Conceptualizing a Target-Oriented Design Model for Incentive Systems in Online Production Communities

Abstract

Online production communities aim to realize the collective intelligence and leverage the potential creativity, manpower, and knowledge of volunteer users to generate high quality, public content. Designing and implementing appropriate incentives to sustain participation is still a challenging task for community designers due to the dynamic and multi-dimensional nature of such communities. In this paper, we review and synthesize the existing body of research pertaining to user participation and incentive systems to propose an integrative framework to address influential factors concerning this issue. Based on this framework and by drawing upon various theories and best practices, we conceptualize a generalized and target-oriented design cycle for developing and adopting incentive systems. The result provides a model that addresses user behavior and inter-dependencies between various incentives with an emphasis on user desires.

1 Allgemeine Informationen

Online or virtual communities provide an easy-to-access platform with valuable functions and mechanisms for various purposes including socialization, networking, gaming and content generation. Due to the voluntary nature of participation in many types of online community, social behavior complications and individual dynamism are critical factors for designers and operators to deal with. Designing a successful online community as an ubiquitous form of socio-technical systems (STSs) [14] needs, therefore, meticulous and constant attention to different aspects of technical, individual and social layers [62]. Human behavior, in particular, is a multi-dimensional, interactive and sometimes irrational, especially when put into a social context. Moreover, external factors such as new technologies, paradigms and networks require a perpetual adoption of constructs and methods [6].

While early research in this area has been largely descriptive, in recent years there has been a shift toward prescriptive modeling of online communities in particular and STSs in general. The goal of these studies has been to bring a more systematic approach for their design and operation [24; 42] by providing evidence-based and scientific guidance [35].

In this paper, we narrow our focus to (online) production communities1 as an increasingly important type of online community. In production communities (PCs), the primary objective is collecting and/or developing content, with voluntary users as the main explicit2 producer of content. These communities

[1]In this paper, the term "community" represents an online or virtual community, unless explicitly stated otherwise.

[2]This is different from implicit content production, where user activities are captured as content (e.g. in searching algorithms).

aim to accumulate, rate and share information, create digital artifacts, foster innovations and solve problems [25] by utilizing the collective intelligence of voluntary participants.

Since production communities heavily depend on contributions of voluntary participants (users), sustained participation (not necessarily by the same users) plays a crucial role in their success [34]. In many PCs, incentive systems are introduced to attract new users, keep active users motivated and encourage passive users to become more committed. Taking the large number and geographic dispersion of users and the variety of their motives and characteristics into account, introducing effective incentives is a delicate and dynamic process. What is unique about production communities in contrast with other types of online community is the salience of content or knowledge within their scope. An effective and dynamic incentive system should address various aspects pertaining to user, community, and content in a coherent way. Also, communities change in scope and direction and set different goals and objectives in the different stages of their lifecycle [30] and so do users [52]. All these factors account for the complexity and dynamism of incentive systems.

There is a large body of literature on theorizing incentive systems for different types of communities including discussion forums [10], open innovation communities [22], open source communities [59] and Wikipedia [47; 65]. The key success factor, and at the same time the major challenge for all these different types of PCs, is their ability to enhance interest and drive users to participate and contribute more frequently, consistently and in alignment with the community's goals and norms. There is, however, no conceptualized framework to theorize on general design flow of incentives that can be indiscriminately applied to all different types of production communities. This paper is dedicated to providing a comprehensive literature review on established theories and best practices for different types of production communities pertaining to user participation and incentive systems.

For this purpose, we try to conceptualize existing relevant theories, approaches, and features from the vast but disperse practices and findings into a comprehensible and concretized integrated framework. Our intent in this exploration is to address underlying differences as well as similar patterns in different types of PCs that are relevant to user participation and the role of incentive systems. Various influential factors including user desires and characteristics, user intrinsic values and community features (goals and lifecycle) are studied with a scientific canon. Based on this integrative framework, relevant theories and appropriate concepts are drawn and synthesized from relevant disciplines including psychology, sociology and economics in order to construct a design cycle for implementing, operating and adopting incentive systems. We hope that the findings will shed light on recent discoveries in designing successful incentive systems and help explain the interdependencies and intricacies in this area. The outcome may also pave the way for future research endeavors on other relevant aspects of STSs.

Our study is structured as follows: first we provide a generalized definition of production communities and their characteristics. Then, we outline an integrative framework that surfaces the general determinants of their incentive systems. In the next section, based on the proposed integrative framework, the implicit and explicit incentives and objective of incentive systems are discussed and drawn upon to conceptualize a design cycle for target-oriented incentive systems with clear steps and guidelines. We conclude the paper with a discussion of our findings, open issues and implications for future research and practice.

2 Theoretical Framing

2.1 Research Context: Production Communities

Communities can generally be distinguished by following an approach based on users' needs, such as socialization, gaming, content or knowledge sharing, activism, development and exchange [27]. The communities of interest in this study are PCs, which have the primary goal of accumulating and sharing user-generated content. There are various types and terms in the literature to refer to PCs including open content projects [9], web-enabled collective intelligence systems [42], social computing systems [50], peer production communities [63], open source content projects [49], community-driven knowledge sites [33] and social media [28]. We chose the term production communities inspired by the definition provided by Oreg and Nov [49] and Wilkinson [63], emphasizing the crowdsourcing of content.

Considering this broad definition, a few well-known community types can be distinguished based on the type, form and collectivity [48] of content. One study divides PCs into three primary categories of collaborative, creative and competitive communities [69]. In collaborative communities, content can be developed collaboratively and by more than one user. The type of content that can nowadays be created collaboratively is not limited to text and ranges all the way from knowledge generation (e.g. Wikipedia) to architectural sketching, product design, movie making and geographical maps [17]. In creative communities, however, each user is basically the "owner" of his generated content and the other members may only contribute in the form of comment (discussion), ratings, recommendations, and other auxiliary forms. Competitive communities, as the name suggests, consist of short-lived competitions with specific topics (e.g. product design, innovation ideas, etc.).

2.2 Individual Motivation

The term motivation has been used in the literature very loosely, and we therefore propose a distinction between *encouragement* or *enticement* (users motivating each other) and *motivation* (internal drivers to participate based on personal desires, values and traits). In literature, motivation been has primarily divided into two general types: intrinsic motivations and extrinsic motivations, although some scholars further divide extrinsic motivations into internalized extrinsic and purely extrinsic ones [59].

There is no certain verdict regarding which type of motivation is generally of more importance. Some theories on individual motivations for participating in online communities have been mainly geared toward putting more weight on external motivational factors as the main drivers [39], whereas other empirical findings suggest that intrinsic and particularly enjoyment-based intrinsic motivations are, after all, the dominant driver [36; 56; 61]. What is certain is the weight or importance of each motivation with regard to the behavioral characteristics of users and the goal of the community. This suggests that designers should understand the personal interests of different groups of users to be able to provide suitable incentives that are aligned with each group's internal and external motivations [40]. Here, observing users' behavior from a motivation perspective is best suited for a descriptive approach to justifying their participation. A design-oriented view of the behavior should tap into the distinction between various motivations to be able to provide suitable incentives. This has been made possible by applying theories such as self-determination theory [20] or the Reiss's theory of 16 basic desires [54]. These theories try to find autonomous causality between people's desires, motivations and actions.

2.3 *User Participation and Basic Desires*

To distinguish between different kinds of motivation and address those differences to introduce the most effective incentives, individual preferences based on personal needs provide a potent theoretical ground. Accordingly, Reiss [54] proposed the theory of 16 basic desires based on psychometric research. His widespread theory suggests that all fundamental desires can exist with different strength at different times in different individuals. This implies that any incentive utilized in order to boost personal motivations or encourage users to take actions should be observed in a more holistic context, with time-dependent and personalized variables, to prove effective. According to his theory, individuals behave in ways that is appealing to both reference group members (community) and their own desires of affiliation and power [60]. We derived seven primary user desires that are relevant to the context of production communities: *self-importance*, *self-development*, *fun*, *vindication*, *socialization*, *group identity* and *uniqueness*. Table 1 shows how we identified these seven desires.

<table>
<tr><th>Intrinsic feeling/motive</th><th>Pertinent desire in PCs</th><th>Remark</th></tr>
<tr><td>- Efficacy/power
- Freedom/ Independence</td><td>Self-development</td><td>The same. Self-development is a more common term in the literature [49].</td></tr>
<tr><td>Self-importance/ Status</td><td>Self-importance</td><td rowspan="2">Uniqueness is a well-known desire in online communities[15] and can be derived from self-confidence and self-importance motives. It is distinguished from self-importance, since it emphasizes the individual aspect, whereas self-importance can be achieved as part of a bigger group (e.g. via status)[29].</td></tr>
<tr><td>Self-confidence/ Acceptance</td><td>Uniqueness</td></tr>
<tr><td rowspan="2">- Fun/social contact
- Wonder/Curiosity</td><td>Fun</td><td rowspan="2">Socialization, as an important motivation in online communities [46],though not explicitly mentioned, is a part of “fun” in Reis’s basic desires.</td></tr>
<tr><td>Socialization</td></tr>
<tr><td>Vindication/ Vengeance</td><td>Vindication</td><td>The same. Especially important in competitive production communities [7].</td></tr>
<tr><td>Loyalty</td><td rowspan="3">group identity</td><td rowspan="3">Loyalty, compassion and love were merged into “group identity”, a well-known desire in online communities[63].</td></tr>
<tr><td>Compassion/ Idealism</td></tr>
<tr><td>Love/family</td></tr>
<tr><td>Ownership/ saving</td><td>X</td><td>Not relevant</td></tr>
<tr><td>Stability/order</td><td>X</td><td>Not relevant</td></tr>
<tr><td>Lust/romance</td><td>X</td><td>Not relevant</td></tr>
<tr><td>Vitality/physical exercise</td><td>X</td><td>Not relevant</td></tr>
<tr><td>Satiation/eating</td><td>X</td><td>Not relevant</td></tr>
<tr><td>Safety/tranquility</td><td>X</td><td>Not relevant</td></tr>
</table>

Table 1 Deriving primary desires in production communities from Reis's 16 basic desires

We hypothesize that the more desires of users an incentive system can successfully address and support, the more effectively it can motivate them to participate. In the next section, we draw on these findings to conceptualize a generic and target-oriented design model that respects the identified dynamics and can be applied to all types of production communities.

3 Theorizing a Generalized Target-oriented Design Cycle for Incentive Systems

As discussed in the last section, constant observation of contextual and individual factors and appropriate reactions to inevitable changes throughout the lifecycle of a community are essential for designing a successful incentive system. For this reason, the design process of incentive systems can be regarded as a never-ending cycle. In this cyclic design process, the objectives of a community should be defined and redefined according to the confronted challenges and current needs of a community and its users. Then, based on the addressed desire(s), the selected incentive for achieving these objectives should be applied to the right users in a personalized way. Incentives are then to be selected and prioritized. This design cycle is demonstrated in Figure 1.

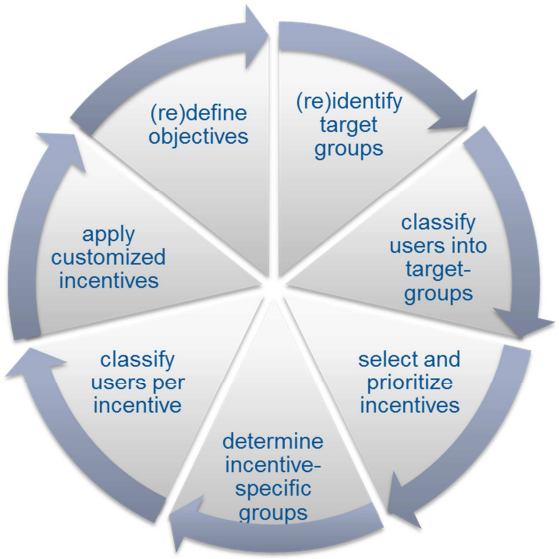

Figure 1 Designing a target-oriented incentive system

Next, we provide a short description of each step in the proposed design cycle.

3.1 Design Steps

3.1.1 Defining Objectives

Incentive systems can embrace certain objectives at different stages of a community's lifecycle. Their objective is sometimes directly aligned with the community's objectives [13] and sometimes with a temporary goal to overcome imminent problems. For instance, while encouraging timely contributions is a persistent goal in open media communities, it can be adapted temporarily in open file sharing communities to regulate data traffic [57]. Some general objectives are, for example, increasing *user attraction and enjoyment*, encouraging *timely contributions*, enhancing *content quality*, increasing *content quantity*, increasing *metacontent*[3] *[67] quantity*, *discouraging excessive contributions* and *promoting presence* (e.g. reading, navigating, distributing content or taking part in elections).

3.1.2 Determining Target Groups

Many seemingly sound approaches fail when they are applied to certain groups, since they are not tailored based on user needs and preferences (reflected in their activity pattern) and therefore prove to be psychologically invalid [16]. In order to be able to select incentive features or prioritize one objective over the other for each group of individuals, it is first necessary to determine the target groups based on the objectives of the system and contextual factors (contribution context). For example, Prieur et al.[53] suggest that Flickr users can be categorized into three groups with regard to their activities: those who focus on socialization around the content, those who focus on socialization regardless of content, and those who focus on content without socialization. These groups often have different desires, motivations and contribution patterns and, as a result, react differently to the same applied incentives.

[3] metacontent refers to socially-generated metadata aimed at providing supplementary information for an item (content) to enhance its quality or to add new perspectives to it (e.g. tags, ratings, votes, comments, etc.).

3.1.3 Classifying Users into Target-Groups

Assigning users to the right behavioral group can be achieved through various approaches depending on the available resources, contribution context and the heterogeneity of users. One approach to classifying users is to explicitly measure user values and preferences via a questionnaire upon registration or as an optional feature in user profiles [64]. Another approach is to use software agents to implicitly gather user preferences by monitoring their activities [21] and extract certain patterns. It should be noted that although the first approach is more accurate and transparent, it may impose a cognitive burden on the users [45]. Also, it does not take gradual changes in user behavior into account. A thorough exploration of these techniques and their advantages and disadvantages is outside the scope of this paper.

3.1.4 Selecting and prioritizing Incentives

After establishing the primary objectives and identifying the right target-groups, it is time to select and prioritize suitable and relevant incentives. The critical question for community designers or operators is what kinds of incentives would be most likely to have a positive effect on a certain target-group to achieve the determined objective(s). Most incentives utilize certain primary desires (or motivations) of users. This provides the opportunity to select incentives and apply them accordingly. For example, in open source software development communities, self-development, socialization and group identity are primary user desires [49; 59]. This information can be used to identify and provide possible incentives (e.g. “systematic feedback mechanisms” or “self-evaluation tools”).

Here the distinction between content and metacontent is of great importance. Many studies show that not only is the significance of each of them different with regards to the stage and objective of a community [31], but also that users show diverse attitudes and priorities toward contributing content or metacontent [49; 55]. Supplementing additional information to existing items is in part a personal act (e.g. to structure a user’s own collected content) and partly a social activity targeting other users [1]. This implies that the tendency to contribute metacontent depends strongly on user characteristics.

Here, a word of caution on the effect of monetary awards on the quantity and quality of user contributions is also necessary. In certain community types, where strong intrinsic motivations such as enjoyment or altruism prevail (represented by desire for fun, uniqueness and self-importance), monetary awards can have devastating effects. In psychology, this trade-off between extrinsic incentives and intrinsic motivations has been referred to as "the corruption effect of extrinsic motivation" [18] or the "hidden costs of reward" [38]. In economics, this effect has been known as "crowding-out[4]" [19]. Two theories from knowledge sharing in organizations can be drawn relating to this matter. Kelman [32] argues that monetary rewards can secure merely temporary compliance, and Meyer [44] points out that mismatches often exist between employees and management as to how appropriate such rewards are. Non-monetary rewards, on the other hand, like social recognition or memory gifts, can be extremely powerful incentives, especially when they are public, credible, infrequent and culturally meaningful[37].

3.1.5 DeterminingIncentive-specific Groups

Determining certain group of users can also be carried out for specific incentive practices. If an incentive is focused on fulfilling certain desires (e.g. self-development), it is only effective when

[4]As opposed to “crowding in”, where an external intervention has a positive effect on intrinsic motivations.

applied to users who possess and/or value those desires. For example, if socialization is the sole desire of a user to participate in an open source project, then emphasizing his achievements (to support self-development) may not be as effective or may even prove unproductive (see [11] for an example of the negative effect of an incentive on a certain group of users). Furthermore, each incentive can be customized based on the characteristics of its target users. For example, for "thank you notes", the formulation of the text or the color of the message may vary for different genders or ages. The gender of users is believed to determine their perception of features [3] or preferred form of communication or layout [23].

3.1.6 Classifying Users into Incentive-specific Groups

This step is very similar to the third step, where users were classified based on the alignment of their desires and activity patterns with the objectives of the incentive system. There are few incentive practices that can be effectively applied to all users in the same form and style. Formulation and presentation of incentives is of great importance [5] and can be performed based on characteristics of users (e.g. gender, age, level of education, etc). Even for the same user, there might be a need for certain incentives to be presented differently on different occasions. User salutations, invitations to contribute, "thank you" notifications, content or activity recommendations, socialization functions, etc. can all be personalized based on user characteristics and customized according to the frequency of use. Moreover, customization can also be practiced for content presentation, layout and hyperlinks [51]. Users can be persuaded to be more committed by changing the way they interpret their environment and see their desires fulfilled.

How an incentive can be further adapted and customized depends on the situation and form of the incentive. If the customization is based on gender, age or other explicit attributes, the classification is relatively simple and can be performed based on the profile information of users. It should be noted that designing a user profile that captures salient information without overwhelming users is a delicate matter. The requested information should correspond to and be meaningful within the given context [4].

3.1.7 Applying the Customized Incentives

The last step is the application of the customized incentives. Keeping track of the activities of users after applying the incentives may help the operators gain more insight about the effectiveness of those incentives. Moreover, if an incentive proves ineffective for a certain user or group, the target-group can be redefined in the next cycle. In case introducing an incentive does not yield the expected outcome, it can be removed or modified to decrease the cognitive burden on users.

The proposed design cycle can summarized as follows: The objectives of the incentive system and the target groups are determined with regard to the characteristics, goals and lifecycle of the community and users. A list of relevant incentives should then be compiled and prioritized. Thereafter, for each incentive the possible customizations are determined and the target users are classified into corresponding groups. The incentive(s) are ultimately customized and applied. This cycle is ongoing and the target-groups and incentives can be modified based on the observed outcomes.

Taking the generic and target-oriented nature of this design cycle, some steps may be removed or adjusted depending on the context, importance of the incentive system and available resources. We end this section with two examples from the literature, one depicting a target-oriented incentive and the other an adaptive and personalized one.

3.2 Empirical Examples

3.2.1 Target-oriented Incentives: MovieLens

Social comparison is a well-known incentive in online communities. In this practice, users are informed about their contribution compared to other users. In *MovieLens,* a community for evaluating and recommending movies, Chen et al. [11] applied this incentive to observe its effect on increasing participation (the defined objective). The incentive was not initially aimed at a specific target-group and all users were notified of their contribution compared to the median of all users. When the results were studied, only those who were below or near the median increased their contribution while the contribution of those above the median was decreased significantly (by 60%). In the next cycle, users were classified into two groups (with contributions above and below average) and the incentive was applied only to the less active users.

3.2.2 Adaptive and personalized Incentives: Comtella

Reward mechanisms based on user reputation is another popular method for boosting participation [66]. In a project called *Comtella,* in which students can share articles related to weekly topics, Cheng and Vassileva [12] designed an adaptive reward mechanism to achieve two main objectives: encouraging timely participation and discouraging excessive (and often low-quality) contributions. The rewarding was performed based on previous contributions of users and the time of contribution. Their personalized incentive led to a sustained increase in the quality of contributions [58].

4 Conclusion, Implications and Litmiations

This paper aimed to review and synthesize the literature on user participation and incentive mechanisms and theorize a generalized design cycle (model) for incentive systems in PCs. With the perspective that we have outlined in this paper, most incentives are not general measures to increase participation, but ad-hoc and target-oriented practices to encourage specific activities in line with a set of objectives. Designing incentive systems, selecting the right incentives and applying them to the suitable target group in a proper and personalized format takes into account various dimensions including users (their characteristics and activity patterns) and community (its characteristics, goals and lifecycle). We focused on PCs as an increasingly popular type of STS [62] with the focus on content being the unique and salient attribute. The main objective of PCs is to produce high-quality content (e.g. text, source, audio or video files, designs, etc.) by maximizing user participation in the community-related processes [66]. The extant interdisciplinary research was organized around an integrative framework that focuses on user desires, characteristics and activity pattern as well as community characteristics, lifecycle and goals to address user participation and applied incentives (see **Error! Reference source not found.**). We explored and drew upon pertinent theories from psychology and sociology to address human behavior regarding the production of content as public goods and establish a sound theoretical foundation for our proposed design model for dynamic, personalized and multi-dimensional incentive systems.

Our review shows that a narrow focus on incentive systems can be misguided and misleading. Designing incentive systems should be carried out by a holistic consideration of user-related and community-related factors. In particular, the dynamic nature of both users and communities that is reflected in users' evolving activity patterns and a community's lifecycle should not be underestimated.

Furthermore, our review reveals that significant exploratory research and theoretical development has occurred in this area, but mostly in the context of a specific type of community (e.g. open source development) and thus there is still a paucity of research providing clear and generalized prescriptions for effective incentive systems. From a practical perspective, by providing an intellectual basis, this framework helps community designers press forward with concrete steps toward addressing different pertinent dimensions when designing incentive systems. It also assists community operators to refrain from harmful practices and motivate users in an effective way.

The theorized design model extends the current body of research by accumulating and merging the academic findings from different types of communities into a unified design cycle with generic guidelines that can be modified and applied to all types of production communities. Each and every incentive is employed to address at least one of the primary personal desires: self-importance, self-development, fun, vindication, socialization, group identity and uniqueness. Studying the incentive from the perspective of user desires helps in their selection and prioritization in accordance with the overlap of the users' prominent desires and the desires an incentive is intended to fulfill or trigger. This approach points the way for researchers to give further consideration to general and multilevel issues as they study user participation and incentive systems.

Our work makes two principle contributions. Theoretically, it provides a more detailed understanding of user participation and interdependencies between various incentives with a focus on user desires. It also suggests the possibility of categorizing incentives based on primary desires that they address and applying them to only those groups of users with the same desires. Practically, the results of this study may be used by online community designers and operators as a knowledge framework and guideline to situate design choices to aptly select and prioritize the best possible incentives with regard to user characteristics and activity patterns (particularly towards content or metacontent generation) as well as community characteristics, goals and lifecycle. We believe that this conceptualization will help community designers move from ad-hoc speculation to a predictable and sustainable approach when designing an incentive system.

4.1 Practical Implications

One practical implication of the current research concerns the combination of incentives. Incentives are believed to not act in an additive fashion [2]. Interactions between different incentive approaches can sometimes culminate in the mutual neutralization of their motivational effects. Therefore, applying more than one approach should be performed carefully or gradually so that the effects can be observed and measured.

Regarding monetary awards, effective incentive systems are often a hybrid of economic incentives and social motivators. Economic incentives are less effective or possibly even counterproductive when they contradict intrinsic motivations such as altruism, fun, ethical norms or other known social preferences [8]. Also, an under-compensation may result in a decline in contributions [43]. For this reason, even in competitive communities, economic incentives such as monetary payments should be applied with the greatest of care and consideration to avoid any negative side-effects.

Increasing the contribution of content without sacrificing quality is another concern when applying incentives in practice. The desires of a user may be related to the impact of incentives. For example, it has been shown that users who enjoy helping others tend to focus on quantity rather than quality and that users with a strong self-development desire care more about the quality of their contributions [41].

How to apply certain incentives to a specific group of users with particular desires is no easy question and should be pondered with an understanding of the characteristics of the target community and users.

Whether or not to consider memory for incentive systems is another design decision that needs to be addressed. Incentives can “learn” from the past reactions of a user and employ specific incentives correspondingly. For example, if applying a specific incentive does not affect the contribution of a user, it might not be wise to apply the same incentive repeatedly in the future. This, however, adds another dimension to the system and increases its design complexity.

4.2 Limitations

There are vast research opportunities in all areas covered in this study to extend our theorizing. For example, the weight (importance) of the identified implicit motivators in each type of production community needs further investigation.

Also, proper customization of incentives based on user characteristics is another open issue in practice. Practical research on this matter has usually focused on one particular type of community with specific characteristics. User behavior can change depending on contextual factors including the age, language, gender or national culture of the majority of users [34]. Some studies have shown that even the gender of users can be a decisive factor with some incentive practices such as social comparisons [26]. Moreover, while true dynamic and multi-dimensional incentive mechanisms might be ideal in theory, they may prove too complicated to implement within a reasonable time and budget, especially for new and rising communities.

Another area that requires further scrutiny is the alignment of primary desires with the objectives of an incentive. Some desires can be intuitively assumed (e.g. leaderboard addresses the desire for self-development, uniqueness and self-importance). However, identifying the right primary desires and their respective weights might be arduous for certain incentives, especially for less clear and subjectively defined desires such as fun.

Another shortcoming is that most of the research is undertaken on successful and popular communities that have passed their rising stage. This generality might instigate problems when it comes to providing and weighting certain incentives in a particular context. Failed communities or successful communities that cannot sustain user participation and die out (e.g. Google Answers) deserve more academic scrutiny. Shedding light on failed practices can elucidate critical issues and challenges that can trigger the demise of a community, if not properly handled.

Determining target groups of the incentive system and an acceptably precise classification of users is also a great challenge in practice. First, defining the right number of target groups with fine distinction is a delicate matter; next, assigning users to the right category is not trivial. The question remains as to how effectively classification of users can be carried out without imposing too great a cognitive burden on them. This calls for future research on providing answers for a systematic detection of users’ desires.

Implicit incentive or motivational factors were also outside the scope of this paper. Implicit factors are embedded in the design and operation of a community and its culture. These factors include but are not limited to the quality of site, quality of content, community sponsorship, content ownership or authorship, leadership, and issues such as privacy and security [68].

In conclusion, our work provides a clear and generalized framework for scholars and design steps for community designers and invites them to recognize the dynamic, interdisciplinary and personalized

nature of incentive systems. We believe our findings provide an intellectual basis in support of designing dynamic, target-oriented and personalized incentive systems for production communities and suggest new venues for future scientific endeavors.

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