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CONTROLLING THE OPEN CONTENT CREATION PROCESS: AN ANALYSIS OF CONTROL MECHANISMS USING THE REPERTORY GRID METHOD

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Abstract

We develop a governance framework for open collaboration, specifically for the process of collaborative content creation. Our analysis is based on in-depth interviews with 12 active Wikipedians using the repertory grid method. The framework reflects the governance of wiki-based peer production by identifying the different structures, processes and mechanisms which guide and control the contributions and activities of individuals. Our findings concerning the driving principles for successful governance recognize four such principles: the power of the many, the influence of the few, the role of (persistent) conversations, and the value of rules.

Keywords: open collaboration, wiki, Wikipedia, governance, repertory grid

1 Introduction

One of the most significant facets of the web 2.0 phenomenon is the concept of open content creation. Open content creation describes the preparation and publication of information based content in a format that explicitly gives everyone read/write access. Content is created by multiple individuals who collaboratively contribute through adding, editing, formatting or referencing. It is an open process as anyone with access to the Internet can contribute to the content. Open content creation is frequently based on a wiki platform – a read/write web and software that allows anyone to update everyone else's content (O'Reilly, 2005). Wikis have become the prime facilitator for this form of open collaboration. The number of wiki-sites has considerably increased in the last years, which confirms the viability and success of the open collaboration movement (Shah).

While there are numerous examples of successful open collaboration, whether in the form of open content (e.g. Wikipedia.org), or open source software (OSS) (e.g. Linux), it is not without controversy. Critics point to a lack of oversight, a lack of a single responsible party, participation without participant vetting, and threats of vandalism as key weaknesses (Schiff, 2008). Several authors (e.g., Larry Sanger (2004)) have explicitly warned against the open collaboration principle and have called for more stringent control mechanisms to ensure the integrity of the collaboration process and the quality of the collaboration outcome. In fact, widely publicized cases, such as the demise of the LA Times Wikitorial (Glaister, 2005) and cases of abuse of Wikipedia for positive spinning or derogatory activities for commercial or political interests (Erickson) have provided fuel for critics. The open principle of public Wikis as one of the key features of the open content creation movement seems to be its largest threat.

Yet, despite these high-profile incidents, the open content creation movement continues to flourish. Even without explicit access control and centralized oversight, wikis have thrived and thwarted the challenges. One of the key success factors which allows wikis to thrive are the particular 'light' governance mechanisms which have emerged and which control and guide the activities of their users. Jimmy Wales, the founder of Wikipedia, (personally interviewed by one of the authors) has stressed the importance of social governance which is based on equality among contributors and a large group of well-meaning participants who protect this site against a few vandals. Nevertheless, even Wikipedia saw it necessary to tighten its controls as the site grew significantly larger, more authoritative, and therefore more interesting to potential vandals (Silverthorne, 2007). It appears that the emerging governance is critical for the development and success of open content creation. Investigating these governance phenomena has the potential to create a better understanding of the underlying mechanisms and the success of open content creation.

The present research seeks to explore the governance phenomenon in wikis and thereby helps to build a theoretical foundation of governance in the context of open content creation. At this point, very little is known about governance of open content creation processes and particular calls for research have been highlighted (eg. Parameswaran & Whinston, 2007a, 2007b). Our objective is to investigate the explicit and implicit mechanisms which govern the content creation process and to determine the relative importance of these governance mechanisms. We based our investigation on the English language Wikipedia

(en.wikipedia.org) and employed the *repertory grid technique* (Tan & Hunter, 2002) (explained in detail below) to extract shared concepts of governance from a group of experienced contributors.

The remainder of this article is organized as follows. We first discuss the theoretical framework underlying governance and its study in information and communication technology (ICT) facilitated communities. We then explain repertory grid analysis and its usefulness in the context of our study. This is followed by a description of the analysis and a presentation of the findings. The findings and their underlying principles are discussed, and venues for future research into the governance of collaborative content creation are provided thereafter.

2 Literature review: Governance in the wiki-context

The governance phenomenon is rarely conceptualized in a wiki context. In this section we therefore explain governance and its underlying theories, before focusing on governance research within the context of open collaboration in general and the wiki-context in particular.

2.1 Established modes of governance

Traditionally, governance has been examined within an agency theoretical framework as it describes the mechanisms which control and guide commercial interactions. Williamson (1999) identified governance as “a means by which to infuse order in a relation where potential conflict threatens to undo or upset opportunities to realize mutual gains” (p. 1090). Arguing from a transaction cost perspective it is the objective to establish a governance mode which minimizes the control and coordination costs associated with the provision of goods and services (Coase, 1937). Hence, a governance structure is established as an explicit or implicit contractual framework within which each transaction is located (Demil & Lecocq, 2006), thus reducing uncertainty and transaction costs. Traditional economic theory distinguishes hereby between hierarchies (based on formal contracts and high control) and markets (based on few control mechanisms) as two major modes of governance (Watson et al., 2005). While markets and hierarchies characterize classical modes of governance, changes in business practices have led to the identification of the network as a third governance mode (Ulhøi, 2004). Network governance describes a hybrid mode of governance identified by an intermediate level of control. Control emanates from defined relationships which are partially formalized but not tightly bound as in a hierarchical context.

Together, market, hierarchies and networks are widely used as theoretical lenses to characterize control environments and to analyze the activities of individuals and organizations which operate in these environments (eg., Powell, Koput, & Smith-Doerr, 1996).

The recent proliferation of peer production activities (Benkler, 2002) challenges the applicability of established governance theory and has led to the notion of an additional governance model, *bazaar style governance* (Demil & Lecocq, 2006). Governance in peer production environments distinguishes itself from markets, hierarchies or networks: Individuals contribute to projects without an explicit employment-like relationship. They may be part of a hierarchy (in OSS, for instance), but it is not a formal one, and compliance with rules is frequently not enforceable. No monetary rewards are offered for contributions and therefore price does not guide the activities of individuals as suggested by a market model of governance. Without enforceable contracts or monetary exchanges, the network governance model also does not apply to the peer production process (Demil & Lecocq, 2006). Bazaar style governance illustrates the theoretical environment of peer production platforms (Raymond, 1999): control and oversight is largely provided through social interactions with limited formal hierarchies, a low level of defined relationships and a lack of direct reward mechanisms.

2.2 Governance elements in the wider open collaboration domain

While only few studies focus on governance in the context of open content creation, governance research in the OSS domain has identified a range of formal and informal mechanisms which control and guide the software production process. Formal mechanisms describe the explicit structures and processes which govern the software development process and associated activities. Studies have focused on roles such as project leaders (Rossi, 2006) or core groups (Sharma, Sugumaran, & Rajagopalan, 2002). Also, decision making processes as well as sanctioning processes, such as locking and banning, have been identified as viable governance mechanisms (Osterloh & Rota, 2004). Among the informal governance mechanisms which have been identified in the OSS domain, are aspects of social pressure and collective sanctioning (Sagers, Wasko, & Dickey, 2004), as well as informal leadership as important sources for control and guidance (Bonaccorsi & Rossi, 2003). Other studies have pointed to the role of shared rules, norms and communication protocols, which help contributors to coordinate their activities (Bonaccorsi & Rossi, 2003). Today's

understanding of open software creation acknowledges that both informal and formal governance mechanisms work hand in hand in order to control and guide the software development project.

While OSS and wikis share open access and collaboration characteristics there are also a couple of differences which might impact the way the governance mechanisms emerge. Differences include the exclusivity in OSS where few people have the authority to change the code (since programming is a high-skill activity, low performers potentially destroy value). Also, a strong hacker cult has been observed in the OSS environment which facilitates the development of social norms and accentuates the impact of sanctioning (Rossi, 2006). A much larger diversity of individuals contributes to wiki-platforms, which might impact the development of social norms as viable governance mechanisms. Other differences between open content and OSS can be found in the outcome of the collaboration product itself: software is brittle (fails to work even if with few or small errors) and requires rigor and coordination in its development. By contrast, contributing to an article does not require particular domain knowledge (e.g., correction of grammar), and the result can still be interpreted and be useful in spite of some content mistakes. Even though both peer production domains share a range of similarities, they also contribute with inherent differences which might impact the emergence of the governance phenomenon.

The particular circumstances of governance in the open content creation process have started to become acknowledged. Moreover, a number of relevant studies have emerged which are focusing on formal roles, policies and system features. Even though content in public wikis is developed by common editors (anonymous or registered), additional formal roles have been established to provide a level of oversight. An example is the role of the Administrator (Sysop) in Wikipedia which provides users with advanced privileges and access rights. Forte (2008) has argued that these formal roles not only resemble different hierarchies but that they are also linked to the social status of the respective members in the community. Ortega (2007) identified that Wikipedians associated with these roles do not necessarily stand out for the contributions to content but are often users whose activities contribute to the overall sustainability of the community.

A range of formal policies and guidelines have been identified as viable governance mechanisms in the open content domain. Studies investigating Wikipedia have highlighted several policies which have a particular impact on the content creation process. The *Neutral*

Point of View (NPOV) policy, for example, spells out the requirements for the creation of unbiased content (Roth, 2007). The *Three-revert* policy specifies the extent to which contributors can undo changes from other editors (Kriplean, Beschastnikh, McDonald, & Golder, 2007). Policies are used as references in negotiation processes among contributors and therefore facilitate the consensus seeking among Wikipedians (Kriplean et al., 2007). However, it has been also observed that the large number of policies have an intimidating effect on would-be participants (Silverthorne, 2007). In addition to roles and policies, other authors point to systems features of wiki-platforms as important governance tools. Viégas (2007) identified polling mechanisms, watch lists, templates and public documentation tools as features which help to guide and control wiki-based activities. These features create a transparency of the entire content creation process which significantly contributes to the sustainability of the community.

The literature on governance of open content creation has started to develop but is still in its initial stages. With a few notable exceptions (eg., Forte & Bruckman, 2008) the wiki based governance literature tends to focus on exceptional cases to investigate the governance phenomenon, such as the development of featured articles (Viégas, Wattenberg, & McKeon, 2007) or heavily discussed articles (Kriplean et al., 2007). While the focus on exceptional cases provides valuable insights, it does not take into account that the development of the majority of articles does not follow such exceptional trajectories, but instead follows ordinary steps in its development. Consequently, in order to more fully understand governance of open content creation, it is necessary to expand the range of cases and consider the diversity of situations commonly encountered in the content creation process. Adding to this broader understanding is the purpose of this research.

3 Research methodology

With this research we seek to explore the governance mechanisms which control and guide the content creation process on open collaboration platforms. The following questions guide our investigation:

- Which mechanisms govern the creation of collaborative content?
- Which of these governance mechanisms are perceived as the most important for the development of collaborative content?

Considering the scarcity of research on governance in open content creation, the present investigation is exploratory in nature, intended to develop a governance framework instead

of testing or extending established theory. The repertory grid technique has been identified as a methodology well suitable for the exploratory focus of our work.

3.1 Using the repertory grid technique to investigate governance mechanisms

The repertory grid technique seeks to elicit underlying cognitive constructs from individuals who are actors with respect to the phenomenon under investigation. The repertory grid technique (RPT) is thought to elicit underlying concepts in an “uncontaminated” way (Alexander & van Loggerenberg, 2005, p.195), whereas surveys or traditional interview techniques may constrain or direct responses of participants. The RPT is therefore considered highly suitable for framework elicitation. Data collection follows a systematic process where participants use labels (constructs) to characterize instances of the phenomena under investigation (elements). Data analysis focuses on identifying patterns among these individual constructs as the basis for a shared understanding of the investigated phenomenon.

The repertory grid technique has been successfully used in the IS domain to investigate the skill-sets of successful project managers (Napier, Keil, & Tan, 2007) or perceptions of expert users (Davis & Hufnagel, 2007). Tan and Hunter (2002) have reviewed IS based studies using the RPT and concluded that it is a valid and useful method whose focus on actual experiences and perceptions of individuals contributes to the relevance of IS research. Based on its demonstrated validity and its suitability for our research task, the repertory grid technique became our choice for this exploratory research. The specific steps of our data collection and analysis are described in the following section.

3.2 Data collection and analysis

Our goal was to investigate the governance mechanisms of open content creation based on the English-speaking Wikipedia (en.wikipedia.org). To achieve this end, we selected twelve experienced Wikipedians for individual repertory grid interviews (Crudge & Johnson, (2007) recommend at least ten participants, mainly to achieve closure or “saturation” (Moynihan, 1996) in the identification of new framework concepts). A criterion based selection strategy was employed to assure a high level of experience among the participants (Miles & Huberman, 1994). Participant selection was based on the following criteria: 1) active involvement with Wikipedia for more than one year; 2) substantial contributions to more than six articles, 3) recent contributions (within the past 5 months). To obtain access to a diversity of users, interviewees were identified through their co-authorship of a variety of articles.

Following established practice of the minimum context variation of the repertory grid method (Hunter, 1998), participants nominated six articles (elements) they had actively contributed to. Active contribution involves at least five individual contributions either to the article or its associated discussion pages. We asked for nominating relatively stable as well as more controversial articles to ensure variety and to enable richer construct creation (Napier et al., 2007; Tan & Hunter, 2002). Other authors also included the notions of ‘ideal case’ and ‘worst possible case’ as the seventh and eighth element into the selection of elements to introduce even further variety (Hunter, 1997). However, since no concepts of good or bad governance have been established for collaborative content creation practice, no such elements were included here. Interviewees noted the titles of their articles on note cards to provide visual support for subsequent construct creation.

Construct creation followed a triadic elicitation process (Tan & Hunter, 2002): three cards were randomly selected, put side-by-side on the table, and the participant was asked: “with regards to the control and guiding mechanisms, which two of these articles are different from the third?”. The term ‘control and guiding mechanisms’ was used instead of ‘governance mechanisms’ as the pilot test showed that participants better understand this wording. Participants were encouraged to physically separate the note cards, verbalize similarities and differences and to label them (Napier et al., 2007). Labels were bipolar (e.g., discussion on the talk page *did not* impact the development of these two articles – discussion on the talk page *did* impact the development of this article) and included processes, mechanisms or specific tools inherent to the wiki-platform. The labels were entered as constructs into the repertory grid table, and by selecting a new triad of cards, the process was repeated three to four times with each interviewee.

Next, we aimed to determine whether governance constructs (labels) mentioned together with one triad of elements (articles) were also relevant for others. Interviewees used a rating scale from 1 (very little) to 5 (major impact) to express the extent to which each control and guiding construct contributed to the development of the entire range of their articles (element). The rating process thus identified the relative importance of each of the particular governance constructs (following Alexander & van Loggerenberg, 2005; Tan & Hunter, 2002). The first three interviews were conducted face to face, while the remaining were carried out by phone and virtual whiteboard (www.teamskrbl.com) to provide the visual support for construct creation.

The data analysis initially focused on the consolidation and aggregation of the raw governance constructs created by the participants. To minimize the subjective influence, two raters evaluated and aggregated the construct set with consideration of the interview information. To identify the relative importance of the governance construct, the average rating scores (not weighted) for the constructs were determined (Tan & Hunter, 2002).

4 Findings

Twelve repertory grid interviews created a total of 154 raw constructs. After consolidation and aggregation 65 constructs remained, 24 of which were shared constructs (identified by at least two interviewees). Given that governance principles must be shared to have collective impact, only shared constructs were considered further as ‘governance mechanisms’. We confirmed saturation of construct creation (Moynihan, 1996) by determining that no new mechanisms emerged after the ninth interview and repertory grid creation. In fact, the entire set of mechanisms was generated from eight interview responses as all other interviewees contributed either duplicates or unique constructs which were based on idiosyncratic experiences. The observed saturation confirmed the appropriateness of the sample size (Crudge & Johnson, 2007).

4.1 Research question 1: Governance mechanisms for open content creation

Among the 24 constructs, the grid analysis identified 9 formal and 15 informal governance mechanisms (see Appendix). Every interviewee mentioned both formal as well as informal mechanisms and no particular bias among interviewees was identified. The level of agreement ranged from 12 (shared by all interviewees) to 2 for formal methods and from 10 to 2 for informal methods. The most agreed upon methods were *administrator involvement* (formal; agreed by all) and *discussion on talk pages* (informal; agreed by 10).

4.2 Research question 2: Important governance mechanisms for open content creation

The importance of the governance mechanisms was based on the relative importance participants had assigned to the governance mechanisms during the completion of the repertory grid. Each participant, focusing on his or her own governance constructs and Wikipedia articles only, had rated the importance of each construct for each of the six articles. The ratings base varied quite widely, from 12 to 72 articles, as constructs shared by many participants (e.g., administrator involvement) were considered for many more articles than those shared by only 2 participants (see Appendix). The table in the Appendix lists the

ratings which were obtained for each governance mechanism, and shows the distribution of the ratings. As an example, *administrator involvement* (identified by all 12 participants and thus evaluated 72 times (namely, 12 participants x 6 articles)), was rated by participants as 1 (not important) in 41 articles, but also as 5 (very important) in the development of four articles. A considerable spread of ratings can be observed for most governance mechanisms.

To identify the most important governance mechanisms, our analysis focused on the *ratio* of ratings obtained for each article. A rating of at least 4 (important) was used as threshold to identify an important governance mechanism for the development of an article. Governance mechanisms which yielded 50% or more ratings of 4 or higher were then considered as of particular overall importance. Eight constructs were thus identified as important governance mechanisms: individuals with attachment to the article, *experience level of individual users*, *policies*, *discussions on article talk page*, *large number of editors*, *collaboration among users*, *inviting individuals to participate*, *reputation of individual users*.

A comparison between the formal and informal governance constructs shows which group of mechanisms participants considered more or less important. The average importance ratios of the governance mechanisms within each group showed informal governance mechanisms were rated higher than formal governance mechanisms. Hence, on average the informal governance mechanisms were considered to have a higher importance for the development of the article than formal mechanisms (see Appendix).

5 Discussion

The findings suggest a combination of four principles underlying the governance of open content creation: (a) the power of the many, (b) the influence of the few, (c) the role of (persistent) conversations, and (d) the value of rules. These underlying principles are used here to structure the discussion as they capture the diversity of important governance mechanisms identified in the research.

The *power of the many* describes a principle which has often been referred to in the context of open collaboration processes. Raymond (1999) coined the famous expression underlying the open source principle, also referred to as Linus' Law: "Given enough eyeballs, all bugs become shallow". In other words, if enough "debuggers" are involved, they will eventually identify all faults in the work product. A similar phenomenon has been identified in the context of open content creation where a larger group has been recognized for its

contribution to the development of high quality articles (Kittur, Chi, Pendleton, Suh, & Mytkowicz, 2007; D. Wilkinson & B. Huberman, 2007; D. M. Wilkinson & B. A. Huberman). However, in the context of the open content creation, this principle arises from a narrower quality focus to become a governance principle.

In line with the underlying principle of *the power of the many*, interviewees identified the *number of editors* as an important governance mechanism. In open content development, a larger number of editors impact the article quality by spotting and removing grammatical errors, adding missing references and generally improving an article to an acceptable level, or even reverting acts of vandalism. However, in the open content domain, a larger number of editors also have a direct impact on the development and direction of an article. In particular, highly controversial articles are subject to intensive editing where individuals or factions seek to steer the article into a certain direction. Thus, the resulting article becomes an “equilibrium of points of view”, when no editor seeks to make any further changes, weighing the required effort against the possibility of creating an article that better reflects the editor’s view. Hence, in open content creation, a large number of editors is not only a quality mechanisms but a governance mechanism which controls and guides the development of an article. This identification of the *number of editors* as governance mechanism extends the current view on governance in the open content domain.

The *influence of the few* as the second underlying principle seems to directly contradict *the power of the many* discussed above. However, the relationship between the many and the few is more complex. Wikistats report that Wikipedia contributions are vastly unevenly distributed, with “the few” contributing substantially more than average contributors (Priedhorsky et al., 2007). The influence of the few is also being recognized in other sites, such as digg.com where a small number of community members has a strong influence on homepage content (e.g., Seomoz.org, 2008). Four governance mechanisms identified in this research refer to individuals as a source for control and guidance: (1) inviting individuals to participate, (2) reputation of individual users, (3) experience level of individual users, and (4) individuals with attachment to the article. The apparent contradiction between the role of the many vs. the few becomes less of a contradiction when the range of Wikipedia articles is considered. The power of the many refers primarily to articles with a large group of interested editors. However, the majority of articles do not have such a large number of editors and therefore a few individuals have a strong impact on their development. For such

articles, the level of experience and the reputation of the individual editor becomes a major source of guidance in the development of the article. Interviewees reported that at times editors with particular expertise are even invited to contribute, which may then create a major drive for the development of the article. The current literature has also recognized the influential role of individuals but has mainly focused on formal roles such as administrators (Forte & Bruckman, 2008; Ortega & Gonzalez-Barahona, 2007; Viégas, Wattenberg, & McKeon, 2007). Interestingly, in the present study, participants also pointed to such formal roles but mentioned that administrators would only intervene in exceptional circumstances, and that their influence would be hardly noticeable during the development of the majority of articles. It can be assumed that the deviating interpretation of the role of the Administrator is based on the wider scope of articles considered here.

Persistent conversation refers to the discussions on talk pages which were considered as important governance mechanisms by interviewees. Wikis have two levels on which the participants interact with each other and on which the outcome is negotiated. One level refers to the editing process where people create the actual article (this is where the first two principles apply). The second level of interaction is based on the talk page where contributors discuss controversies, seek information, or coordinate activities. Hence, the conversations on talk pages can become a major vehicle for comparing arguments and creating opinions, thus ultimately directing the development of articles. Discussions remain documented indefinitely, so that contributors joining at a later stage can review previous discussions and understand the direction the article has been taking. This mechanism is also highlighted by Viegas et al. (2007; 2007) as an important governance aspect since it provides the necessary transparency for participants to understand the community processes.

The *value of rules* (principles and policies) describes the fourth principle identified from the review of the important governance mechanisms. The identification of formal rules as an important governance mechanism supports findings from a range of related studies (e.g. Kriplean et al., 2007; Roth, 2007). Despite the diversity of social governance mechanisms, explicit rules remain important for governing and controlling the content creation process. Interviewees explained that the rules primarily help to communicate the standards for editing and interaction among editors. What is particularly interesting in Wikipedia is that the rules themselves are largely a product of the ongoing open content creation process (community created policies) and are negotiated among Wikipedians (Forte & Bruckman, 2008).

Furthermore, rules are mostly enforced through the social system itself as editors quote these rules to each other in order to guide the development of the article. Only in rare occasions are rules used as the basis for sanctions. And, despite being formal, rules as a governance mechanism still seem to be rooted in the informal governance mechanisms which dominate the open content creation process.

6 Conclusion and further research

The present research set out to identify important mechanisms in the governance of open content creation. Governance has been recognized as a crucial phenomenon in a range of research domains but has received little attention in the wiki-context. Wiki-based collaboration constitutes a distinct theoretical environment which can be expected to create a particular range of governance mechanisms. To identify these governance mechanisms, an informative, but little used research methodology was adopted, the repertory grid technique. The RPT was used to elicit governance mechanisms from experienced users through an open and exploratory process. Participants identified governance mechanisms and rated their importance for their own wiki contributions, providing the basis for determining the relative importance of commonly agreed governance mechanisms.

By identifying the range and relative importance of governance mechanisms, the present research has extended the thinking of control and guidance within the wiki context. The choice of methodology has helped to obtain a view of governance from the perspective of the participant with minimal interviewer or method bias. By focusing on a balanced selection of articles instead of targeting only exceptional or controversial situations, the present research has unearthed a broader range of mechanisms, and their relative impact on the governance of open content creation. Considering the prevalence of the informal mechanisms identified in this research, it appears that governance in the wiki-context is largely based on social norms and interaction. Any future governance research should therefore take these informal mechanisms into account.

Even though the choice of methodology and research design put strong emphasis on rigor, several limitations need to be acknowledged. (1) The number of research participants was limited and constrained as to those who could be identified and contacted (cf. many active Wikipedians remain anonymous). (2) Participants were recruited from different subject domains, but only within the English speaking Wikipedia. A larger number of participants and the inclusion of different collaboration platforms may have provided an even more

refined understanding of the governance phenomenon. (3) The range of articles used as elements for construct creation and rating were not directly representative of the range of articles available on the Wikipedia platform. As we asked participants to identify both stable and controversial articles, we may have distorted the selection and still given too much weight to controversial ones, since the number of controversial articles in Wikipedia is in fact not very large (Kittur, Suh, Pendleton, & Chi, 2007). (4) The construct creation process focused on eliciting differences among the governance mechanisms of articles and thus did not necessarily elicit aspects which are common among all articles. Hence, further governance mechanisms might play a role, which have not been identified due to the inherent constraints of the chosen methodology.

However, despite (and perhaps also because of) its limitations, the present exploratory study opens up a range of opportunities for future research. The governance mechanisms identified here may serve as the basis for a governance framework which would allow a systematic comparison and analysis of governance scenarios enabling a range of specific future research projects, such as

- to identify governance situations on different platforms, or across different subject domains, and
- to show how different governance situations affect the quality of the content created.

These future investigations have the potential to create a better understanding of governance and its diversity and importance for the open content creation process.

References

- Alexander, P. M., & van Loggerenberg, J. J. (2005). *The Repertory Grid: "Discovering" a 50-year-old Research Technique*. Paper presented at the SAICSIT, White River, South Africa.
- Benkler, Y. (2002). Coase's penguin, or, Linux and the nature of the firm. *The Yale Law Journal*, 112(3), 369-446.
- Bonaccorsi, A., & Rossi, C. (2003). Why Open Source software can succeed. *Research Policy*, 32 1243-1258.
- Coase, R. H. (1937). The Nature of the Firm. *Economica*, 4, 386-405.
- Crude, S. E., & Johnson, F. C. (2007). Using the repertory grid and laddering technique to determine the user's evaluative model of search engines *Journal of Documentation*, 63(2), 259-280.
- Davis, C. J., & Hufnagel, E. M. (2007). Through the eyes of experts: A sociocognitive perspective on the automation of fingerprint work. *MIS Quarterly*, 31(4), 681-703.
- Demil, B., & Lecocq, X. (2006). Neither Market nor Hierarchy nor Network: The Emergence of Bazaar Governance. *Organization Studies* 27(10), 1447-1466.

- Erickson, D. Wikipedia abuse. Retrieved 2010, January 6, from <http://e-strategyblog.com/2006/01/wikipedia-abuse-sen-coleman-staffer-banned/>
- Forte, A., & Bruckman, A. (2008). *Scaling Consensus: Increasing Decentralization in Wikipedia Governance*. Paper presented at the 41st HICSS, Waikoloa, Big Island, HI, USA.
- Glaister, D. (2005, June 22). LA Times 'wikitorial' gives editors red faces. Retrieved February 12, 2009, from <http://www.guardian.co.uk/technology/2005/jun/22/media.pressandpublishing>
- Hunter, M. G. (1997). The use of repgrids to gather interview data about information systems analysts. *Information Systems Journal*, 7(1), 67-81.
- Hunter, M. G. (1998). *Managing information systems professionals*. Paper presented at the CPR, Boston, USA.
- Kittur, A., Chi, E., Pendleton, B. A., Suh, B., & Mytkowicz, T. (2007). *Power of the Few vs. Wisdom of the Crowd: Wikipedia and the Rise of the Bourgeoisie*. Paper presented at the 25th Annual ACM Conference on Human Factors in Computing Systems (CHI 2007), San Jose, CA. .
- Kittur, A., Suh, B., Pendleton, B. A., & Chi, E. H. (2007). *He Says, She Says: Conflict and Coordination in Wikipedia*. Paper presented at the 25th Annual ACM Conference on Human Factors in Computing Systems (CHI 2007).
- Kriplean, T., Beschastnikh, I., McDonald, D. W., & Golder, S. A. (2007). *Community, Consensus, Coercion, Control: CS*W or How Policy Mediates Mass Participation*. Paper presented at the GROUP'07, Sanibel Island, Florida, USA.
- Miles, M. B., & Huberman, M. A. (1994). *Qualitative data analysis: an expanded sourcebook*. Thousand Oaks, California: SAGE Publications, Inc.
- Moynihan, T. (1996). An inventory of personal constructs for information systems project risk researchers. *Journal of Information Technology*, 11(4), 359-371.
- Napier, N. P., Keil, M., & Tan, F. B. (2007). IT project managers' construction of successful project management practice: a repertory grid investigation. *Information Systems Journal*, 1-28.
- O'Reilly, T. (2005). What is Web 2.0: Design Patterns and Business Models for the Next Generation of Software. Retrieved January 05, 2010, from <http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html?page=1>.
- Ortega, F., & Gonzalez-Barahona, J. M. (2007, October 21-23). *Quantitative Analysis of the Wikipedia Community of Users*. Paper presented at the WikiSym'07, Montreal, Quebec, Canada.
- Osterloh, M., & Rota, S. (2004). Trust and Community in Open Source Software Production. *Analyse & Kritik, Zeitschrift für Sozialtheorien*, 26(1), 279-301.
- Parameswaran, M., & Whinston, A. B. (2007a). Research Issues in Social Computing. *Journal of the Association of Information Systems*, 8(6), 336-350.
- Parameswaran, M., & Whinston, A. B. (2007b). Social computing: An overview. *Communications of the Association for Information Systems*, 19, 762-780.
- Powell, W. W., Koput, K. W., & Smith-Doerr, L. (1996). Interorganizational Collaboration and the Locus of Innovation: Networks of Learning in Biotechnology. *Administrative Science Quarterly*, 41(1), 116-145
- Priedhorsky, R., Chen, J., Lam, S. T. K., Panciera, K., Terveen, L., & Riedl, J. (2007). *Creating, Destroying, and Restoring Value in Wikipedia*. Paper presented at the GROUP'07, Sanibel Island, Florida, USA.
- Raymond, E. S. (1999). *The Cathedral & the Bazaar*. Sebastopol, CA: : O'Reilly Press.
- Rossi, M. A. (2006). Decoding the "Free/Open Source (F/OSS) Software Puzzle: A survey of

- theoretical and empirical contributions. In J. Bitzer & P. Schröder (Eds.), *The Economics of Open Source Software Development* (pp. 15-55): Elsevier Science.
- Roth, C. (2007). *ViableWikis: Struggle for Life in the Wikisphere*. Paper presented at the WikiSym'07, Montréal, Québec, Canada.
- Sagers, G. W., Wasko, M. M., & Dickey, M. H. (2004). *Coordinating Efforts in Virtual Communities: Examining Network Governance in Open Source*. Paper presented at the AMCIS, New York, USA.
- Sanger, L. (2004). Why Wikipedia Must Jettison Its Anti-Elitism. Retrieved January 06, 2010, from <http://www.kuro5hin.org/story/2004/12/30/142458/25>
- Schiff, S. (2008). Can Wikipedia conquer expertise? *The New Yorker*, from http://www.newyorker.com/archive/2006/07/31/060731fa_fact
- Seomoz.org. (2008). Top 100 Digg Users Control 56% of Digg's HomePage Content. Retrieved January 05, 2010, from <http://www.seomoz.org/blog/top-100-digg-users-control-56-of-diggs-homepage-content>
- Shah, S. WikiInterchangeFormat. Retrieved 2010, January 08, from <http://www.usemod.com/cgi-bin/mb.pl?WikiInterchangeFormat>
- Sharma, S., Sugumaran, V., & Rajagopalan, B. (2002). A framework for creating hybrid-open source software communities. *Information Systems Journal*, 12, 7-25.
- Silverthorne, S. (2007). HBS Cases: How Wikipedia Works (or Doesn't). Retrieved January 04, 2010, from <http://hbswk.hbs.edu/item/5605.html>
- Tan, F. B., & Hunter, M. G. (2002). The repertory grid technique: A method for the study of cognition in information systems. *MIS Quarterly*, 26(1), 39-57.
- Ulhøi, J. P. (2004). Open source development: a hybrid in innovation and management theory. *Management Decision*, 42(9), 1095-1114.
- Viégas, F. B., Wattenberg, M., Kriss, J., & Ham, F. v. (2007). *Talk Before You Type: Coordination in Wikipedia*. Paper presented at the HICSS 2007, Hawaii, USA.
- Viégas, F. B., Wattenberg, M., & McKeon, M. M. (2007). The Hidden Order of Wikipedia. In D. Schuler (Ed.), *Online Communities and Social Computing* (pp. 445-454). Berlin: Springer-Verlag.
- Watson, R. T., Boudreau, M.-C., Martina Greiner, Wynn, D., York, P., & Gul, R. (2005). Governance and global communities. *Journal of International Management*, 11, 125-142.
- Wilkinson, D., & Huberman, B. (2007). *Cooperation and Quality in Wikipedia*. Paper presented at the WikiSym'07, Montreal, Canada.
- Wilkinson, D. M., & Huberman, B. A. (2007). Assessing the value of cooperation in Wikipedia. *First Monday*, 12(4).
- Williamson, O. E. (1999). Strategy research: Governance and competence perspectives. *Strategic Management Journal*, 20, 1087-1108.

Appendix

Governance mechanism		Number of mentions (interviewees)	Number of articles rated for the mechanism	Count of individual ratings from 1-5					Number of ratings above threshold and percentage over all ratings received for construct	
				1	2	3	4	5	≥ 4	%
Formal Governance Mechanisms	Administrator involvement	12	72	41	11	12	4	4	8	11
	Arbitration process	2	12	9	0	1	0	2	2	17
	Featured article process	5	30	22	0	0	5	3	8	27
	Formal article review process	5	30	14	1	4	5	6	11	37
	Formal mediation process	2	12	7	1	0	2	2	4	33
	Formal voting process	2	12	9	1	1	0	1	1	8
	Guidelines	3	18	3	2	6	5	2	7	39
	Policies	3	18	4	2	2	6	4	10	56
	Reverting mechanism	5	30	9	4	9	4	4	8	27
Informal Governance Mechanisms	Collaboration among users	2	12	3	1	2	2	4	6	50
	Consensus building	4	24	8	7	2	5	2	7	29
	Coordination process among users	6	36	17	8	1	6	4	10	28
	Discussions on article talk page	10	60	12	9	6	14	19	33	55
	Discussions on user talk page	3	18	8	4	4	2	0	2	11
	Experience level of individual users	3	18	1	0	5	6	6	12	67
	Feedback from users	3	18	0	3	10	4	1	5	28
	Individuals attached to the article	2	12	0	0	2	4	6	10	83
	Informal mediation practice	2	12	4	5	0	2	1	3	25
	Informal networks among users	5	30	6	4	6	8	6	14	47
	Inviting individuals to participate	2	12	5	0	1	1	5	6	50
	Large number of editors	6	36	5	2	10	11	8	18	50
	Mentoring by experienced users	3	18	8	5	2	2	1	3	17
	Personal relationships among users	5	30	6	6	7	4	7	11	37
	Reputation of individual user	6	36	3	3	12	14	4	18	50