Editing Beyond Articles:

Diversity & Dynamics of Teamwork in Open Collaborations

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ABSTRACT

We report a study of Wikipedia in which we use a mixed-methods approach to understand how participation in specialized workgroups called WikiProjects has changed over the life of the encyclopedia. While previous work has analyzed the work of WikiProjects in supporting the development of articles within particular subject domains, the collaborative role of WikiProjects that do not fit this conventional mold has not been empirically examined. We combine content analysis, interviews and analysis of edit logs to identify and characterize these alternative WikiProjects and the work they do. Our findings suggest that WikiProject participation reflects community concerns and shifts in the community's conception of valued work over the past six years. We discuss implications for other open collaborations that need flexible, adaptable coordination mechanisms to support a range of content creation, curation and community maintenance tasks.

Author Keywords

Wikipedia; group work; group dynamics; open collaboration

ACM Classification Keywords

H.5.3 [Information Interfaces and Presentation]: Group and Organization Interfaces – Computer-supported cooperative work

General Terms

Human Factors, Theory, Measurement

INTRODUCTION

The Internet has fostered many new ways for volunteers to organize around a common cause, but few of these initiatives have had the longevity or impact of Wikipedia. Wikipedia is one of the most visibly successful examples of large-scale, open collaboration. The English language edition has been a hive of activity for the past 10 years, with tens of thousands of regular contributors logging in each month to build and maintain the encyclopedia. The

community around Wikipedia has certainly changed over that time. While Wikipedia's readership and article base has grown steadily, its active contributor base, which grew exponentially until late 2007, has ebbed in recent years [30][14]. Yet even with that ebb, tens of thousands of dedicated editors still contribute to Wikipedia, working together to coordinate their activities.

One key type of coordination is the WikiProject. A WikiProject is a collaborative effort organized around topic areas of interest or specific work activities. Previous research has shown that WikiProjects can play an important role in coordinating different tasks around editing Wikipedia articles. WikiProjects can also serve important social functions for those involved, who often become both more productive and more engaged in the editing community [16][11]. In this respect WikiProjects fill similar roles to work groups, teams and task forces in other settings, from World of Warcraft guilds [27] and Open Source software development projects [8] to offline groups [1].

Previous studies of WikiProjects present a compelling but incomplete picture. They have tended to focus on projects that coordinate work around particular encyclopedia topics (like military history, medicine, or feminism), on the largest and most active projects, and on project activities during Wikipedia's growth years. However, research on other online collaborations [15][20][25] suggest that teams within the same system vary greatly in the work they do and the ways they organize their work. Furthermore, both the teams themselves and the nature of the work they perform can change over time. The evolution of other coordinating structures on Wikipedia such as community policies [2][14] suggest that WikiProjects likewise have the potential to adapt to environmental shifts. How the universe of WikiProjects has changed in response to the changing environment in Wikipedia has not been examined.

Investigating how WikiProjects have adapted to environmental change can inform our understanding of the specialized work activities necessary to maintain a mature peer production community. It may also reveal patterns of participation that illustrate shifts in the community's priorities and work activities, and provide new insights into

how open collaborations adapt and persist during periods of change. This could inform the design of tools to encourage participation in other open collaborations, and help designers and community managers address shifts in member activity and motivation [28].

In this paper, we analyze 978 WikiProjects that have achieved sustained activity at some point in Wikipedia's history. Our investigation combines interviews with Wikipedia editors, content analysis of WikiProject pages, and quantitative analysis of edit logs between 2002 and 2012. To characterize the diversity of work activities coordinated through WikiProjects, we draw a distinction between *conventional* WikiProjects that are generally scoped around an encyclopedic topic and focus on coordinating article editing tasks, and *alternative* WikiProjects in which the project scope and/or primary tasks differ significantly from the conventional model. Our analysis unpacks key relationships between the creation of and participation in alternative WikiProjects, environmental changes within Wikipedia, and the editing community's perceptions of valued work. We close with a discussion of the current role of alternative WikiProjects in Wikipedia and present implications for supporting a wide range of specialized workgroups in other open collaborations.

BACKGROUND AND RELATED WORK

Two key challenges for open collaborations are helping potential contributors find productive and engaging ways to get involved and ensuring sustained productivity and project maintenance despite low levels of member commitment and rapid member turnover [10]. Open collaboration systems address these challenges by *keeping barriers to participation low* and by *supporting the development of persistent social structures*. Low barriers to participation help assure that community members who leave are replaced by a steady stream of new contributors, and persistent social structures help organize and integrate contributions and maintain a sense of community and continuity.

One of the ways that Wikipedia keeps its barriers low is by allowing editors to decide for themselves where, when, how, and how much they will edit. In order to ensure that these contributors and their contributions are successfully integrated, the Wikipedia community has developed a variety of social structures—such as community rules and awards—and embedded them into the website itself. Over time, these social structures have proliferated and developed complex internal structures and inter-relationships as community members adapt and refine them to better suit community needs or address new community concerns.

WikiProjects are a prime example of a persistent, community-created social structure that addresses the challenges of open collaboration. Since the first WikiProjects were created in 2002, thousands of projects have been founded and tens of thousands of Wikipedia
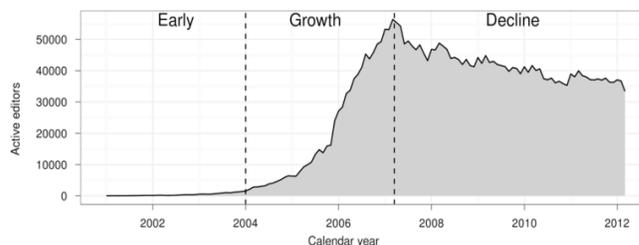
Figure 1. Rise and decline of active Wikipedia editors. Source: Wikimedia Commons *The_English_Wikipedia_Decline.png*

editors have participated. WikiProjects come in all sizes: some projects may host dozens or even hundreds of participants within a single month, while others only have a handful of members. Despite an overall decline in active editors on the English Wikipedia since 2007, hundreds of WikiProjects are still active in 2013 [39].

One reason WikiProjects have flourished may be that they resemble Wikipedia as a whole in their openness and flexibility. Each project is a relatively autonomous and informal entity with no official control over the domain of wikiwork it focuses on [11]. Anyone can create a new WikiProject around any work activity they think is important, and others can participate in that project in whatever way they choose [23]. Within these broad parameters, different WikiProjects are free to develop their own individualized strategies for motivating members and coordinating work.

A lot of the useful work on Wikipedia does not involve writing encyclopedia articles. Kriplean et al. [18] found that editors give one another specialized awards called Barnstars to recognize a variety of valuable contributions beyond editing articles: from meta-work such as developing specialized tools, to work that sustains the community such as conflict mediation. Barnstars are also awarded to recognize positive personal qualities like leadership or civility reflected in the performance of work. Given the broad leeway that WikiProjects have in the work they focus on and the way they organize, it is reasonable to expect that different projects also exhibit a degree of specialization and address valuable work beyond editing articles.

The work that is most valuable to Wikipedia may have changed over the course of its 12-year history. In particular, the decreasing rate of new article creation and article development over the past six years has potential ramifications for WikiProjects that focus on major topics, which may now direct more of their energy towards curating existing content than creating new content. Furthermore, the Wikipedia community's growing awareness of other emerging concerns seems to be reflected in the names of newer projects such as *WikiProject Editor Retention* and *WikiProject Cooperation*.

In order to understand the ways Wikiprojects may have adapted it is necessary to examine the diversity of projects

and project work. Studies of FLOSS projects have shown that both the size of a project and the nature of its work are reflected in the structure and activities of the project [15, 37]. Previous research on WikiProjects has demonstrated that many large, topic-focused projects have developed diverse mechanisms to fulfill members' needs and coordinate editing work. We believe that smaller projects and projects that focus on alternative forms of work may exhibit even greater diversity.

Several previous studies have examined the work productivity of WikiProjects—operationalized as the number of edits made by project members to articles within the project's topical scope. Kittur et al. [16] examined the impact of project membership on users' editing behavior in a set of 73 topic-focused WikiProjects and found that editors who joined a project became more productive Wikipedians, communicated more with other editors, and engaged in 'good citizenship' activities like reverting vandalism to articles at a higher rate. A series of studies led by Chen [4] and Wang [34] that investigated the relationship between the group structure and work productivity in more than 300 topic-focused WikiProjects found that projects with a mix of veteran editors and relative newcomers made more edits to articles. However, the work productivity of veteran editors in these projects declined significantly more quickly than that of younger editors. The authors suggest that the decline in veteran productivity may be due to these editors taking on community maintenance and coordination roles within the project that were not counted as work in their analysis.

Several other studies have shown that such coordination work is important to a project's productivity. In a study of 310 topic-focused WikiProjects on the French Wikipedia, Ung & Dalle [32] demonstrated a correlation between coordination activity on the project talk page and 'bursts' of editing activity on project-related articles. Supporting Wang et al.'s post-hoc hypothesis on the importance of coordination work, they found that in the majority of cases there was little intersection between a project's most active content producers and its most active coordinators. A study by Zhu et al. [38] found that Collaborations of the Week (COTWs), structured editing events organized by some WikiProjects, were effective at mobilizing project participants to edit articles together, and that participating in a COTW also boosted editors' subsequent productivity.

Other studies describe WikiProjects as a site of both coordination work and social interaction. Two studies led by Forte [9,11] based on interviews with 15 members of *WikiProject Military History* detail a variety of sophisticated coordination mechanisms that that project had developed such as a project newsletter, specialized task lists and task forces, and topic-specific article formatting guidelines and article assessment criteria. They also found that members appreciated *Military History* for its social functions: participating provided opportunities to find new collaborators, get expert help, protect and advertise their work, and network socially.

While these studies demonstrate that the role of WikiProjects extends beyond production work, it is not known whether the projects previously studied reflect the range of coordination mechanisms and group dynamics among the hundreds of other projects on Wikipedia. For example, WikiProject participants interviewed in Krieger et al. [17] stated that they seldom referred to project task lists when deciding what to work on, and suggested that COTWs were often unsuccessful at mobilizing collaboration even when they were prominently advertised. An analysis of coordination practices across a sample of 138 WikiProjects by Morgan et al. [23] found evidence that project members generally worked independently of one another and primarily used the project talk page to ask for advice or pass on generally relevant information [23], a lightweight approach to coordination more common in FLOSS projects than in offline groups or other virtual teams [15, 37]. This study also found only limited evidence that WikiProject members exhibit behaviors related to group identification, such as in-group favoritism, in their interactions on the project talk page.

Current study

Given the intriguing but inconsistent picture of WikiProject collaboration presented by these previous studies, we believe that these complex coordination structures warrant further investigation. Our analysis complements and contextualizes the existing body of research on WikiProjects by examining WikiProject participation over time across a large and heterogeneous set of active projects. We expand the scope of analysis in three ways in order to account for a greater diversity of projects and practices.

Examine a greater range of production work. Many WikiProjects have a topic focus, and several previous studies have operationalized the production work of WikiProjects by measuring edits by a project's members to articles within that project's scope [16][5][32][34][4][9]. However, this may not be an effective metric for quantifying the work of WikiProjects organized around editing tasks that span topical boundaries such as *WikiProject Stub Sorting*, or projects that may primarily coordinate non-editing-related activities such as *WikiProject Dispute Resolution*.

We conceptualize these as *alternative* WikiProjects and examine the work they do within and outside article space.

Investigate a larger, more diverse set of projects. Exceptionally large and active WikiProjects, like those studied in Forte et al. [9,11], Zhu et al. [38], and Kittur et al. [16] are unlikely to be structurally or functionally similar to hundreds of smaller and less active WikiProjects. Zhu et al. [38] acknowledge that COTWs were only used consistently in 13 of the largest WikiProjects, and suggested that other projects may have stopped running

COTWs or decided not to adopt this approach because of its high coordination cost. *WikiProject Military History,* studied by Forte [9,11], is one of the largest, oldest and most organized projects on Wikipedia with 1170 active members and 1000 monthly edits in 2007. Smaller WikiProjects may lack the critical mass of highly invested participants necessary to sustain sophisticated collaboration mechanisms like monthly newsletters and COTWs, and their members may not experience the same sense of group identity or engage in the same degree of social interaction or direct collaboration.

We seek to describe a wider variety of coordination practices by collecting data from 978 active projects and interviewing members of multiple alternative WikiProjects.

Analyze project activity over time. Finally, with few exceptions [13, 23], previous studies of WikiProjects on the English Wikipedia have examined data from Wikipedia's peak years (2006 – 2008). Wikipedia has changed dramatically since then: for example, there are an increasingly smaller number of articles on major topics that need writing or significant expansion, and an increasing number of quality control tasks being performed by bots [30]. Furthermore, as contribution volume dropped off and the community itself began to shrink after 2007, the social system of Wikipedia began to change in significant ways. The community has grown more mistrustful of the motives of outsiders in recent years, and it has become more difficult for newcomers to contribute [14]. Both of these factors are thought to have contributed to the current editor decline [14, 30].

These findings suggest both a change in the social climate of Wikipedia, as well as a shift away from direct editing work as the primary mode of contribution towards more of the meta-work activities—such as border patrol, community support, administrative work and meta-content work—described in Kriplean et al.'s [18] barnstar analysis. Some factors that contributed to Wikipedia's rise—its openness to new contributors, its adaptable community rules—have grown more rigid, possibly precipitating or contributing to its decline [14]. Other important coordination mechanisms, such as WikiProjects, have not been examined in this new environment: how have WikiProjects weathered Wikipedia's climate change?

METHOD
We gathered our edit log data from toolserver.org[1], a public data repository hosted by the Wikimedia Foundation that maintains a nearly live mirror database of the English Wikipedia. We conducted queries against the Toolserver database, parsing results to create our own metadata about WikiProjects and cached results to offload subsequent processing.

Figure 2. WikiProject banner from the *Department of Fun* project

While WikiProjects share many common features, each project is individual and is not required to adhere to any specific naming or formatting conventions. In order to identify WikiProjects, we considered all of the pages in the project namespace that either displayed the WikiProject banner (see **Figure 2**) or had "WikiProject" in the page title. We excluded pages that met these criteria, but which were a subpage of some other page. As well, we considered any redirects and included the page to which a redirect pointed if the page met our inclusion criteria. This resulted in a set of 1868 total WikiProjects as of May 2013.

Identifying Active WikiProjects
Some WikiProjects sustain regular participation from a large number of editors for many months or years. However, many WikiProjects that are created never garner significant participation over a sustained period of time. Measuring project activity in terms of edits by declared project members to articles is unsuitable as a universal measure of WikiProject activity simply because not all WikiProjects focus on editing a restricted set of articles and because project member lists do not accurately reflect project participation [23].

However, edits to project pages, whether made by declared members or non-members, are likely to reflect the overall level of community investment in a project's work. We define an active WikiProject as one that averaged 10 edits per month to the project page and any sub-pages including talk pages (i.e., the approximate lower bound for active project from Forte et al. [9]) for at least one calendar year. We exclude edits by unregistered editors and automated bots. 978 of the WikiProjects we identified (52%) were defined as current or formerly active projects using these criteria.

Identifying Alternative WikiProjects
Many WikiProjects focus on editing articles on particular topics and this norm has been formalized in a template for creating a new WikiProject provided by the *WikiProject Council* (which is itself a WikiProject). The template states *"Several Wikipedians have formed this collaboration resource and group dedicated to improving Wikipedia's coverage of [some topic] and the organization of information and articles on this topic"[2]*. This template provides top-level page section headings for the project to define its goals (the intended impact of the project), scope

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[1] http://toolserver.org/

[2] http://enwp.org/Template:WikiProject

(the boundaries of the project's work), and tasks. WikiProjects that follow this template are often organized around encyclopedic topics, as provided in the outline. We define these projects as *conventional* WikiProjects because they follow the common conventions of WikiProject organization, goals, scope, and tasks.

A number of WikiProjects deviate from this conventional description. These projects may still use the template provided by the WikiProject Council, but the scope, goals, and tasks defined by the project point clearly to other types of work, with goals and scope that are not focused on encyclopedic content, or else they focus on work that spans multiple topical categories. We define these projects as *alternative* WikiProjects because their activities do not follow the conventional pattern of coordinating a *loosely defined* range of article creation and curation-related activities within a *well defined* topic area. Thus we define alternative WikiProject only *negatively*—the criterion for identification is deviation from the norm in stated goals, scope or primary tasks—in order to avoid forcing artificial distinctions onto our data and to allow patterns to surface in the analysis.

To identify alternative projects, we examined the current project page of each active project in our sample, identifying each of the 978 active WikiProjects as either conventional or alternative based on that project's conformity with the WikiProject template. This first pass of coding was binary: is this a conventional project or does it deviate from the norm in its goals, scope, or tasks? Initial coding and subsequent peer-review resulted in a final set of 131 out of 978 active projects (12%) labeled as alternative.

Classifying Alternative WikiProjects
Kriplean et al.'s barnstar categories, which were developed through a grounded coding approach on a similar dataset, serve as a set of sensitizing concepts [3] and a minimal structure that provide a useful descriptive framing for the work of alternative WikiProjects. That study analyzed the work activities described and acknowledged in barnstars, some of which were even developed by WikiProjects. The coding scheme naturally includes the type of editing work found in conventional, topically oriented WikiProjects, but also includes dimensions of wikiwork outside the scope of content production such as dispute resolution, question answering, vandalism detection and removal, template creation, participation in formal review processes, administrative activities, and other forms of meta-work.

Two independent coders classified the focal type of work claimed by each alternative project as described on the WikiProject's main page, focusing on the goals, scope, and tasks. Projects were classified according to the five top-level categories from the Barnstar Wikiwork coding scheme. The second-tier codes from that coding scheme were used to inform our decisions of which top-level code

Table 1. Work activities of alternative WikiProjects, classified according to valued work codes from Kriplean et al. 2008.

Editing work	creating content; starting articles; adding images; citing sources	57	**39%**
Meta-content work	template design; process design; classification	43	**29%**
Social & community support actions	mentorship; recognizing achievement of others; question-answering	22	**15%**
Collaborative action and disposition	policy interpretation; integrity; conflict mediation; explanation	10	**7%**
Administrative	determining article status; privilege granting; formal mediation	7	**5%**
Border patrol	spam removal; vandal fighting; copyright violations	7	**5%**
Undifferentiated work	*(not addressed in this study)*	1	**1%**
Total		147	100%

to use. Both tiers of barnstar codes are presented alongside our results in **Table 1.**

Each coder was to identify and code the most predominant claim of work. In rare cases where it was difficult to identify a predominant form of work, two codes were applied. 16 of 131 alternative projects (12%) were coded with two different codes. Discrepant codes were discussed and resolved through adjudication. The full list of categorized alternative WikiProjects is available[3].

Characterizing participation in Alternative WikiProjects
The project pages provide a structural framework for project work, but it is editors who perform that work. In order to deepen our understanding of why editors do the work they do and the way they experience participation, the first author performed 18 semi-structured interviews with WikiProject members.

The interviews were conducted as part of a larger research study focused on understanding editors' motivation and involvement in WikiProjects (both conventional and alternative) and on identifying important technical and social factors that had impact on the success of projects. The first nine interviews were conducted by the first author with members of *WikiProject Military History* in 2011 in conjunction with an informal self-assessment undertaken by members of that project. Eight of these interviews were conducted with project members, and a ninth with the assessment facilitator, who was also a member and founder of several WikiProjects. The second set of nine interviews were conducted in parallel with the current study, using a refined and expanded version of the initial protocol. Several

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[3]

http://meta.wikimedia.org/wiki/Research:WikiProjects_as_Virtual_Teams/Nontraditional_wikiprojects.
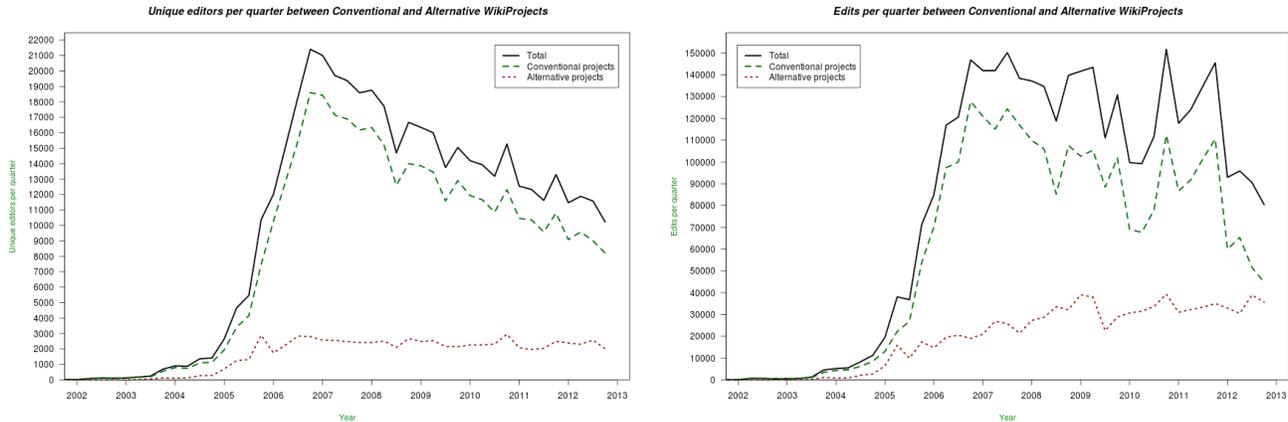
Figure 3. Number of edits to WikiProject pages (left) and registered editors participating in WikiProjects over 10 years. Alternative WikiProject activity (dotted red) is lower but more stable than in conventional WikiProjects (dashed green).

initial interview candidates were approached initially because they mentioned WikiProject participation on their userpages or on personal profiles they created on the Wikipedia Teahouse [22]. Other interview candidates were approached in person at a local Wikipedia Edit-a-thon. Additional interviewees were identified through snowball recruitment. 14 interviews were conducted face to face, over Internet Relay Chat, or by Google Hangout. Four of the initial nine interviews were conducted over email.

Members of the research team analyzed written interview transcripts and identified passages related to projects that had been identified as alternative in the first coding pass. Passages were then sorted by project, and by whether they reflected a) *the editor's motivation for founding or participating in the project* and b) *goals of the project or the activities the project focuses on* (interviewee must identify as a participant). These motivations and activities informed our categorization of the other alternative projects. Data from the interviews and examination of the project pages were used to develop case studies of projects in each of five top-level barnstar wikiwork categories, which are presented below.

FINDINGS

Our analysis indicates that overall WikiProject participation **(Figure 3)** has declined in step with the overall active editor base of Wikipedia **(Figure 1).** WikiProjects are still a major site of editor activity—during the first three quarters of 2012, an average of 11,229 editors made 88,943 edits to WikiProject pages per quarter. However, these figures represent a 46% and 38% decrease in activity from the first three quarters of 2007, when both general editing activity and WikiProject participation were at their greatest level.

Between 2007 and 2012, the number of editors participating in conventional WikiProjects decreased by 51%, and the number of edits to these projects decreased by 56%. However participation in alternative WikiProjects shows a different trajectory: the number of participating editors has declined much less dramatically (13%) and the number of edits to alternative WikiProject workspaces has increased steadily to an average of 35,035 edits per quarter in 2012, compared to 22,300 edits per quarter in 2007—an increase of 57%.

The contrast between the relative stability—and even growth—in alternative WikiProjects and the decline of conventional project activity suggests that alternative WikiProjects are an increasingly prominent part of the WikiProject ecology. This may be due to their ability to provide editors with opportunities to perform valuable and engaging work in the mature peer production system of Wikipedia.

However while the proportion of WikiProject activity within alternative projects has increased from 16% in 2007 to 39% in 2012, conventional WikiProjects still make up the majority of active projects. The lists of the Top 20 WikiProjects in **Table 2** demonstrate that the decline in WikiProject participation has not made conventional projects obsolete. Many historically active topic-focused projects like Military History are still among the most active projects in 2012. However, participation patterns have changed: fewer than half of the top projects in 2007 are still in the top 20. Furthermore, there seems to be a greater churn among alternative WikiProjects: 75% (6/8) alternative projects in 2012 were not among the most active projects in 2007, compared with 50% (6/12) of conventional projects. Historically active alternative projects with names that suggest a focus on content creation, such as *WikiProject Missing Encyclopedia Articles,* have been replaced by different alternative projects whose focus is not known. Below, we investigate the work performed by several of these new alternative WikiProjects.

Table 2. Top 20 WikiProjects by annual edits to project pages in 2007 and 2012. Alternative Project names are highlighted and italicized. An asterisk indicates a project that was not among the top 20 in 2007.

Edit rank	2007	2012
1	WikiProject Military history	*WikiProject Deletion sorting*
2	*WikiProject Deletion sorting*	WikiProject Military history
3	WikiProject Video games	WikiProject Football
4	WikiProject Biography	*WikiProject Articles for creation* *
5	WikiProject Professional wrestling	*WikiProject Guild of Copy Editors* *
6	WikiProject Football	WikiProject Television Stations*
7	*WikiProject Red Link Recovery*	WikiProject Video games
8	WikiProject U.S. Roads	WikiProject Medicine*
9	*Department of Fun*	WikiProject Film
10	*WikiProject Spam*	WikiProject U.S. Roads
11	WikiProject Anime and manga	*WikiProject Wikify* *
12	*WikiProject Missing encyclopedic articles*	WikiProject Chemicals*
13	*WikiProject Council*	*Department of Fun*
14	WikiProject Film	*WikiProject Resource Exchange* *
15	*WikiProject Stub sorting*	WikiProject Birds*
16	WikiProject Comics	*Counter-Vandalism Unit* *
17	WikiProject Cricket	WikiProject India*
18	WikiProject Novels	*WikiProject Good articles* *
19	WikiProject LGBT studies	WikiProject Mathematics
20	WikiProject Mathematics	WikiProject National Register of Historic Places*

Range of work activities in alternative WikiProjects

Just as barnstars acknowledge the variety of work beyond editing articles, alternative WikiProjects are used to coordinate many of these same work activities. **Table 1** illustrates the distribution of assigned wikiwork codes to the alternative WikiProjects in our study. In this section, we draw on findings from our interviews with Wikipedians to show how WikiProjects both reflect the Wikipedia community's conception of valued work and provide a mechanism for performing that work across topical, temporal, and even ideological boundaries.

Editing Work (39%). Kriplean et al. found that editing work was the largest single work category for which editors awarded barnstars [18]. We show similar results among alternative WikiProjects. Like conventional WikiProjects, many alternative projects address the fundamental work activity on Wikipedia: making edits to articles. However, while conventional WikiProjects focus on a specific topic area and coordinate a range of activities to improve coverage of that topic, alternative projects like *WikiProject Unreferenced BLP Rescue* (founded 2010), coordinate a single, specific task. The goal of Unreferenced BLP Rescue was to systematically eliminate a backlog of biographical articles about living people (BLPs) that had been tagged by other editors as lacking sources. Providing sources for BLPs is particularly important work because of notorious, high profile controversies that uncovered untrue and unsourced statements in articles about public persons such as American journalist John Siegenthaler. In 2009, the Wikimedia Foundation passed a resolution on the importance of *"neutrally-written, accurate and well sourced articles on living people"* [12]. This project's approach—setting monthly targets and efficiently coordinating work around those specific target articles—was successful in mobilizing participation by a large number of editors to eliminate the existing backlog over the course of 15 months. The project also streamlined Wikipedia's article deletion process to combat future backlogs:

> *"The project that handled referencing BLPs they managed to really kind of promote systemic change in the way BLPs are handled... they created a new deletion process, the 'Sticky prod'[4], with BLPs that don't have*

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[4] http://enwp.org/WP:Proposed_deletion#Sticky_prod

references are automatically deleted after a certain time. This was a huge change in the approach." [participant 11]

All of the articles within the scope of Unreferenced BLP Rescue are also within the scope of *WikiProject Biography*, one of the largest and oldest conventional WikiProjects (f. 2002). Specialized subgroups like Unreferenced BLP Rescue are frequently set up as task forces within parent projects [11]. Although task forces are generally fairly autonomous of their parent project, one interviewee suggested that Unreferenced BLP Rescue may have benefitted from being a distinct project because it increased the project's visibility within the community, allowing it to draw in editors who were not interested in writing biographical articles, but enjoyed hunting for sources.

Another alternative project that coordinates direct article editing is *WikiProject Wikify* (f. 2006). This project also chose a limited and well-defined set of editing activities, namely *wikification*—the practice of fixing wikitext markup, adding internal links between related articles, and standardizing the basic page layout of articles. This project differs from conventional projects in that it takes the whole encyclopedia as its scope. One Wikify member, who has often served in an unofficial coordinator role for the project, was drawn to the project as a new editor because he viewed wikification as a simple way to improve the overall credibility of Wikipedia:

> *"...for me it was like here's this thing it's got these goals and it wasn't a difficult thing to do, especially once you learn how to wikify an article... I consider that process really important because there was an article that I didn't really change the content to but one of the greatest improvements I've made to an article was just through wikifying it because it makes it look like it's encyclopedic." [p8]*

Like Unreferenced BLP Rescue, Wikify conducts structured collaboration drives, in which editors informally compete to wikify the most articles within a given month. While some conventional WikiProjects also conduct collaborations of the week [38], these events focus on improving a single article, usually with the intent of gaining official acknowledgement that the article is of Good or Featured status, a community-wide designation that is determined through an official peer-review process. Contributions like wikification that do not involve adding substantial content may not be as well acknowledged in topical WikiProjects. Furthermore, creating and applying consistent wikification standards may be difficult to do within conventional projects, since these projects often create their own local style guides and formatting conventions [9].

Meta-Content Work (29%). Our second most frequent work category, meta-content work, was the primary focus in 29% of alternative WikiProjects. As the name suggests, meta-content work covers a wide range of activities that do not involve editing articles directly. Some of the projects in this category, such as *WikiProject Infoboxes* (f. 2007) and *WikiProject Disambiguation* (f. 2005), build and maintain Wikipedia's template and category infrastructure. WikiProject Disambiguation creates disambiguation pages for commonly confused titles. These pages are located in the article namespace, but rather than presenting original content they function as a reader-facing index to the content of the encyclopedia. Another alternative WikiProject, *Stub Sorting* (f. 2004) builds and maintains a complementary editor-facing index: it builds lists of categories and subcategories of stubs (very short articles) arranged by topic. Other editors and WikiProjects can use these lists to identify articles with their area of interest that need substantial improvement.

Other projects in the meta-content work category focus on editing activities at an even greater remove from articles themselves. *WikiProject Deletion Sorting* (f. 2005) performs similar work to *Stub Sorting*, but instead of categorizing articles it categorizes previous discussions at the Articles for Deletion noticeboard (AFD) according to the topic of the article under consideration to be deleted. According to one long-time member of Deletion Sorting, the goal of this work is to improve the decision-making process around article deletion:

> *"Deletion Sorting I kind of went into that with the aim, the idea that this was a problem that needed to be solved... AFD was becoming very high-volume at that point and a lot of discussions were going by with not much input. And sometimes they could have benefitted from input from for example people in the UK, or Chemists, or whatever. So the idea was that we would have a list of chemistry-related deletion discussions and a list of England-related deletion-discussions so that people who were interested, it was a resource for them to use if they wanted." [p9]*

The *Help Project* curates pages in the Help namespace, a set of editor-facing pages devoted to tutorials and how-to guides related to technical topics such as how to redirect a page or create a table in wiki-markup. There are thousands of help pages on Wikipedia, but they are often incomplete, out-of-date, hard to find, and dense with technical jargon. The Help Project (f. 2006) is dedicated to making these help pages more helpful, and making the best ones easier for editors in need to find. One current member describes how the Help Project provides an alternate way to contribute content to Wikipedia for editors whose interests may lie outside of encyclopedia articles, but who want to create resources that may be read and used by thousands of other editors.

> *"I'd been interested in a lot of this meta stuff and I'd kind of touched on Help pages before and made a few edits and done categorization and stuff... I saw someone*

had proposed this project to improve the help pages and I thought "God, yes they really do need improving" [p9]

Another alternative project that curates meta-content resources that are primarily editor-facing is the *WikiProject Council* (f. 2006). The Council is in some ways the most meta project of all: a WikiProject founded to help coordinate WikiProjects. Its pages provide a central hub for WikiProject-related guidance and discussions. It maintains a WikiProject Directory with lists of projects sorted by their type and how active they are believed to be, making it easier for editors to find WikiProjects that they may be interested in joining. The council also provides templates, style guides and how-to's for creating a WikiProject. As the Council's founder explains:

"My initial idea in creating it was actually to bring together the coordinators of the various active projects so that we could discuss common strategies and share best practices." [p6]

Stub Sorting, Deletion Sorting, the Help Project and the WikiProject Council all create and maintain important resources that support content creation, but indirectly: making it easier for editors to find interesting work to do, aiding in group decision-making, clarifying complex technical problems, and helping people create and maintain their own autonomous work groups.

Social and Community Support Actions (15%). The WikiProject Council is a good example of a project that plays multiple roles: in addition to performing the valuable meta-content work, it also provides a forum for social and community support activities. The Council provides a proposal board where editors interested in creating a new WikiProject can draft a project plan and receive feedback. Other editors can indicate their interest in participating by signing up for the proposed project. While the Council has no authority over whether or not a project is created, the structured proposal process provides mentorship and guidance and also regulates the creation of projects that may be unlikely to succeed:

"It's made the process of creating new WikiProjects marginally more complex which weeds out some of the most unsuitable candidates. One of the main reasons WikiProjects fail is because they choose an unsuitable scope. The proposal process provides an opportunity for someone to point that out, and ideally redirect the proposer's energy towards something more productive." [p6]

The WikiProject Council was founded near the peak of both editing activity and WikiProject activity (426 new projects were founded in that year alone). Channeling thousands of new editors' efforts towards areas where they would have the greatest positive impact may have been seen as a productive approach, even in a community that is generally leery of bureaucracy.[5]

Several recently-founded social and community support projects address issues related to the editor decline. These projects employ different strategies to recruit new editors and retain existing ones. *Today's Article for Improvement* (TAFI) (f. 2012) organizes Collaboration of the Day, which functions like a Wikipedia-wide Collaboration of the Week [38]. Project contributors select an article to collaboratively boost to Featured Article status from a list of proposed collaborations. While improving article quality is one of the primary functions of conventional WikiProjects, TAFI differs from the norm not just in its broader scope, but in its goals:

"The main motive was to create a good enough framework for all editors and collaborators to come in... It was as much of a "Rope in the newcomers" thing as "Improve the important articles" [p1]

Inviting newcomers to work collaboratively on improving an article alongside more experienced editors who are there to provide friendly guidance and constructive criticism provides an opportunity for direct mentorship, which has been shown to be successful but rare on Wikipedia [26]. As of mid-2013 TAFI members are working to feature the current Collaboration of the Day on the front page of Wikipedia in an effort to convert Wikipedia readers to editors.

Another recently-founded (2012) alternative WikiProject, *Editor Retention* (f. 2012), has a complementary focus: it provides a forum for discussing strategies for retaining established editors, who often leave Wikipedia because of negative social experiences or a feeling that their work is not acknowledged [35]. In service of this goal, Editor Retention runs an Editor of the Week board, a "place to nominate someone for Editor of the Week recognition: an unsung hero who has been doing great work for months but is not well-known."

Many members of the Wikipedia community have suspected for years that their shrinking community is partially due to new editors having difficulty learning the ropes and having few opportunities to interact with the Wikipedia community in positive ways, a theory supported by recent research [14][22]. The creation of projects like Today's Article for Improvement and Editor Retention demonstrates how the WikiProject model for group collaboration can be adapted to address these emerging community concerns.

Collaborative Actions and Disposition (7%). Following Kriplean et al. [18], we distinguish the Collaborative Actions and Disposition category from Social and Community Support Actions by direct implication of

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[5] see http://enwp.org/WP:NOTBUREAU

collaborative activities such as dispute resolution or helping individuals adhere to formally-stated Wikipedia policies such as Neutral Point of View, Notability and Civility. Several alternative WikiProjects have been founded to support conflict resolution within topic areas that reflect geo-political controversies. *WikiProject Israel Palestine Collaboration* (f. 2008) was founded to:

> *"create a more hospitable editing environment for Category:Israeli–Palestinian_conflict related topics, including through a) actively seeking the cooperation of people who are uninvolved or hold strong and differing points of views[sic] and b) preventing and resolving disputes about the application of Wikipedia policies to these articles."* [40]

Similar projects include *Ireland Collaboration* (f. 2008) and *Sri Lanka Reconciliation* (f. 2007). These projects provide a space for coordination, discussion and conflict resolution among individual editors interested in these topics, as well as between WikiProjects. The member list of Israel Palestine Collaboration includes members of the conventional WikiProjects *Israel* and *Palestine*, as well as unaffiliated editors. By providing a neutral space for cross-project dialogue, as well as oversight and informal mediation, these alternative projects play an important meta-role within topical domains where civility, neutral point of view, and verifiability are crucial but may be difficult to adhere to, even by other WikiProjects.

Another project geared towards both supporting cooperation and assuring adherence to Wikipedia policy is *WikiProject Cooperation* (f. 2012), which aims to help editors who have a potential conflict of interest related to an article that they would like to edit, such as a financial stake in the organization the article describes.

> *"[WikiProject Cooperation] is trying to advance a model of cooperation with paid editors... They have a paid editor help board on which paid editors can come and have their drafts reviewed. Interestingly there's a counter-organization called WikiProject Integrity which is very skeptical of this model..."* [p10]

Paid editing has been a known issue on Wikipedia since at least 2007, when Virgil Griffith's WikiScanner tool [41] first revealed that thousands of anonymous edits to Wikipedia articles were being made from corporate IP addresses. Paid editing has increased on Wikipedia as the website's popularity search ranking has risen, but Wikipedia lacks both official policies on paid editing and mechanisms for enforcing compliance. Like WikiProject Israel Palestine Collaboration, WikiProject Cooperation exists to help paid editors who are acting in good faith and would like to adhere to the rules of the site. Submitting their drafts for review may provide those editors with some assurance of protection for their work, a function that some conventional WikiProjects perform for their members [9].

Border Patrol (5%). Not all projects or editors on Wikipedia act with a deliberately cooperative spirit: a more common approach to unwanted content and users on Wikipedia is to revert first, and ask questions later. *WikiProject Spam* (f. 2005), one of the most active alternative WikiProjects, functions primarily as a noticeboard for reporting instances where obviously biased or trivial content has been added to articles. Another more recent border patrol project is *WikiProject Integrity* which exists *"to discuss, raise awareness of, and hopefully address issues regarding paid editing on Wikipedia"* [42]. Integrity was originally founded in early 2012 as WikiProject Paid Advocacy Watch, nearly simultaneously with WikiProject Cooperation, and re-named in 2013 as part of what one interview participant referred to as a "re-branding" effort. Integrity addresses the same issue as Cooperation but takes the approach of WikiProject Spam: it maintains a noticeboard for reporting possible instances of paid editing. The project is also attempting to promote adoption of an official Wikipedia policy for addressing issues of paid editing in articles.

While Paid Advocacy Watch and Cooperation take different approaches, they share members and have collaboratively created a detailed how-to guide—the *Plain and Simple Conflict of Interest Guide* [43]—which is intended to help new editors understand the concept of Conflict of Interest (COI) and contribute more productively when they have a potential COI. Because WikiProjects are open, autonomous, and have no formal authority, these two projects are able to work together even though some members have incompatible ideological stances. Like the talk page of WikiProject Israel Palestine Collaboration, the Plain and Simple Conflict of Interest Guide provides a common space for editors in both projects to work together to address a pressing community concern.

Complex tasks like conflict mediation and outreach requires active coordination among many different stakeholders. The cases of Integrity and Cooperation, and of Israel Palestine Collaboration demonstrate that sustained cooperation is possible even between groups with different ideologies. If Wikipedia's editor base continues to shrink, it may be more difficult to sustain cooperation among these alternative projects, even as the need for them grows. Border patrol projects may be more successful in the long run because they require less coordinated effort to maintain, which may exacerbate Wikipedia's current tendency to revert first and ask questions later.

Administrative Actions (5%). Work categorized in the administrative action category pertains to actions taken by administrators and to acknowledge participation in formal processes like Articles for Deletion (AfD) or Featured Article Review [18]. Only seven alternative WikiProjects deal directly with administratorship or other formal processes. In part this may be because WikiProjects themselves have no formal authority to dictate policy or

enforce decisions [9]. Other groups on Wikipedia like Arbitration Committee (ArbCom) or the Featured Article Committee (FAC) are vested with the formal authority and technical permissions necessary to make binding decisions—respectively, to block or ban a user account, and to decide what articles are featured on the front page of Wikipedia. These groups are not referred to as 'WikiProjects' and use neither the name or the template. They also differ from the WikiProjects we examined in other important ways. For example, both ArbCom and FAC lack open and egalitarian membership—members are appointed or elected to official roles. Other group workspaces on Wikipedia, such as the Good Articles nomination page, are designed to support case-by-case decisions about the quality designation of articles, and do not list members at all.

However, we find that in several cases alternative WikiProjects exist to support these formal processes. The *Featured Article Team* (FAT) (f. 2007) provides newer editors with informal peer feedback in preparation for nominating an article for formal peer review. Another alternative project, *WikiProject Arbitration Enforcement* (f. 2010), supports the other end of an official process: coordinating the enforcement of binding arbitration decisions issued by ArbCom by "listing the administrators who make themselves available for taking enforcement action in these areas, providing spaces to track recurring and longtime problems [and] making AE precedents and best practices more accessible"[44]. This may reflect a further attempt at decentralizing Wikipedia's governance by reducing the burden of monitoring compliance on ArbCom in an increasingly conflict-driven community.

Projects that deal with administrative actions provide support for the (relatively few) official, centralized governance mechanisms of Wikipedia and also provide support for the editors who interact with those processes. They also provide a way for more editors to participate more directly in governance and formal review processes, and even lobby for regime change. As Wikipedia's official policies have grown more calcified and difficult to change [14], participating in these informal projects may be an effective way for everyday editors to have an impact on community rules, norms and processes.

DISCUSSION

"WikiProjects divide so much into the different kind of work they do. Projects that are gathered around specific article subjects might lose steam once coverage of that subject becomes more complete." [p11]

As the work of improving Wikipedia shifts increasingly aware from content creation and towards content curation, alternative WikiProjects may become even more important for maintaining the quality of the encyclopedia. Many valuable editing tasks, such as wikifying articles, span topic boundaries. Other tasks that focus effort within existing topical boundaries, such as eliminating backlogs, may benefit from the specialized coordination mechanisms, autonomy, and visibility that comes with setting up a stand-alone project. Meta-content work coordinated through alternative WikiProjects also helps the community maintain its organizational memory of past decisions (Deletion Sorting) and help contributors can find articles that match their interests and need substantial improvement (Stub Sorting).

As Wikipedia's social climate has evolved, new barriers to participation have arisen. Many alternative WikiProjects such as TAFI and Editor Retention, focus on newly-recognized community concerns such as the decline in retention of new editors and the shortening productive lifespan of established editors. The relevance of these newer alternative projects to the community's current needs may be part of the reason why the level of activity within the set of alternative WikiProjects has increased over the past six years while activity within conventional WikiProjects, and within Wikipedia as a whole, have decreased.

In addition to highlighting the importance of alternative WikiProjects to the health of the modern Wikipedia ecosystem, our findings illuminate other important ways in which WikiProjects differ from one another. While projects like Military History maintain a high degree of engagement by fostering a collaborative atmosphere, one interviewee's description of the task of Deletion Sorting suggests that it is a relatively solo effort:

"So basically we had a script which would pop up when you're on [the Articles for Deletion noticeboard] and for each debate you could click and then select which category it should be in. And it would then put it in that category it would put it on that list so that people would know, and then leave a small notice saying "This discussion has been listed in the list of chemistry related deletion discussions." [p9]

Several other interviewees also described their work within WikiProjects as largely autonomous. One interviewee struggled to name a single other regular participant in their primary WikiProject! Taken together with findings from previous research on coordination in WikiProject talk pages [23], these descriptions of project life suggest that many Wikipedians do not experience WikiProjects as groups, but rather as interest-based coordination spaces that can support both independent and collaborative participation. These findings have ramification for the theoretical and methodological approaches researchers use to study WikiProjects and also for the tools that designers and community managers develop to support the work of WikiProjects and other open teams.

WikiProjects exist on several other Wikimedia wikis that are not encyclopedias[6], and groups called WikiProjects exist within other wiki-based online communities, such as Open Street Map[7] and Wikia[8]. The degree to which these groups resemble Wikipedia WikiProjects in their diversity of roles, goals, and practices has not been studied but could illuminate whether WikiProjects' pivotal role in coordinating work around critical tasks on English Wikipedia represents a special case or a general trend within open collaborations.

One domain of open collaboration that may benefit from fostering WikiProject-like groups is citizen science. Rotman [29][28] has suggested that better support for federated, task-based subgroups in the Encyclopedia of Life project could help encourage collaboration, foster a stronger sense of community, and aid in the development of a common taxonomical classification standard. In designing affordances to support such subgroups in the system, it may be helpful to follow a WikiProject model—allowing contributors to create new groups and group workspaces freely and dynamically, in response to their own shifting interests and the overall project's evolution.

Other citizen science projects such as Zooniverse already contain a federated system of different collaborations that participants can move between [19]. However, research funding is required to start a new Zooniverse subproject. Despite this constraint, in 2011 a group of volunteer participants in the climatology Zooniverse project *OldWeather* undertook their own independent research project, tracking the spread of the 1919 Spanish Flu pandemic through 'sick lists' in archived ship log data [31]. Explicitly supporting self-organized citizen research initiatives like this one could encourage more people to contribute to Zooniverse and also yield valuable scientific discoveries.

Implications for Design

Directing people towards engaging and important activities and allowing them to coordinate those activities in their own way is key to sustaining an open collaboration. Based on our examination of the range of work activities that all WikiProjects perform—not just conventional ones—and the different ways editors work within those projects, we offer the following set of design suggestions for supporting WikiProjects and open teams in related systems.

General requirements. While many excellent information visualization (i.e. [33]), task recommendation, and vandal-fighting tools have been developed on Wikipedia, most of these tools are intended for use by individuals rather than groups, and are designed to support article production activities. Tools designed to support WikiProjects and

similar open groups should allow these groups to maintain the openness and flexibility that enables them to support a wide variety of tasks and diverse ways of working, while minimizing the effort required to maintain project resources. Building effective tools in this design space require a nuanced understanding of which features can be baked in to the platform, or made available as opt-in modules, and which ones need to remain open to creative reconfiguration and remixing by user-designers. Below we provide some specific suggestions.

Socially intelligent task routing. Many WikiProject participants report that they do not use WikiProject task lists, preferring to work more independently [17]. One successful tool that supports this task management style, SuggestBot [6], uses Wikipedia's template and category structure to generate a list of task recommendations for a user based on articles they previously edited. Intelligent task routing tools like SuggestBot could be designed to recommend tasks beyond editing, such as sorting deletion discussions or improving help pages. *Socially intelligent* routing tools could also recommend WikiProjects that an editor may want to join based on their edit history or stated interests. A research prototype system called WikiTasks [17] allowed WikiProject members to provide contextual information about the tasks they request and let other users publically claim requested tasks. These detailed annotations could be useful for helping editors understand the scope and nature of a task, and also have the potential to serve as *practice proxies* [24] that teach new editors norms of participation.

Social translucence visualizations. Wiki pages do not surface activity well. It is difficult to tell who is active on a page without digging into the edit histories, or to distinguish a living project from a moribund one. Social translucence tools such as the Re:Flex toolbar [21] show who the most active editors are on a particular wiki page, and also let users to see what other pages these editors are editing and who they communicate with. Re:Flex and similar tools that visualize dynamic relationships and activity networks could help WikiProject members find both potential collaborators and relevant tasks.

Leaderboards. Metadata about project participants' recent editing activities could also be leveraged to visualize activity at the project level. Configurable leaderboards like CommunityCompare [36] could be enabled on WikiProjects to visualize the project's recent and historical activity across multiple dimensions of work. For example, featuring the most active contributors to the project workspace provides public acknowledgment for the (often invisible) work of project coordinators, which may encourage them to continue participating longer. Leaderboards can also be used to track progress towards group goals—our interviewees described handmade leaderboards in use among several projects for this purpose. Automating this feature reduces the administrative cost of conducting

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[6] e.g. http://www.mediawiki.org/wiki/Project:WikiProject_Extensions
[7] http://wiki.openstreetmap.org/wiki/WikiProject_Haiti
[8] http://entourage.wikia.com/wiki/Entourage_Wiki:WikiProject

focused editing drives and COTWs, potentially encouraging more direct collaboration among project members and deepening their commitment to the project and the community.

CONCLUSION

To understand and support group work in open collaborations, we need empirical investigations into actual work practices across a diverse set of groups. In this study we have made an attempt to more fully characterize the range of work performed by one type of group, WikiProjects, within one of the largest and longest-lived open collaborations, English Wikipedia. We have made four primary contributions to research:

- Characterized alternative WikiProjects, an important sub-set of WikiProjects that do not focus on general improvements to articles within a particular encyclopedia topic area.

- Presented empirical data on the range of work activities performed by these projects.

- Described how these projects facilitate collaboration around emergent problems and current community concerns.

- Demonstrated that participation in alternative WikiProjects has remained relatively stable, and even increased by some measures, as participation within conventional WikiProjects and Wikipedia as a whole has declined since 2007.

Participating in Wikipedia involves editing beyond articles. Wikiwork increasingly involves filling in around the edges, increasing the overall quality of the encyclopedia (not just a particular topic), and actively recruiting and retaining productive contributors. If Wikipedia remains open and active, these alternative ways of contributing will only grow more important. The fact that Wikipedians have successfully adapted WikiProjects, a mechanism originally designed for coordinated content creation, to effectively manage these emerging work activities demonstrates the resilience of open collaboration systems and also suggests a potential strategy for replicating the success of Wikipedia in new domains of open collaboration.

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