PDHonline Course E254 (3 PDH)

Introduction to Wiki Technology

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Course Content

Module #1: Introduction

Wiki technology is only one example of the emerging wave of Web 2.0 social networking technologies. Terms like FaceBook, LinkedIn, Flickr, Dopplr and Twitter are now new words in everyday conversation. These new web technologies make local and mass collaboration possible at the new levels. The success of the Linux open source operating system is perhaps one of the best recent examples. The impact and potential of peer collaboration is only beginning to be felt in the corporate and engineering communities.

Peer collaboration across organizational boundaries using Web 2.0 technologies is becoming common place. Although the traditional hierarchies of corporations are not disappearing, there are profound changes being wrought that are giving rise to new models of production that are based on community, collaboration and peer self-organization. In this new paradigm customers can become what some are calling "prosumers" by becoming part of the process of creating goods and services in the same sense as users of Linux can access the source code and become a contributor to the functionality of the system.

Some believe that this new way of organizing will eventually replace the traditional hierarchies as the primary generator of wealth for the economy. Others see these new ideas represented by the "open source" projects such as Linux and Wikipedia as a threat to the legitimate right and need for companies to make a profit. As with all new waves of change, there is a wide range of initial acceptance of Web 2.0 technologies across organizations. In this case the shift from the top down traditional command and control to bottom-up facilitate has a feel of inevitability about it since it is being driven by customers and grass roots employee levels.

It reminds the author of the early days of the personal computer in the corporate world IT mainframe executives were definitely threatened by the influx of PCs into business units and the emergence of databases at the end user (i.e. grass roots employee level) outside of IT corporate control. We all know how this wave of change was resolved by the integration and leveraging of the new PC technologies into more powerful strategies for future applications. It is reasonable to expect a similar outcome for the current Web 2.0 technologies "threat". Indeed, the Gartner Group predicts that wikis will become mainstream in at least 50% of companies by 2009. So it appears that the formula for corporate success must be to "embrace a new art and science of collaboration we call

wikinomics [3]".   The two following stories serve to illustrate what some are doing to leverage these new mass collaboration tools.

Dell has used Salesforce.com to open communications with customers for suggestions and votes on new concepts and feature changes in Dell products. Almost 10,000 ideas have been introduced since the service went live. Those reporting directly to CEO Michael Dell are charged with monitoring this information and implementing the best ideas.

Goldcorp, Inc., a struggling gold mining company in Canada, had evidence of rich gold deposits at a location in northern Ontario, but geologists and engineers were having great difficulty providing an accurate estimate of the gold's exact location. The CEO decided to do the unthinkable in the mining industry and go public on the internet with all the proprietary data on the location and see if the global community could help. The Goldcorp Challenge was launched with a total of $575,000 in prize money to those who came up with the best methods and estimates. The response was overwhelming. Respondents included graduate students, consultants, mathematicians and military officers with capabilities and skills that the industry had never seen before. The results transformed the struggling $100 million dollar company into a $9 billion operation [3].

Module #2: What is a Wiki?

The first wiki, called the WikiWikiWeb, was implemented in 1994 by Ward Cunningham to facilitate the exchange of ideas within a programming team. The name wiki is derived from the Hawaiian word which means quick. As the name suggests, the goal was to provide users with a tool that could be used to quickly produce web content. Perhaps the most famous wiki is Wikipedia on the web. The idea here is to create an encyclopedia of knowledge to which anyone can contribute. Some have questioned the integrity of the project and the accuracy of its content given that anyone can contribute. Those believing in the viability of the project point to the fact that errors and inaccuracies can also be corrected by anyone who feels he or she is qualified to do so.

So in their simplest form, wikis are web pages that can be edited by a community of users. A typical wiki can support the following [1]:

- Add new content

- Link to other related material

- Edit existing content

- Organize and structure content

- View content

- Access a history of contributed content

Although most wiki content is text, other media such has audio, images and video can be included. Mechanisms are available to facilitate the tracking of the history of contributed content.

Clearly wikis are also a form of knowledge management. In classic knowledge management experts are enlisted to produce the knowledge needed from a specific domain. Wikis rely on the community at large, within the enterprise or the global public internet, for contributions. In the case of an enterprise application in which content must be kept private, wikis may not be appropriate or must be tightly controlled.

The first wiki, WikiWikiWeb was a CGI application written in Perl, but today wikis can be found written in Ruby, Java, PHP, ASP and others. A simple version of a wiki, called wikish, written in Unix commands is available at http://wikish.do.homeunix.org.

Module #3: Wikis Compared to Other Web 2.0 Technologies

To provide some context for wikis in the world of Web 2.0 technologies, a comparative summary is provided below:

- Blogs – A place where an individual can express ideas and opinions and for others to provide feedback. The information posted is usually temporal, conversational and sometimes truly vile. No long term community building involved.

- Forums – An online community where you can obtain answers to questions from other community members. For example, if it is an Oracle Forum, one could ask questions related to installing the latest Oracle database system. No collaboration processes are involved.

- RSS Feeds – Determines what content you receive based on specific needs and interests. You can also specify how this content is received. E.g. email, company web page, etc. No collaboration processes or community.

- Wiki – In–depth contextual content with associated group collaboration with controls. The goal is building long-term communities.

Module #4: Wiki Implementations

As with any other software product category, there are several approaches to implementation.

- Open Source Wiki – This means that the wiki has been developed, debugged and is being updated by a community of developers. The code is usually available free and can be changed, allowing you to customize to your requirements. Some open source wikis are supported by companies.

- Hosted Wiki – The clear advantage of a hosted wiki is its immediate availability to anyone with internet access. It is a good choice for small groups or small businesses. The downside may be security issues. For information outside the corporate firewall, a company policy may be required.

- Commercial Wiki – With this approach the wiki is behind the firewall on the corporate network and can usually be configured for remote access. You do have to install and maintain it as contrasted with the hosted mode.

- Hardware Appliance – A wiki appliance is the wiki software and dedicated hardware within which it is embedded. No installation or configuration is required. It can be secure behind the corporate firewall and should be a plug-and-play application.

- Software Appliance – The wiki is packaged as a pre-configured single image and can be moved from one computer to another after installation. This implementation can be installed in minutes and provides convenience and flexibility within large enterprises. Virtualization can reduce hardware requirements.

Module #5: Which Wiki?

A variety of wikis are available in the marketplace. Four important features to consider are ease of use, open standards, integration and extensibility potential and security.

- Ease of Use – this is especially critical for wikis. A WYSIWYG rich text editor, image embedding, file attachments and an intuitive interface are important. Some also feel that training should take less than 30 minutes.

- Open Standards – wikis that store data in non-standard formats could be a problem. Open standards such as XML will help in integration with current and future corporate applications.

- Integration and Extensibility – Choose a wiki with a rich API that can support integration and future customization.

- Security – For corporate applications, security is a major concern. Look for multi-level user permissions to the page level and support for ActiveDirectory and other authentication services.

A website http://www.wikimatrix.org can be used to explore comparisons of a large number of available wikis. Although comparison is the primary goal of the site, it is also instructive to take a look at the extensive list of features used in the comparisons to get a feel for the capabilities of wikis on the market today. Wiki features are grouped into 15 categories. Here is a sample of the information available for three example wikis.

Wiki Engine Comparison

Feature	Mediawiki	XWiki	Confluence
Programming language	PHP	Java	Java
Page preview	Yes	Yes	Yes
Page revisions	Unlimited	Unlimited	Unlimited
Access control lists	No	Yes	Yes
Math formulas	Yes	No	No
Syntax highlighting	No	Yes	Yes
Tables	Yes	Yes	Yes
Email notifications	Yes	Yes	Yes
Conflict handling	Conflict resolution	Page locking	Detection
WYSIWYG	No	Yes	Yes
Search	Full text	Full text	Full text
PDF export	No	Yes	Yes
Data storage	MySQL	MySQL, PostgreSQL, Oracle	HSQL(included), MySQL,Oracle

Although Mediawiki is not as full featured as some others, it is becoming more popular since it is simple to use (It powers Wikipedia.) and many like its look and feel. XWiki is a wiki for the enterprise, provides an application to manage a farm of wikis and a social RSS reader allowing groups to collaboratively follow information news and filter it. Confluence structures content in different spaces, allowing multiple linked wikis and can search different types of content including pages, blogs, MS Word, MS Excel files and PDF documents.

Module #6: Wiki Capabilities and Limitations

When considering wiki technology for a particular need, both the capabilities and limitations must be considered.

Capabilities

- "Wisdom of the Crowd" – The openness of wikis and the inherent democratic environment ideally brings contributions ranging over a broad spectrum of perspectives and expertise. All contributors can evaluate the quality of the contributions of others and can add or edit content.

- Consensus – Wikis can build community consensus since the community as a whole is developing, evaluating and editing the content.

- Accuracy – Studies have shown that the accuracy of wiki content is surprisingly high, given the uncontrolled open access contributions, and comparable to traditional published sources. For example, one study found that *Wikipedia* had approximately four inaccuracies per entry, only one more than *Encyclopedia Britannica*. Other studies are not as generous.

- Delegation of Control – Control of content is delegated to the level of the individual contributor. This can be a potential advantage for organizations where the leadership is looking for bottom-up feedback on specific issues or business processes.

Limitations

As with any concept, wikis have certain inherent limitations. We review some of the major ones here.

- Lack of Authority – the democratic nature of the content input process suggests concerns about the credentials of contributors. Often information on contributing authors is limited.

- No Referees – refereeing is rare since it violates the open wiki spirit. Therefore, there is no guarantee that the content is accurate.

- Vandalism – since it is the nature of wikis to be open, they are susceptible to inappropriate contributions such as obscenities, personal attacks and meaningless content.

- Legal Problems – the distribution of sensitive corporate information or private data can lead to legal exposure.

Module #7: Enterprise Applications and Implications

Email Reduction

The volume and distractions of email is a continuing problem within the corporate community. Much has been made of this issue in the trade and research literature. It is not unusual to have employees report that up to 85% of their email is not important to their job. Many companies are beginning to look to other technologies to help reduce the email overload. Wikis are a clear candidate. The idea is to set up a wiki for a given project and allow colleagues to collaborate on the document which is accessible by web browser. Then rather than groups of people emailing amended versions of the document, one central wiki document is created and the project participants make updates directly to the wiki which can be accessed by all. A simple wiki example to quickly learn how they function and can be used is Google Docs at http://www.docs.google.com.

Software Development

A common application of wikis is their use in support of software development processes. These potential applications include support for project management as mentioned in the previous paragraph, but also include requirements engineering and software reuse.

In the case of projects that involve high uncertainty, it is known that the participation of stakeholders in the development of requirements results in higher quality requirements products. This participation needs the support of a flexible platform for asynchronous collaboration. This platform must be capable of addressing the following stakeholder challenges [11]:

- Different perspectives on the system under development.

- Different backgrounds, which can cause communication problems.

- Different objectives, which influence views on the requirements.

- Different abilities to express requirements and document them using a technical platform.

- Different involvements e.g., some stakeholders are entitled to make decisions and others are not.

If an organization is typically involved with small or medium sized development projects and use office suites or web sites for supporting requirements engineering, wikis may provide an increase in productivity and perhaps product quality. Wikis are considered to be more powerful than plain office suites or collaborative tools and more user friendly than proprietary requirements engineering systems for large projects.

Two technical features are particularly helpful [11]:

- Easy page linking reduces redundancy by making it easier to link content than to copy a page.

- Page history capture, which most wiki software offers, provides a foundation for requirements traceability on a per document basis.

Because previous document versions can be easily retrieved, new stakeholders can be brought in to the process when needed. The ease of use also develops an evolutionary mind-set in the participants, giving them a sense that the document can be improved quickly and incrementally at whatever level of granularity is needed. Wikis for requirements engineering support can be more useful if an organization of document structure is imposed consisting of use case templates and requirements templates (e.g. ReadySet requirements templates http://readyset.tigris.org).

Wikis are also being used in the broader application of reusing of software development artifacts across projects. They act as a type of organization memory of knowledge and information within the domain of application development of the enterprise. In order to be effective in this application wikis need to be augmented with the semantic structure of the domain. This semantic structure can be limited or can be a full ontological representation of the domain. The term ontology is used to mean the combination of concepts, instances and relationships between concepts. The idea of ontology has recently taken on important practical importance for systems that are knowledge depositories. The term semantic wiki is sometimes used for wikis that contain this metaknowledge.

Second generation wikis are emerging that provide the capability for developing simple applications within the wiki itself. This means that you can build custom applications through the wiki web interface with no compilation, packaging, or deployment of software components. This capability is particularly attractive for small applications that are not yet currently developed because of excessive complexity and high costs. Some examples of candidate collaborative web applications that fit these criteria are as follows:

- Blogging applications

- RSS feed aggregations

- Poll/survey applications

XWiki is one example system that provides these second generation capabilities with two scripting languages called Groovy and Velocity. See website http://platform.xwiki.org for more details.

For an overview of basic software engineering concepts, see the PDHOnline course number E145.

Project Management

Although project management software has been dominated by Microsoft Project and its de facto standard file format, there are recent indications that Web 2.0 technologies have begun to make inroads. Wikis can be used to capture information about ongoing projects. However, they lack many of the management and tracking tools required. Although wikis can be used to supplement project management software like Project, at this point it may be more likely that wiki functionality will enter the project management scene as features of project management software. An example is a system called LiquidPlanner which is also known for its innovation in dealing with uncertainty. Users can define both a low and high range on task completion deadlines.

For details on how wikis can be organized and used as project management tools, see reference number 14 entitled "Wiki: Web Collaboration" by Anja Ebersbach et al, in the list at the end of this course. Perhaps one of the simplest forms of project management application is the use of wikis to set meeting agendas and keeping minutes in situations where there may be participants who do not agree. This approach is much more productive than the traditional approach of email solicitation of input and comments and then working to merge and resolve all inputs.

Meeting Planning

Wikis can be used to facilitate the planning of meetings by obtaining input prior to the meeting. Making the planning process open to all attendees rather than only management or a small committee can improve the quality of the resulting agenda. This approach can be particularly time-saving for lengthy complex multiday meetings.

<u>Competitive Intelligence</u>

The gathering of competitive intelligence is typically carried out by a small group in relative secrecy. SAP, a large business software company, is using a wiki to monitor how its pricing tactics and sales strategies are working in the field. By opening the process to more people, they have been able to obtain more timely collective intelligence and make it available to more people.

<u>Artificial Intelligence System Development</u>

There are many potential applications for wikis in smart systems development. Group input could be used in the knowledge acquisition phase of rule-based system development. In addition, a wiki can capture insights and conceptual relationships that can be important in system design. Wiki content can also be enhanced by AI-based question and answering systems that are designed to improve a knowledge base. For more details on Smart Systems Design, see PDHOnline course number E157.

<u>Mobile Wiki</u>

A wiki hosting company called Socialtext has introduced a mobile wiki called miki. A mobile web browser and a simplified user interface can be used by miki to connect smart phone users with their wikis from anywhere and anytime. As wiki use increases this type of mobile access may also increase in the corporate community. The website http://www.socialtext.com has more details.

Course Summary

This course presents an overview of wiki technology as part of the larger landscape of emerging social networking technologies. Insights are provided into how social networking and its potential for mass collaboration can transform organizations by leveraging bottom-up facilitate strategies along with the traditional command and control management organization. Strengths and weaknesses of wikis are discussed along with evaluation guidelines and enterprise applications that can impact the engineering corporate community. References and web site resources are provided for those who desire more in-depth information.

Selected References

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13. Leuf, Bo and Ward Cunningham, *The Wiki Way: Quick Collaboration on the Web,* Addison-Wesley, 2001.

14. Ebersbach, Anja, Markus Glaser and Richard Heigl, "Wiki: Web Collaboration", Springer, 2005.

Selected Web Resources

Artima interview: Ward Cunningham discusses ideas underlying wikis.
 http://www.artima.com/intv/wiki.html

Wiki Design Principles
http://c2.com/cgi/wiki?WikiDesignPrinciples

A web site that allows you to compare available wikis.
http://www.wikimatrix.org

Proceedings of the International Symposium on Wikis of October 16-18, 2005
http://wikisym.org

The famous Wikipedia
http://www.wikipedia.org

The Gilbane Report on "Blogs and Wikis: Technologies for Enterprise Applications"
http://gilbane.com/artpdf/GR12.10.pdf