Corporate Wiki Users: Results of a Survey

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ABSTRACT
A survey of 168 corporate wiki users was conducted. Findings indicate that corporate wikis appear to be sustainable. Users stated three main types of benefits from corporate wikis: enhanced reputation, work made easier, and helping the organization to improve its processes. These benefits were seen as more likely when the wiki was used for tasks requiring novel solutions and the information posted was from credible sources. Users acknowledged making a variety of contributions, which suggests that they could be categorized as "synthesizers" and "adders". Synthesizers' frequency of contribution was affected more by their impact on other wiki users, while adders' contribution frequency was affected more by being able to accomplish their immediate work.

Categories and Subject Descriptors
H.5.3 **[Group and Organization Interfaces]**: Asynchronous interaction, Collaborative computing, Computer-supported cooperative work, Organizational design, Synchronous interaction, Theory and models, Web-based interaction; H.4.3 **[Communications Applications]**: Computer conferencing, teleconferencing, and videoconferencing; H.3.1 **[Content Analysis and Indexing]**: Abstracting methods; Indexing methods.

General Terms
Management, Documentation, Performance.

Keywords
Corporate wiki, knowledge contribution, knowledge reuse, synthesizers, adders, knowledge restructuring, survey.

1. INTRODUCTION[1]
Increasingly, the private sector is engaging in the use of wikis. Gartner, Wall Street Journal and Business Week [3,5,7] have identified wikis as an up-and-coming technology to support collaboration within and between firms.

Despite this increasing attention to corporate wikis in the popular press, there has been little research attention to how corporate wikis are used, the benefits they create, and the factors that encourage sustained use. Therefore, following-up on a series of in-depth interviews with wiki champions in Summer 2005, we embarked on a survey of corporate wiki users in the Fall 2005 initiated at the 2005 WikiSym in San Diego. We were interested in addressing five questions:

1) Are wikis sustainable?

Since many firms are still in a piloting mode, we were curious to find out if wikis in a corporate context have sustainability, or whether they were generally short-lived. We reasoned that if corporate wikis were in use for a reasonably long time, it would suggest they were purposeful rather than a fad.

2) Do wikis create different forms of benefits for their users?

The open source research community [6,8,9] has generally argued that people contribute to open sites for both altruistic and personal benefits. What benefits would arise in a corporate context? Personal benefits are likely to be centered on the work the wiki is supporting. In addition, can personal reputation gains be achieved, in an environment where most users are company insiders? Finally, will the list of benefits include benefits to the organization, or are users only concerned about their own gains? To answer these questions, we explored the extent to which three types of benefits were achieved: make work easier, personal reputation, and organizational improvements.

3) What factors affect the benefits that users receive?

Since wikis facilitate shared editing and information exchange, a variety of collaboration-related factors are likely to shape the work, reputation, and organizational benefits obtained from wikis.

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Previous studies of open source communities have not explored these factors, and hence we were interested in exploring them.

4) Are there different types of contributors to wikis?

The wiki way encourages different forms of contributions, ranging from simply adding new content on an existing page, to significant refactoring. We sought to determine in which ways participants tended to contribute and whether they preferred a particular form of contribution.

5) What factors encourage different types of contributors to contribute?

The factors that influence different types of contributors to make their wiki contributions are yet unknown. Hence we decided to explore the relative influence of a range of factors on encouraging different types of contributors to make their contributions.

2. SURVEY

The survey results presented in this paper come from the second of a two-phase research project investigating how wikis are used in corporate settings. In the summer 2005, we undertook a set of qualitative interviews with champions of several corporate wikis, as well as wiki evangelists in companies. Based on those interviews, we were able to prepare and pilot a questionnaire at the 2005 WikiSym in San Diego. We then advertised the wiki survey on 10 different list servers likely visited by corporate wiki users[2]. We also contacted companies likely to be using wikis, asking them to advertise the survey to their user population. We offered a raffle in exchange for completing the survey. We randomly selected a prize winner from the first 80 respondents and then another one from the next 80 respondents.

This type of sampling technique, called purposive sampling, allows for a greater freedom in locating and contacting corporate wiki users around the globe and in a variety of corporate settings (large vs. small firms, research vs. production, etc.) [1]. Often wiki users visiting the sites listed in footnote 2 forwarded the survey link to other users that the authors were not even aware were using corporate wikis. It is possible that internet-based surveying can lead to response bias, since the researchers are not able to pre-select a random sample of wiki users to respond and do not know for certain why some wiki users opted to take the survey while others did not. However, based on our response patterns and qualitative feedback from the respondents we believe that response bias for this study is minimal. For example, there were no significant differences in responses between the first 80 and the second 80 respondents. Also, there was almost equal representation from 'core group' respondents and non core-group respondents (83 and 85, respectively). Finally, qualitative feedback indicated a range of successes vs. failures and acceptance vs. rejection of wiki technology. Thus we are confident that our respondents were not all enamored with wikis nor did they all have axes to grind, but represented a fair mix of impressions and experiences.

We closed down the survey late in December 2005, after obtaining 168 responses. In January 2006, we sent a report to the respondents describing the initial results. This article describes the results of our continued analysis of the responses.

2.1 Respondent Sample

The 168 respondents overall were experienced wiki users, with an average of 15 months contributing to a company wiki, and an average of 26 months contributing to wikis in general. In addition, the respondents, on the average, read 3.4 different wikis daily, contributing to 1.5 company wikis. There was much diversity in the sample, however, as some respondents had spent only one month contributing to their wiki, one month contributing to wikis in general, and had read and contributed to only one wiki regularly.

To ensure anonymity, we did not ask respondents for their place of employment. However, several factors indicate a breadth of companies being represented in the survey. We asked about the number of employees in respondent organizations and obtained the full range of organizations, from less than 100 employees to 10,000+ employees.

We asked about the work activities that the wiki was used to support. We received a range here as well. The most common work activities mentioned were:

- **Software development** (including technical documentation, client approval, issues tracking, internal workflow, quality & process management, software design, reference information, setup information, configurations, specifications, instructions for installing software, listing of software versions used in the company, tracking information on the various software applications used in the organization, application maintenance and operations).
- **E-learning** (including web design, requirement descriptions, testing, assignments to training).
- **Project management** (including creation of deliverables, meeting agendas, status reports, "great ideas" saved for later, standards and practices).
- **Posting of general information and knowledge management** (including vacation schedules, how-tos, personal blogs, corporate information, collaborative pages of resources related to a topic as a complement to formal intranet pages, best practices, innovative methods and processes utilized, corporate polices and procedures, human resource information, guidelines, insurance information, expense reimbursement, time-off).
- **Communities of practice and user groups**.

[2] These included meatball.com, wikisym.org, twiki.org, mediawiki (mail.wikipedia.org/pipemail/ mediawiki-I), a variety of Yahoo Groups including bayxp, domaindrivendesign, industrialxp, junit, siliconvalleypatterns, and testdrivendevelopment, j2eepatterns-interest@java.sun.com, patterns-discussion@cs.uiuc.edu, Twiki Codev community, Twiki Support community, www.aacrawiki.com, Colabria blog (http://kmblogs.com/public/blog/107934), KM Cluster (www.kmcluster.com), SIM (www.simnet.org), the Marshall alumni page, and many interested bloggers who took it upon themselves to spread the word.

- **Ad-hoc collaboration** (including creating work product drafts, hashing out ideas, remote collaboration, business brainstorming).
- **Tech support** (including best practices, customer support information-sharing, local help information with how-tos and best known methods, systems requests for new hardware, email setup, software downloads).
- **Marketing and customer relationship management** (including tracking interesting marketing trends, collecting data, logging daily lead counts, information on partnerships, notifying users of new features, marketing materials, with some opening up their wikis to selected customers).
- **Resource management** (enabling users to make claims for usage of shared machines).
- **R&D** (including product requirements, product information, & commercialization with one reporting that "almost everything relating to R&D is tracked through the wiki").

The rich set of organizational uses is illustrated for instance by the following response: "The *Sales* department uses wikis to log the daily lead counts and to get information about partnerships, positioning, product features, and company intelligence; the *Professional Services* department uses the wiki to outline the details of each client implementation and record progress as mini-projects; the *Operations* department uses the wiki to update the company on product issues; the *Marketing* department uses the wiki to produce web and print collateral and manage some aspects of marketing campaigns; the *Product Management* department uses the wiki to track interesting marketing trends, and the *Partnerships* department uses the wiki to collaborate on a joint project with a remote team at another company in a different continent."

Clearly, then, the survey has captured a range of ways in which wikis were used and a range of users. We now proceed to each of our five questions.

3. RESULTS

3.1 Are Wikis Sustainable?

A variety of measures have been proposed to assess sustainability of a wiki site [2]. We focused on four measures: length of time in existence, number of lurkers, number of contributors, and frequency with which pages are accessed. We found that the wikis referenced by our respondents were indeed being sustained. The respondents stated that wikis had existed, on the average (median), from 12-24 months, had on the average of 12 contributors and 25 lurkers, and were "frequently" (5.8 on a 1-to-7 scale) accessed. We found that the age of the wikis contributed to the sustainability. That is, the older the wikis, the more frequent the accesses, the greater the number of lurkers, and the greater the number of participants (significant correlations ranging from .28 to .51). Thus, according to our sample, companies appear to succeed at using wikis beyond few-month pilot projects, into a sustainable part of their collaborative work processes.

3.2 Do Wikis Create Different Forms of Benefits?

We used three standardized scales to assess the degree to which a respondent felt that wiki use led to reputation, easier work, and organizational benefits. Note that all respondents were contributors to the wiki that they were assessing. Table 1 includes the actual items used in each scale. It is apparent from the table that while wikis appear to rarely help an organization identify new business opportunities, wikis can help an organization by improving work processes, collaboration and knowledge reuse. Most respondents reported that wiki use made their work easier.

Table 1: Benefits Obtained from Wiki Use

	% "often" to "significant" (5-7 on 1-7 scale)	Mean / (Std. Deviation)
Enhanced Reputation "To what extent has using this wiki helped you to":		
-- earn respect of others	29	3.66 (1.48)
-- improve professional status	23	3.25 (1.56)
-- improve reputation in company	28	3.53 (1.50)
Made Work Easier "How often have you added new information or made a change to the wiki because":		
-- information was of immediate relevance to my work	81	5.40 (1.36)
-- by keeping knowledge updated, my work would be easier	75	5.23 (1.35)
-- by putting in my knowledge, disseminating my work would be easier	71	5.03 (1.56)
Helped Organization "To what extent would you say that your knowledge-sharing on this wiki has helped your organization to":		
-- improve work processes	49	4.46 (1.35)
-- increase collaboration efficiency	63	4.78 (1.34)
-- increase knowledge reuse	69	5.07 (1.34)
-- identify new business opportunities	11	2.45 (1.36)

Finally, only a minority of the respondents reported that the wikis enhanced their reputations. This result differs from the open source research findings which indicate reputation as a primary benefit of contributing. Thus, we believe that corporate wikis have a different effect on users than open source software

community participation, and that the benefits are primarily organizational and work-related. Nevertheless, some users received reputation benefits, and these will be explored next.

3.3 What Affects Benefits?

As wiki contributors, the respondents are engaged in an active process of adding information, editing information, reading wiki information, and then using that information in their daily work. What factors influence whether one respondent obtains more benefits from this process than another?

We looked to the collaboration and knowledge-sharing literature to identify factors that might affect wiki user benefits. The factors we explored included the degree to which the individual:

- believes there is a need for collaboration (because the task requires new solutions or requires others' inputs),
- has the capability to collaborate effectively,
- believes other contributors to the wiki have credible knowledge to contribute,
- is reliant primarily on the wiki for collaboration (versus other communication tools), and
- has a formal role related to collaboration on the wiki (such as being a member of the wiki's core group. Core group members are those users with special access rights or responsibilities).

Table 2: Regressions of Benefits on Influencing Factors

	Organiz-ation Benefits (n=168)	Reputa-tion Benefits (n=168)	Work Benefits (n=168)
Degree to which the individual believes there is a need for collaboration (because task requires new solutions)	sg	sg	sg
Degree to which the individual believes there is a need for collaboration (because task requires others' inputs),	--	--	sg
has the capability to collaborate effectively (with task expertise),	--	sg	sg
believes others in the collaboration have credible knowledge to contribute,	sg	sg	sg
is reliant primarily on the wiki for collaboration,	--	--	sg negative
has a formal role for collaboration on the wiki (such as a member of the wiki's core group)	--	--	sg
Adjusted R^2	.15	.21	.31

Table 2 displays the results of the regressions for each of the three benefits on these sets of factors ('sg' indicates a statistically significant impact.) The table shows that there is a core set of two factors that contribute to achieving all three of the benefits: 1) users performing tasks that require new solutions (with a corresponding need for collaboration), and 2) users believing that other collaborators possess credible knowledge. The more these factors are in place, the more each benefit is achieved. In addition, reputation benefits are further increased the more the respondent feels s/he has relevant task expertise. Reputation gains, according to these findings, may likely only occur for those who have some expertise to contribute to the wiki. Finally, the benefit of making work easier with wikis is enhanced when the wiki is used on tasks that not only require novel solutions but require others' inputs. Contrary to expectation, we found that the more additional channels of communication respondents use to collaborate with others, the greater their work benefits. This may be due to the additional channels being used to help in interpreting information obtained on the wiki. Thus, reliance on wikis as the sole communication channel is not critical or even helpful to acquiring benefits; but wikis may functionally bridge the gap between development of knowledge and discussion of what was developed, which does not occur as easily with other communicative media such as email [4]. Finally, work benefits are more likely to accrue to those who have a formal role related to the wiki (i.e., that are members of the core group), presumably because the relevance of the wiki to the work activities of a core group member is likely to be higher than for non core group members. Note that the total variance accounted for in organization and reputation benefits is fairly low compared to work benefits, and thus, the factors are not highly predictive.

3.4 Are There Different Types of Contributors to Wikis?

We asked respondents to report on the frequency with which they made nine different types of contributions.

Table 3: Types of Contributions

	Mean (1=never, 7=all the time)	Standard Deviation
How often have your contributions to the wiki been:		
Adding content to existing pages	5.41	1.12
Adding new pages	5.02	1.39
Making comments on existing pages	3.88	1.77
Making small corrections in factual inaccuracies	3.78	1.54
Integrating ideas that have been posted onto existing pages	3.47	1.53
Reorganizing a set of pages	2.82	1.50
Editing others' grammar or spelling	2.73	1.60
Rewriting whole paragraphs	2.29	1.29
Rolling-back others' writing	1.74	1.02

Table 3 shows, not surprisingly, that adding content and adding pages were the most frequent contributions, with comments and small corrections the next most frequent. Somewhat surprising was that integrating ideas already posted was the next most frequent indicating that the sample included people who were willing to spend their time integrating others' contributions. Not surprisingly, roll backs were the least frequent type of contribution made.

To determine if respondents clustered into subgroups by the types of contributions they made, we first conducted an analysis (referred to as a factor analysis) to determine which types of contributions clustered together. Then, we assessed if respondents could be associated with these clusters. The factor analysis results are shown in Table 4.

Table 4: Results of Factor Analysis on Types of Contributions

	Loadings		
	Factor 1 "Synthe-sizing"	Factor 2 "Adding"	Factor 3 "Comm-enting"
Adding content to existing pages	.10	.83	.33
Adding new pages	.24	.88	.02
Making comments on existing pages	.15	.13	.88
Making small corrections in factual inaccuracies	.40	.18	.72
Integrating ideas that have been posted onto existing pages	.82	.01	.29
Reorganizing a set of pages	.79	.37	.09
Editing others' grammar or spelling	.76	.17	.20
Rewriting whole paragraphs	Cross-loaded		
Rolling-back others' writing	Cross-loaded		
Amount of variance accounted for by factor	30%	24%	22%

The findings suggest that contributions involving integration, reorganization and rewriting whole paragraphs could be clustered together – a cluster we call "Synthesizing". Contributions involving adding content and adding pages could be clustered together as well – a cluster we call "Adding". Finally, a third cluster of commenting and small corrections emerged (labeled as "Commenting").

We then created variables for each cluster; the synthesizing variable averaged the three types of contributions for synthesizing, and the adding variable aggregated the two types of contributions respondents made for adding. Then, for each of the two variables created – synthesizing and adding - we split the sample of respondents into those above and below the median.

This procedure separated respondents into high versus low contributors for both variables. Crossing the two splits yielded, as shown in Table 5, a group of respondents who primarily made adding contributions – we call them "adders" – and a group of respondents who primarily made synthesizing contributions – we call them "synthesizers" – emerged.

Table 5: Number of Respondents for each Created Variable

		Amount of Adding Contributions (split by median)	
		Low	High
Amount of Synthesizing Contributions (split by median)	Low	37 ("Minimalists")	47 ("Adders")
	High	47 ("Synthesizers")	37 ("Multiplexers")

This analysis suggests that there are different types of contributors, some who focus primarily on adding new content, and some who focus primarily on synthesizing already existing content. There are also those who focus on both types of contributions, the "Multiplex" contributors, as well as those who make minimal contributions of either type.

3.5 Are There Different Factors that Encourage Different Types of Contributors?

We concentrated on the two "pure" sub-samples of synthesizers and adders in trying to understand what factors would encourage these two different contributor subgroups. Our assumption was that both contributor groups were influenced by the same set of factors. In addition, we reasoned that the success of the website, in terms of site accesses by others and benefits achieved, were part of a feedback cycle, likely to influence the frequency of contributions made to the wiki site. The results of our analysis, conducted as a set of regressions, are shown in Table 6.

Examining Table 6 reveals several interesting results. First, the amount of variance accounted for by the factors is very high, giving us some confidence in the predictability of these factors. Second, the factors influencing frequency of contribution for each subgroup is quite different, suggesting that the different groups have different motivations for contributing. Finally, examining the specific factors for each group suggests some labels we can apply. Synthesizers are more affected by the impact they can have: impact to the organization, impact on the task by finding a new solution, impact on people who are accessing the wiki site, and impact on others based on their reputation. Synthesizers are not more likely to make integrative contributions when it helps make their work easier; nor are they more likely as a member of the core group – providing further evidence that Synthesizers are more interested in their impact than other factors. In contrast, adders are more "utilitarian", concerned with helping the organization, while also being concerned about their time, and easy work process, and about fulfilling their formal roles as core group members. Adders are, in tendency, not concerned about reputation, frequency of site access, or task novelty. This result provides further evidence that adders are less interested in impact and more interested in having their immediate work

responsibilities fulfilled. Note that, contrary to expectation, core members are *not* more likely to be synthesizers.

Table 6: Results of Regressions of Frequency of Contribution on Possible Influencing Factors for each Subgroup

	Synthesizer Subgroup	Adder Subgroup
Degree to which wiki benefits organization (normalized by org. size)	sg	sg
Degree to which task requires new solutions	sg	--
Degree to which wiki helps my reputation	sg	--
Degree to which time is a barrier to my contributing	--	sg negative
Degree to which wiki helps make my work easier	--	sg
Frequency with which the wiki site is accessed by others	sg	--
Being a member of the core group	--	sg
Non-significant factors: bridging capability, credibility of others, familiarity with others, task expertise, available alternative comm. channels, interdependence with others, personal and organizational experience with wikis		
Adjusted R^2 (amount of variance accounted for by the influencing factors)	.53	.40

4. CONCLUSION

This study of corporate wiki users confirmed across a relatively large set of respondents that corporate wikis are sustainable. Sustainability is based on the length of wiki existence, the number of participants, the number of lurkers, and the frequency of accesses.

Three types of benefits are achieved though the participation in and use of corporate wikis: benefits to enhanced reputation, benefits to making work easier, and benefits to helping an organization improve its processes. Not all corporate wikis generate these benefits, however. Benefits are more likely perceived when work tasks require novel solutions (rather than routine tasks), and when other wiki contributors are believed to provide credible information. In addition, specific benefits are susceptible to different additional factors: reputation benefits are more likely the more expert someone is, and work benefits are more likely associated with task interdependence, availability of alternative communication channels, and membership in the core group. Finally, we found that users make a variety of contributions to wikis, and that adders and synthesizers do constitute different subgroups of users. Synthesizers are more interested in impact, while adders are more interested in accomplishing their immediate work responsibilities.

As with any study there were a few limitations concerning our methods which should be addressed. First, our focus on corporate wiki users may not generalize to non-organizational contexts such as contributors to Wikipedia. Our intent was to capture contribution activity related to organizational motivations in addition to any altruistic and/or personal use motivation. Even though corporate uses for wikis vary widely, the embeddedness of corporate wiki users in their organization is similar across different organization types. Second, respondents 'opted-in' to the survey by clicking on a web link, thus we have no way of discerning which users were aware of the survey but decided not to participate, and how many users started the survey but failed to submit. These limitations are common for internet-based research and, compared to more traditional methods such as in-person interviews or mailings, this problem is more pronounced. However even with more traditional survey methods, accountability of non-respondents does not mean the researcher has any additional insight into how these individuals might have responded. And the breadth of experience made accessible via internet surveying positively outweighs any negative repercussions. Even if some response bias were present its impact on this study would be minimal; all of our research questions except the first two concern relationships between variables and there is no theory to suggest that highly committed and interested wiki users would respond differently than less committed users. For the first two research questions, the breadth of response more than compensated for any potential bias.

This research yields several implications for the corporate wiki community and managers pursuing wikis in the workplace. First, clearly identifying benefits towards improved organizational processes, collaboration, and knowledge reuse will encourage user contributions. This insight expands our understanding of open contribution that is based on research in open source software development, since corporate wikis add the additional elements of organizational context and collaborative authorship. Second, seeking out both impact-oriented individuals and utilitarian-oriented individuals will help to ensure that each wiki site has both synthesizers and adders. Third, tying wiki use to more novel, rather than routine tasks, will lead to greater benefits. Finally, ensuring that wiki users recognize that added knowledge must be credible, and that synthesizing is as important as adding, will increase the probability that benefits will be achieved.

5. ACKNOWLEDGMENT

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