

Encyclopedia of E–Collaboration

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Wikis as Tools for Collaboration

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INTRODUCTION

Tim Berners-Lee, the inventor of the World Wide Web, envisioned it as a place where “people can communicate ... by sharing their knowledge in a pool ... putting their ideas in, as well as taking them out” (Berners-Lee, 1999). For much of its first decade, the Web was, however, primarily a place where the majority of people took ideas out rather than putting them in. This has changed. Many “social software” services now exist on the Web to facilitate social interaction, collaboration and information exchange. This article introduces wikis, jointly edited Web sites and Intranet resources that are accessed through web browsers. After a brief overview of wiki history, we explain wiki technology and philosophy, provide an overview of how wikis are being used for collaboration, and consider some of the issues associated with management of wikis before considering the future of wikis.

In 1995, an American computer programmer, Ward Cunningham, developed some software to help colleagues quickly and easily share computer programming patterns across the Web. He called the software WikiWikiWeb, after the “Wiki Wiki” shuttle bus service at Honolulu International Airport (Cunningham, 2003). As interest in wikis increased, other programmers developed wiki software, most of it (like WikiWikiWeb) open source. Although wiki software was relatively simple by industry standards, some technical knowledge was required to install, maintain and extend the “wiki engines.” Contributors needed to learn and use a markup language to edit pages, and even if the markup languages were often simpler than HTML, non-technical users did not find these early wikis compelling.

In the early years of the twenty-first century, a number of developments led to more widespread use of wikis. Wiki technology became simpler to install and use, open source software was improved, and commercial enterprise-grade wiki software was released. The not insignificant issues associated with attracting and

managing a community of people who use a wiki to share their knowledge were discussed in forums such as *MeatballWiki* (<http://www.usemod.com/cgi-bin/mb.pl?action=browse&id=MeatballWiki&oldid=FrontPage>). The public’s attention was drawn to wikis following the launch, in January 2001, of the publicly written Web-based encyclopedia, *Wikipedia* (www.wikipedia.org). And wiki hosting services and application service providers (ASPs) were established to enable individuals and organizations to develop wikis without the need to install and maintain wiki software themselves.

By July 2006, nearly 3,000 wikis were indexed at the wiki indexing site www.wikiindex.org, popular wiki hosting services such as *Wikia* (www.wikia.org) and *seedwiki* (www.seedwiki.org) hosted thousands of wikis between them, and *Wikipedia* had more than four and a half million pages in over 100 languages. Moreover, wikis were increasingly being used in less public ways, to support and enable collaboration in institutions ranging from businesses to the public service and not-for-profit organizations.

THE NATURE OF WIKIS

Wiki software allows users to collaboratively edit pages for the Web or intranets. The pages created with wiki software are called “wiki pages” and sites that contain wiki pages are called wiki sites, or simply “wikis.”

Technically, wikis consist of four basic elements:

- Content
- A template which defines the layout of the wiki pages
- Wiki engine, the software that handles all the business logic of the wiki
- Wiki page, the page that is created by the wiki engine as it displays the content in a browser

Figure 1. How wikis work (Adapted from Klobas & Marlia, 2006)

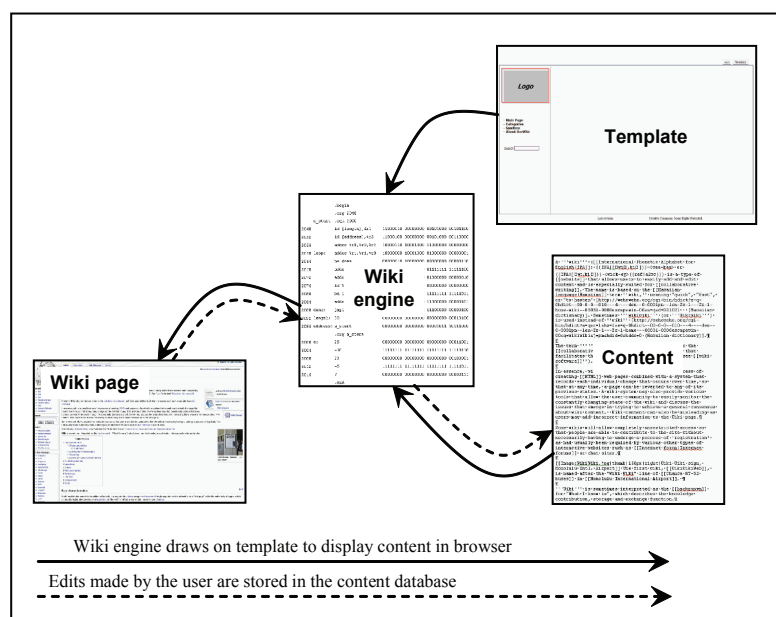


Figure 1 shows how these elements work together.

Wikis consist of pages accessible from a Web browser. They are edited by opening an editing screen in the browser and using either a simple markup language or, increasingly, a rich text editor to edit the text. Links to pages internal or external to the wiki site can be added using simple conventions. These conventions allow a link to be created to a page that does not yet exist; the wiki engine flags such links for future editing. Unless the wiki managers decide otherwise, the content is updated in real time, and once an author saves and closes their changes on the editing screen, the changes are immediately visible online.

Almost all wikis keep track of changes. Older versions of a page can be viewed and, if necessary, restored. Most wikis include a page where recent changes are listed. This feature helps members of the wiki community to keep up to date with changes in content, and can help newcomers get a quick feel for the current concerns of the wiki community. Increasingly, wiki software is integrated with news aggregators like RSS or e-mail notification to alert users to changes without their having to enter the wiki itself.

Another important feature of wikis is the simple permissions structure. Typically, there are three levels of permission: reader, editor, and administrator. Reading permissions may be open to anyone on the World

Wide Web or limited to specific, registered individuals. When reading permissions are limited, the wiki is known as a “private wiki.”

Various wikis offer support for non-Latin character sets, different media and file types, mathematical notation, style sheets, conflict handling, spam handling, and facilities for merging, exporting and backing up. The different features available in different wiki engines can be seen at the wiki engine comparison site, *WikiMatrix* (www.wikimatrix.org).

Wiki features are based on design principles established by Ward Cunningham. These principles address human as well as technical goals, for example (in the terms used by Wagner, 2004), wikis are:

- **Open:** If any page is found to be incomplete or poorly organized, any reader can edit it as he/she sees fit
- **Organic:** The structure and content of the site evolve over time
- **Universal:** Any writer is automatically an editor and organizer
- **Observable:** Activity within the site can be watched and revised by any visitor to the site
- **Tolerant:** Interpretable (even if undesirable) behavior is preferred to error messages

Wikis usually adopt “soft security,” social conventions that assume that most people behave in good faith, establish that users (rather than the software or a system administrator) operate as peer reviewers of content and behavior, allow that people might make mistakes but that mistakes can be corrected, and emphasize the importance of transparency in their management (Meatball, 2006). Together, these technical features and social principles provide a supportive environment for human collaboration.

HOW WIKIS ARE BEING USED FOR COLLABORATION

Wikis are used by groups of people who collaborate to produce information resources that range from meeting agendas to Web sites. They are used in business, government, research, and education.

Public wikis are often built by communities of practice, hobbyists and other interest groups. Most of these wikis are concerned with quite specific topics such as a specific sport, book, author, religion, or philosophy. Often, they are maintained and read by small groups of friends and colleagues. An example is *ukcider*, a wiki that provides information about real cider (<http://ukcider.co.uk/wiki>) and supports advocacy for real cider enthusiasts and small producers.

Wikis can be used to create and maintain knowledge repositories for communities of practice (Godwin-Jones, 2003; Roberts, 2005). Members of the community update the repository with information and solutions to problems. As with other types of wiki, the communities served might be public or private. Potential uses of private wikis to increase autonomy among US intelligence workers were described by Andrus (2005).

Committees and working groups, particularly those that work across institutional and/or geographical boundaries, use wikis to develop and maintain agendas and documentation. The DCMI Education Working Group Wiki (<http://dublincore.org/educationwiki>), for example, contains work plans, FAQs, agendas, notes, documentation, and links to key references for the group.

A common organizational use of wikis is project support (Bean & Hott, 2005). Wikis are used to support the sharing of agendas, ideas, resources, plans and schedules. Documents can be jointly produced within

the wiki or made available as attachments. Angeles (2004) describes how wikis have been used by Lucent Technologies for project documentation including preparation of meeting notes, product specification notes, product requirements documents, project deliverables, content audits, technical documentation, and style guides. Other companies that use wikis for project support include Michelin China and the investment bank, DrKW (Paquet, 2006).

Wikis are also being used to write and maintain system documentation. A public wiki has been developed by Mozilla, the provider of the Firefox Web browser, to maintain Mozilla product documentation (<http://kb.mozillazine.org>). Any member of the public can contribute. Some companies have established private wikis to maintain documentation for their internal information systems (IS). Users contribute to documentation based on their experience with the system.

Organizations and groups can use wikis to produce reports of news or events. Schools, in particular, appear to be experimenting with this type of wiki, in which parents, teachers, administrators, and students can all contribute reports, photographs, audio and video of a school event.

Some groups use wikis to plan conferences or meetings and to continue discussions that were begun at a meeting. Examples include the American Library Association (ALA) 2006 Conference wiki (<http://meredith.wolfwater.com/ala2006/>) and the Yale Access to Knowledge wiki (<http://research.yale.edu/isp/a2k/wiki/>). Some experiments in use of wikis during conferences have found them valuable (Boyd, 2004; Suter, Alexander, & Kaplan, 2005). Boyd describes how workshop participants quickly learnt to use wikis to capture “their own streams of consciousness or the comments of others.”

Wikis are used in a variety of ways for collaboration in classrooms ranging from primary school to university (Bold, 2006; Ferris & Wilder, 2006; Lamb, 2004; Skiba, 2005). Mitchell (2006) notes that wikis are consistent with modern theories of learning such as “connectivism” (Siemens, 2004), the idea that learning occurs in a complex and changing environment that cannot be controlled. In the classroom, wikis are used in collaborative writing, student projects and group assignments. Collaborative writing tasks can be given to develop writing and collaboration skills or to develop information resources for use by other students.

Wikis are particularly well adapted to shared creation of directories and lists such as bibliographies, staff lists and job vacancies. In schools and universities, teachers who use wikis in this way assign groups of students or whole classes the task of jointly preparing annotated lists of information resources. Although most educational wikis are private, some become public resources. An example is the *Wiki for IS Scholarship* maintained by the Information Systems Department in the Weatherhead School of Management at Case Western Reserve University (<http://isworld.student.cwru.edu/tiki/tiki-index.php>) which contains summaries of major books and articles in IS as well as reviews of the contributions of major IS scholars. Often, wiki-based directories also provide access to resources. Participants in the Government Open Code Collaborative (<http://www.gocc.gov>) use a public wiki to list and describe source code that can be shared among its members.

Wiki software is also being used to create Web sites that draw on the contributions of a number of people. One example is the site developed by the Bach-Academie of Montreal to publicize a series of concerts. The musicians themselves added details to the wiki, which was then published to the Web (<http://www.bach-academie-de-montreal.com/>).

ISSUES IN WIKI MANAGEMENT

The ease with which individuals can contribute to wikis, the open nature of contribution, and the philosophy that the guardians of the content are the people who create the wiki can produce outstanding knowledge resources. On the other hand, these very characteristics can also be associated with problems such as reluctance to contribute or chaos through unstructured contribution. Some management is therefore required by the person or group that wishes to develop and maintain the wiki. The most significant management issues tend to be those of encouraging people to contribute, and managing intellectual property, problem users and spam.

As with any knowledge resource, people need both a reason to contribute to a wiki and a sense that they have the ability to do so. Wikis created for small groups or communities with a specific purpose should quite readily attract users if those users also know how to access and use the wiki. For example, a wiki established for the purpose of jointly preparing an agenda or document, where all members of the group responsible for prepar-

ing the document are motivated to contribute and know how to access the wiki and use the editor, is likely to be used by the intended users for the intended purpose. The more diffuse the purpose and the user group, the more uncertainty there will be about the development and continuation of a wiki. In practice, however we usually find a core group of regular contributors and a peripheral group of occasional contributors and people who read the wiki but do not contribute to it. (This pattern is common in online communities; see, for example, Wenger, McDermott, & Snyder, 2002). The core users can act as role models for other users. Other patterns that have been observed include the champion pattern (“single wiki-nut, encourages coworkers to add, view, improve”) and the trellis pattern (“egregiously boring content calls for fixing ... My [contribution can be] far more interesting than that!” Confluence, 2006).

Techniques for ensuring that potential contributors feel able to contribute include providing simple, easy to follow documentation for editing pages and assurance that mistakes are permitted and can quickly be remedied. Anti-patterns that discourage use include the gate pattern, “too many procedural barriers to adding content” (Confluence, 2006).

Where the content of a wiki may include information, images and files drawn from other sources, the intellectual property of the original sources must be respected. Standard policies for dealing with material that is the intellectual property of others include: (1) only material that does not violate the copyright of the original creator can be included in the wiki and (2) the sources of all included material should be acknowledged. Equally, a decision has to be made about ownership and conditions for re-use of original material included in a wiki. The fact that the content of any single wiki page is usually produced by multiple authors needs to be acknowledged. A typical statement of the intellectual property in a wiki acknowledges its joint authorship and permits re-use, provided the wiki page is acknowledged as the source of the material. The GNU Free Documentation License used by Wikipedia provides an example (Free Software Foundation, 2002).

The more open a wiki to the public, and the larger the wiki user community, the greater the potential of encountering a problem user. Problem users may post unacknowledged copyrighted material, post material designed to offend or anger readers or contributors, remove material or otherwise “vandalize” the wiki. Some wikis use registration to limit the possibility that

a problem user will continue to damage the wiki, but many wiki communities prefer to adopt the soft security principles described earlier in this article. It may be sufficient simply to let someone know (privately, by e-mail) the first time they post unacceptable content, that this type of content is not appropriate for the wiki (Turnbull, 2004). A wiki page that contains problem content can easily be replaced by an earlier, "clean" version. The active members of a wiki community often share the task of watching pages and dealing with problems.

Another potential problem, for public wikis in particular, is spam. Pages can be watched for spam in the same way that they are watched for other problem content, but this can be a time-consuming task. Some wikis use registration processes that require human intervention, such as CAPTCHA (Carnegie Mellon University School of Computer Science, 2000-2005), to prevent mass spam attacks. Spam capturing services are being added to wiki engines to reduce the amount of spam that reaches a wiki page.

FUTURE TRENDS AND CONCLUSION

At the time of writing, wikis were still the domain of early adopters, rather than a part of the mainstream. Despite widespread use of *Wikipedia*, knowledge of what wikis are and how they can be used for collaboration, particularly for private use, is not widespread. As of the end of 2006, only two non-technical books about wikis had been published (Klobas, 2006; Tapscott & Williams, 2006). Nonetheless, in October 2006, Google Inc. bought the wiki software and Web hosting service, JotSpot, an indication that consumer use of wikis is on the rise. The Gartner Group envisages wikis reaching maturity for business use some time before 2010 (Fenn & Linden, 2005). As wiki software matures, we can expect improvements in technical qualities such as ease of implementation and stability, as well as improvements in editing interfaces and graphical quality. These improvements, along with the positive experiences of early adopters, should help gain the interest and confidence of potential users and result in further diffusion of wikis as tools for collaboration.

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KEY TERMS

Editor: The authors of wiki pages may be called “editors” because they have editing permissions.

Soft Security: Social conventions for trust, peer review and correction of errors adopted by contributors to wikis.

Wiki: An information resource that is created by multiple authors who use Web browsers that interacts with wiki software.

Wiki Engine: The software that handles the business logic of a wiki.

Wiki Page: A page of wiki content displayed in a Web browser.

Wiki Site: A set of related wiki pages. When a wiki site can be viewed on the World Wide Web, it is also a Web site.

Wiki Software: The suite of software used to produce and manage a wiki. This software may include, in addition to the wiki engine, add-ons and extensions that extend the feature set and functionality of the wiki.

WikiWikiWeb: The first wiki engine, written by Ward Cunningham.