practice. I am interested in receiving feedback on the appropriate scope of this work, and on the most interesting dimensions for analysis.

Another of my research goals is to develop personalization algorithms that improve the effectiveness of online incentives to participate. In MovieLens, we might develop algorithms based on users' preferences and familiarity with various system features and entities. We can use these data to infer which aspects of the system are important for the user, or to compute a user's similarity to other users in the system in terms of feature use, social interaction, and movie preferences. For example, we might compare a "standard" leaderboard to one that displays the contributions of others in a user's social network. I imagine testing these ideas in one or more controlled field studies in MovieLens. I am interested in receiving feedback from the research community on the design of such an experiment.

4 Conclusion

Designed incentives are widely used in online systems, but not well understood. I am interested in pursuing research to better understand how incentives can be used to promote positive discourse on the Internet. I believe that personalization techniques that understand user motivations and preferences can be used to improve the persuasiveness of incentives, and I am interested in investigating these techniques.

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