A Taxonomy of Wiki Genres in Enterprise Settings

Erika Shehan Poole
Georgia Institute of Technology
85 5th Street NW
Atlanta, GA 30308 USA
erika@gatech.edu

Jonathan Grudin
Microsoft Research
One Microsoft Way
Redmond, WA 98027 USA
jgrudin@microsoft.com

ABSTRACT
A growing body of work examines enterprise wikis. In this paper, we argue that "enterprise wiki" is a blanket term describing three different genres of wiki: *single contributor wikis*, *group or team wikis*, and *internal-use encyclopedias* emulating Wikipedia. Based on the results of a study of wiki usage in a multinational software company, we provide a taxonomy of enterprise wiki genres. We discuss emerging challenges specific to company-wide encyclopedias for which platforms such as Wikipedia provide surprisingly little guidance. These challenges include platform and content management decisions, territoriality, establishment of contribution norms, dispute resolution, and employee turnover.

Categories and Subject Descriptors
K.4.3 **[Organizational Impacts]**: Computer-Supported Collaborative Work

General Terms
Human Factors

Keywords
enterprise wiki, pedia, taxonomy, wiki, workplace

1. INTRODUCTION
Based in part on the success of Wikipedia, organizations are experimenting with wikis to address long-standing challenges in knowledge management. A growing body of research has examined cases of organizational wiki success. In this paper, we extend the existing wiki literature through a study of internal wiki use within a multinational software company. We, too, found wikis being used for team and project use. However, we also saw other uses that have not been fully described in the literature. These include the development of a Wikipedia-like internal encyclopedia (which we will call a *pedia*), and the creation of wiki sites maintained and used by a single person.

In this paper, we first provide a taxonomy that identifies three genres of internal-use enterprise wiki: (i) *single-contributor wikis* used as personal information management tools or easily edited web pages; (ii) *group or project wikis* used as team or project collaboration tools; and (iii) *pedias*, company-wide Wikipedia-like encyclopedias.

A pedia may be a major journey into largely uncharted territory for an organization. Wikipedia research helps but is insufficient guidance. We identify considerations for those planning to introduce a pedia, including establishing norms for types and detail of contributions, providing incentives for maintaining multiple views of content, accounting for employee turnover, and creating effective mechanisms for dispute resolution.

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2. RELATED WORK
Most wiki research focuses on either Wikipedia or classroom use. Papers with 'Wikipedia' in the title appear in 40 ACM conference *series*. Four of the 40 series account for one-third of the papers: WikiSym, WWW, SIGIR (Information Retrieval), and CIKM (Information and Knowledge Management). (Another 15% use Wikipedia content as source material for computational linguistic analysis.) Wikipedia research makes use of the publicly accessible content, revision histories, and discussion pages, and includes studies of emerging management practices based on accounts of key Wikipedians [2, 16]. The content studies explore server-side activity, not Wikipedia use in homes or corporate settings.

In educational settings, building a wiki or creating wiki content can be the focus of class activity [2, 7]. Alternatively, wikis used to hold class materials in support of course administration [17] are directed at the customers: students. School or university staff can also use a wiki to support internal projects [14], which most resembles internal wiki use in corporate settings.

This brings us to the relatively small literature that examines how and why people use wikis for knowledge work [5, 6, 13, 24]. Studies generally focus on wiki support for small groups or teams that communicate, share information, and coordinate within a firewall, although some consider interaction with external customers or vendors [21]. Published research focuses on success cases. By taking an organizational perspective, we cover types of wikis and outcomes that have been largely unmentioned.

Findings from all of the research settings help identify similarities as well as contrasts. For example, class wikis typically last only a few months, whereas many enterprise wikis are planned with longer lifespan envisioned. Another significant difference is that vandalism is an issue for Wikipedia and other public-access wikis [8, 15, 20], but is not a concern on corporate intranets, where anonymity is not generally maintained [5, 22].

This paper particularly emphasizes issues around internal pedia development, on which little has been written. The most germane prior research is that on Wikipedia, which includes work on newcomer experiences [2, 3], conflict resolution and governance [11, 16], content quality control [18, 23] and encouraging participation by lowering participation barriers [4] and providing incentives [12]. These identify factors to consider, even when findings do not transfer directly to pedias. Newcomer experiences, dispute resolutions, contribution norms, governance, and rewards for participation differ in enterprise settings. Enterprise wikis are situated in the context of well-established offline environments.

3. METHODS

We studied internal-use wiki usage within a large multinational software company headquartered in North America. Its employees are likely more technically savvy than most knowledge workers, but challenges to adoption and sustainability will plausibly be *more* pronounced in less technically-savvy settings.

Our data include 18 individual interviews, 1 group interview, 5 years of messages from of a social computing email list that included discussions about wikis, 1 planning meeting observation, manual examination of internal-use wikis within the organization, and distribution of a survey about adoption, evolution, and attitudes toward wikis. Our informants included wiki readers, contributors, and IT support staff. We sampled by identifying active contributors to internal email distribution lists about wikis, examining content on internal-use wiki servers and directly contacting contributors, contacting the staff members involved with the management of the wiki platforms within the organization, and by snowball sampling. During interviews, we asked participants about wiki experiences, rewards for use, perceptions of success and failure with collaboration technologies, and effects of wikis and other collaborative software on work processes. When possible, we examined relevant wikis prior to interviews and conducted interviews in informants' offices. In addition to interviews, we observed a planning meeting in which employees of a startup firm recently acquired by the software company discussed integrating their wikis into the large software company's infrastructure and possibly contributing to its pedia effort. Both researchers independently analyzed interview and observation data using open-coding techniques. Guided by these results, we then surveyed users of an internal wiki platform. The survey assessed motivations for wiki creation, the nature of the content included in the wiki, challenges as the wiki evolved over time, and personal attitudes toward the wiki in question and wikis in general. We sent survey invitations to all 4444 users of the system, and received 433 survey responses, as well as notification that 619 invitees were no longer at the organization (a point to which we will return).

To obtain further insight into issues involved in pedia construction, we compared our results against media reports and discussions we had with people involved with Pfizer's Pfizerpedia and the US intelligence community's Intellipedia [19].

4. A TAXONOMY OF WIKI GENRES

Within our site of study, wiki use was an emergent phenomenon, rather than a top-down mandate. Wikis arrived as a broadly-accessible resource at least five years prior, when a product group director created an internal wiki-hosting service. This service had no corporate IT support, consistent with the company's history of unsupported internal use of early-stage software tools. As the time of this research, there were 1071 wikis on the server. A second wiki-hosting service, hosted by a business software team emerged later. This service was a test version of wiki functionality intended for inclusion with a new version of the group's business collaboration software. After many months of having the test platform available, the wiki functionality was introduced as a template in the next version of this group's document repository software (used widely within the organization). Yet even two years after the new version was introduced, 2161 wikis remained on the old test server, some of which were still active. Finally, we observed the emergence of a wiki-based corporate-wide encyclopedia during the course of our study and heard of two similar earlier efforts. Neither of these earlier efforts gained critical mass, stalling after accumulating several hundred articles. Ultimately, this history of wiki usage within the organization illustrates that an "enterprise wiki" is a blanket term describing three different genres of wiki: *group or team wikis, single contributor wikis,* and *pedias.* We discuss each in turn.

4.1 Group or project wikis

Group or project wikis were common; 71% of people responding to our survey indicated they used wikis for purposes such as team communication, documentation of product features, orientation of new workers, and discussions of special interests that may not be directly related to work matters (e.g. pages related to hobbies shared by some workers). This use of wikis has garnered the most study in prior work, and as such, we turn our attention to other less understood genres of enterprise wikis.

4.2 Single-contributor wikis

Our informants described using wikis maintained by a single person. These came in two varieties; the first as personal information management tools intended for the owner's use only. The second use was to provide a resource written by one person and shared with others for reading, a frequent case being a page of answers to commonly asked questions. In some cases, the originator initially anticipated other contributors. These other contributors did not materialize, however.

It can be argued that the essence of being a wiki is collaborative editing, in which case a single contributor wiki is in effect an easily constructed web page built on a wiki platform or tool. Even so, there will be a continuum, with some overwhelmingly created by one person. This usage has been seen in the educational setting as well. For example, Forte's study of wiki use in classroom found that the more successful use was in a class where each student created a page that related to the work of other students and was viewed but not edited by them [7].

In a large organization, responsibilities are divided and over time people become authorities on or responsible for particular subjects. People do not edit one another's web pages, and a wiki initiator may hope others will contribute, but other people may not be sure how much the creator really feels about it. This tension and lack of clear norms for participation may deter contributions, and inadvertently force what was intended to be a group effort into being a single-contributor wiki.

4.3 Pedias

One group within the company was engaged in an effort to create an encyclopedic enterprise-wide information repository, which we define as a *pedia*. Pedias as a genre differ from single contributor and project wikis in notable ways. First, a pedia is a designed object, intended to be a standalone, comprehensive source of company knowledge. The other wikis we saw were primarily tools to assist in creating an artifact (e.g., a software product) or understanding a process (e.g., information for new hires). As a result, we saw more concern about creating uniform, "neat" content within a pedia. Second, pedias strive for uniformity in appearance, degree of detail, and utility to a broad readership. In contrast, single contributor and group wikis target a specific audience. Finally, the comprehensive ambition of a pedia means that it requires more resources, management, and thought devoted to incentive structures and conflict resolution policies.

The success of Wikipedia and the perennial goal of building an effective organizational system to locate knowledge and expertise

make the pedia a naturally attractive proposition. Media reports suggest that organizations are experimenting with pedia introduction (such as the above noted Intellipedia and Pfizerpedia which have also attracted media attention). In the organization we studied, there were three attempts at creating pedias; the first two were short lived. The third has been in use for over two years, though not as extensively as envisioned. In the next section, we cover issues pertaining to pedias.

5. PEDIAS AT WORK

When a large organization undertakes to create a company-wide pedia, how will interest and mechanisms for sustaining the pedia over the long term be established? We observed a tension between the desire to encourage contributions of any sort and the desire for content that is relevant to casual readers. Our informants expressed uncertainty about conflict resolution and equitable participation by non-technical employees. We also saw tensions relating to placing information within both the pedia and other information sources. We discuss each of these issues in turn.

5.1 Encouraging Growth

Wikipedia benefits from the encyclopedia model. Established contribution norms dictate that detail that is of interest to only a few people should be omitted. Pedias, on the other hand, may struggle with adopting Wikipedia's norms. Within the company we studied, questions arose about the types of content and level of detail that belonged. For example, we observed a planning meeting between core members of a recently acquired startup company that was transitioning into the organization and the lead developer of the pedia initiative. The latter envisioned pedia entries as general-interest summaries; the startup team members favored moving in every bit of content they could, including much detail of interest only to team members. The head of the pedia effort was torn between his desire to promote use and his vision of what use should be. Without established contribution norms, whether emergent or it can be difficult to know what is—and is not—appropriate content within a pedia. Yet even if contribution norms are established, how can long-term pedia growth be encouraged? In the company we studied, the pedia team took several steps. They pre-populated entries by scraping information from corporate directories and creating stub pages for each employee within the company. They also dynamically appended Wikipedia content to some articles. Although employees automatically had some information about them in the pedia, this did not guarantee participation. After a year of use, the pedia had contributions from a mere 2% of the company's employees, despite efforts made by the team to publicize the resource.

Why did so few people participate? The company experienced a familiar problem in collaborative software; the people who needed to put in the work to make the system useful were not necessarily those who saw direct benefits of use [9]. Contributing to a pedia was not part of the employees' day-to-day jobs, nor did it appear to help them do their jobs any better (although it could assist others). Moreover, content in the pedia in some cases overlapped with information already in other places (e.g. document repositories or smaller wikis). In organizations considering a pedia, a possibility to increase participation is to reduce the workload of contributing content, for instance by assisting potential contributors with the task of merging information from other resources such as document repositories or smaller wikis.

5.2 Curbing Territoriality

Even with tools to assist adding content to the pedia, will individuals or teams want to expose this information to the company at large? Our data suggest "not always." For example, a lead software developer we interviewed was concerned that information for use within the team could be misinterpreted by the company's sales representatives (e.g., they might infer from a wiki that unfinished features were included in a product). Others recounted accidental misinterpretation of information. For example, a junior developer described downloading resource-intensive software linked from another team's wiki without realizing that it was intended for within-team use only; he only learned of his mistake when a member of the team contacted him to ask him to stop using the software.

This suggests a capability for providing one view of information for the team and another for the company at large. Yet will employees spend the time to keep multiple views up to date? Maintaining multiple views may require having people who take active responsibility and receive recognition for the task.

5.3 Turnover and Organizational Change

In addition to establishment of contribution norms, employee turnover and organizational change also present challenges for which Wikipedia doesn't present clear guidance. Any large company will inevitably experience individual employee turnover (e.g. 14% of the wiki contributors we attempted to survey had left the company). In addition to employees leaving the company, teams within the company may be reorganized or dissolved to meet emerging business needs. Our informants again and again expressed questions about whether information stored in the pedia or in other teams' wikis were up-to-date; the only clues that a reader could see are usernames and timestamps indicating when content had last been updated. Readers had no easy way to tell whether the information was current, the project was still active, or the contributors were still employed with the specific team or the organization at large.

These concerns about organizational change and content freshness suggest a role for more detailed information about the people who contribute content to a pedia. For example, one could imagine that alongside each article in a pedia, there would be a listing of people who have contributed to it with their current company status (e.g., are they still employed?) and contact information. Including these cues both gives employees credit/recognition and makes them more accountable for keeping the information up to date. Furthermore, building functionality into the system to allow people to contact one another using the pedia as a channel might increase the probability that answers and updates will be incorporated into the pedia after the question is resolved.

5.4 Dispute Resolution

Wikipedia is heavily plagued by vandalism and vehement disagreement among contributors on some topics. These concerns play out differently within an enterprise. On a corporate intranet, contributors are less anonymous and have reputations to uphold. Our interview and survey participants were unconcerned with spam and vandalism—*no employees* in the interviews or surveys believed these issues to be relevant in workplaces. Yet even content that is *not* spam or the work of a prankster can cause conflict. During our study, a pedia contributor added a page of what might best be described as gossip and speculation about an employee fired for inappropriate conduct. Such information is typically conveyed through informal, hushed communication

channels, such as hallway conversations, but the pedia entry exposed it to all employees. A Human Resources employee was contacted about the page, but could not figure out how to edit the pedia; she in turn directly contacted the pedia management team and asked them to remove the content. The pedia team itself was divided as to the appropriate response to this situation.

This incident illustrates two concerns with enterprise pedias. First, although content is *relatively* easy to edit, barriers to participation exist. Will participation end up restricted to relatively technical employees? In the organization we studied, the platforms were available to anyone, but wiki use of *any* sort was primarily by more technical employees. Second, there are uncertainties about responsibility and dispute resolution. Should disputants communicate directly through discussion pages? Is the pedia development team responsible? Should a "benevolent dictator" be empowered to change content without discussion? Most Wikipedians communicate through the tool itself. In an enterprise, ready access to email, IM, phone, mailing lists, and shared documents is likely to reduce the drive to establish new channels or formal policies for exchanging information or resolving disputes about pedia entries, limiting the visibility of the transaction history of an entry. Yet formal mechanisms and policies may still be needed to resolve conflicts. Best practices may evolve or vary across organizations. Given that even Wikipedia management is still evolving, enterprises embracing pedias might anticipate an extended period of exploration before contribution and dispute resolution norms are firmly established.

6. CONCLUSION

We provided a taxonomy of internal-use enterprise wikis, and define a genre of enterprise wiki which we call a *pedia*, which is an encyclopedic resource for employee use emulating Wikipedia. Companies embracing pedias must resolve a number of questions. Who will maintain the server, promote use, resolve disputes, enforce consistency, identify topics that need development or maintenance, and reward contributors? If we look to Wikipedia, we see little guidance on these issues. Although Wikipedia has evolved well established norms and a large base of volunteer support for governance, the ways in which it handles these issues may not generalize to enterprise settings. To encourage a thriving pedia, organizations must carefully consider incentivizing participation, establishing clear contribution norms, and providing clear mechanisms for dispute resolution and pedia maintenance.

7. ACKNOWLEDGEMENTS

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8. REFERENCES

[1] Bruns, A. & Humphreys, S. 2007. Building collaborative capacities in learners. Proc. WikiSym'07, 1-10.

[2] Bryant, S.L., Forte, A. & Bruckman, A. 2005. Becoming Wikipedian: Transformation of participation in a collaborative online encyclopedia. Proc. GROUP'05, 1-10.

[3] Choi, B., Alexander, K., Kraut, R.E. & Levine, J.M. 2010. Socialization tactics in wikipedia and their effects. Proc. CSCW'10, 107-116.

[4] Cosley, D., Frankowski, D., Terveen, L. & Riedl, J. 2007. SuggestBot: using intelligent task routing to help people find work in Wikipedia. Proc. IUI'07, 32-41.

[5] Danis, C. & Singer, D. 2008. A wiki instance in the enterprise. Proc. CSCW'08, 495-504.

[6] Egli, U. & Sommerlad, P. 2009. Experience report—Wiki for law firms. Proc. WikiSym'09, Article 19.

[7] Forte, A. & Bruckman, A. 2007. Constructing text: Wiki as a toolkit for (collaborative?) learning. Proc. WikiSym'07, 31-42.

[8] Geiger, R.S. & Ribes, D. 2010. The work of sustaining order in wikipedia: the banning of a vandal. Proc. CSCW'10, 117-126.

[9] Grudin, J. 1994. Groupware and social dynamics: eight challenges for developers. Commun. ACM, 37, 1, 92-105.

[10] Havenstein, H. 2008. Pfizer Launches RSS for R&D Computerworld, May 14.

[11] Kittur, A., Suh, B., Pendleton, B.A. & Chi, E.H. 2007. He says, she says: conflict and coordination in Wikipedia. Proc. CHI'07, 453-462.

[12] Kriplean, T., Beschastnikh, I. & McDonald, D.W. 2008. Articulations of wikiwork: Uncovering valued work in Wikipedia through barnstars. Proc. CSCW'08, 47-56.

[13] Majchrzak, A., Wagner, C. & Yates, D. 2006. Corporate wiki users: Results of a survey. Proc. WikiSym'06, 99-104.

[14] Phuwanartnurak, A.J. 2009. Did you put it on the wiki? Information sharing through wikis in interdisciplinary design collaboration. Proc. SIGDOC'09, 273-280.

[15] Priedhorsky, R., Chen, J., Lam, S.K., Panciera, K., Terveen, L. & Riedl, J. 2007. Creating, destroying, and restoring value in Wikipedia. Proc. GROUP'07, 259-268.

[16] Reagle, J. M. 2007. Do as I do: Authorial leadership in Wikipedia. Proc. WikiSym'07, 143-156.

[17] Rick, J. & Guzdial, M. 2006. Situating CoWeb: A scholarship of application. International journal of computer-supported collaborative learning, 1, 1, 89-115.

[18] Stvilia, B., Twidale, M.B., Smith, L.C. & Gasser, L. 2005. Assessing information quality of a community-based encyclopedia. Proc. ICKM'05, 101-113.

[19] Thompson, C. 2006. Open-source spying. New York Times Magazine, December 3.

[20] Viegas, F. B., Wattenberg, M. & Dave, K. 2004. Studying cooperation and conflict between authors with history flow visualizations. Proc. CHI'04, 575-582.

[21] Wagner, C. & Majchrzak, A. 2007. Enabling customer-centricity using wikis and the wiki way. Journal of management information systems, 23, 3, 17-43.

[22] White, K. F. & Lutters, W.G. 2007. Midweight collaborative remembering: Wikis in the workplace. Proc. CHIMIT'07, Article 5.

[23] Wöhner, T. & Peters, R. 2009. Assessing the quality of Wikipedia articles with lifecycle based metrics. Proc. WikiSym'09, Article 16.

[24] Yang, D., Wu, D., Koolmanojwong, S., Brown, A.W. & Boehm, B.W. 2008. WikiWinWin: A wiki based system for collaborative requirements negotiation. Proc. HICSS 2008, 10 pages.