

# **Innovative Use Of Internet-Based Collaboration Tools And Methods In An Institutional Context**

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## **ABSTRACT**

This paper reports on the experiences and challenges related to first exposure to Wiki in an institutional environment. It examines methods of encouraging contribution, installation, configuration and use of the tool. It elaborates on institutional changes and support needed to adopt the tool.

## **BACKGROUND**

Although it's most publicized use is information distribution, the internet has long been an effective medium for project collaboration. Some of the most successful cases have been projects with volunteer members that are open to anyone with enough interest and understanding of the content to contribute. Amongst these projects, known as open source software projects, the Linux operating system is one of the more well-known examples, and Apache, the most used web server in the world, is another. In these instances, the relevant content of a project is organized using some software that facilitates networked collaboration, it's published to the internet, and visitors are able to view and join in contributing by virtue of their local internet connection.

There are many reasons for organizations to be interested in the open source software movement. The software offers an open data format allowing for data migration, the ability to modify source code, free licenses and upgrades and an opportunity for wealth transfer from developed to developing countries.

The tricky ownership issues are dealt with by adopting a paradigm divorced from the traditional proprietary approach. This is achieved using a novel legal construct called the General Public License (GPL) which affords collaborative ownership of the product, as well as freedom of use. Contributors individually own the copyright of their intellectual output and also make the product freely available for use and modification by everyone.

Through such methods, the open source community has experienced remarkable growth since the advent of the internet.

The story of Linux provides a useful illustration. It developed through the part-time efforts of several thousand developers scattered all over the world. The philosophy of its development and of open source projects in general, is release early and often, delegate as much as possible and show the project to the public in the intervening times. This is fundamentally different to how projects are generally developed within organizations. Eric Raymond describes the previously accepted approaches to collaboration as that of building a cathedral "carefully crafted by individual wizards or small bands of mages working in splendid isolation, with no beta to be released before its time." Whereas the approach of the Linux community "seemed to resemble a great babbling bazaar of differing agendas and approaches ... out of which a coherent and stable system could seemingly emerge only by a succession of miracles."

The purpose of this paper is to investigate the implementation of this remarkably effective model of collaboration in an organizational context. We will focus on applying this method to collaborative content development using a tool called Wiki.

## **THE WIKI**

As collaboration becomes more prevalent in education and the workplace, there will be a need for new tools to facilitate these kinds of interaction. Wiki is one tool that has been proven successful in facilitating new forms of collaboration. The name Wiki, derived from the Hawaiian word for 'quick', was earned through its reputation for being easy to learn and use.

The first Wiki was created in 1994 as an open source solution to collaboratively develop software patterns on the web. Since then it's been adopted for many other uses and its popularity continues to grow. Possibly the most successful Wiki is Wikipedia which is a

free encyclopedia, composed entirely of volunteer contributions, that has produced over 160 thousand articles in less than three years.

A Wiki is basically a web site where visitors can easily edit any of the pages. Every state of each page is automatically stored in the database. Wiki tends towards openness, working in parallel with the idea that the more numerous the obstacles, the less participation the tool will see. Wikis favour authors and aim to involve users in content collaboration. For tasks where the goal is to create elaborate web pages with secure and static content, Wiki is not the correct tool to employ. One way to think of it is as a mixture of the strongest features of email and web-sites. Like email, it's asynchronous and parallel. Like web-sites, it's static and incremental. However, unlike email and web-sites Wikis require people to work together. This requirement to work together is both a challenge and an opportunity, allowing incremental work, collecting content from many experts without necessarily expecting large or continuous contributions but also needing compromise. The major step forward with a Wiki is exactly on the non-technical side. It is there where we want to make institutional progress and we use the Wiki as a means to that end. The strength of the Wiki idea is process-oriented rather than product-oriented.

### **Why choose Wiki?**

Wikipedia and other Wikis have used a model of working together without any dedicated moderators and without access restrictions that has produced useful, quality content and fostered active collaboration and contribution. Wikis encourage contribution and spontaneity in a way that most other tools do not.

Wikis are also very easy to install, customize and maintain. Wikis generally have small hardware requirements and since they often run on Linux-based systems, old and discarded computers can be recycled to run a Wiki service. The most popular Wikis and the operating systems they run on are free; an attractive property for organizations with limited funds. The only requirement for a user to access a Wiki remotely is a web browser.

We have installed and configured Tiki, an implementation of the Wiki concept, for a project aiming to record information of national programs of partners of the International Plant Genetic Resources Institute (IPGRI). This paper contains the strategies, principles and issues of technology transfer we have developed through this process. We believe they can be generalized from our case to other applications.

## **Why Tiki was chosen**

We decided to use Tiki in particular since it has one of the largest and fastest growing user and developer communities amongst Wiki implementations. The developers are open, helpful and willing to offer support to new users. Tiki has a large feature set which overcomes limitations of less elaborate Wikis. Tiki is written using the popular language of PHP with embedded MySQL and runs on the Apache web server. This all translates to simplifying the tasks of support and modification.

## **PRINCIPLES OF COLLABORATIVE DEVELOPMENT**

Using our experiences and the referenced materials, we've identified some general principles that we used to measure the effectiveness of collaborative content development tools at encouraging user participation.

### **Ease of participation**

Use should be so straightforward that there is no excuse to not contribute. Users who find fault with the content have all they need to implement the improvements they might suggest.

The system should be easy to setup and maintain. There should not be any approval mechanism built-in to the system so users will not feel restricted by an invisible process.

### **Concurrency**

In a tool that supports concurrency, many users can access the content at the same time. Often though, changes to the content are not transparent, meaning it's difficult or impossible to see what changes have been made and who has made the changes. Some tools are concurrent without being transparent, creating obstacles for communication. With email for example, many users can send their changes at the same time but they can't see the changes of others until everyone else's changes have been compiled and then sent back to them.

Concurrent activity should be highly granular. That is, it should support concurrent work on different, small units of content. Such activity is not possible on a word processing document. Wiki uses an optimistic approach, without any locking, that

allows as much granularity as the user wishes, and expects few problems in practice, effectively maximizing parallel working possibilities.

### **Transparency**

It should be easy for users to see who edited what, when the edit was made and what edits were made. They should also be able to see how the content has developed over time to get an idea of the process and see how to fit their contribution into the context of that process. These characteristics add value to the content and make contribution easier and more effective, especially for newcomers.

### **Human Factors**

Some users are more likely than others to embrace a new method. Whoever is promoting and maintaining the tool should be aware of attitudes and users that will make adoption more difficult. One of the most important characteristics of a successful collaborative development model is participation.

Possibly the greatest challenge to effective collaboration is that contributors cannot insist on the integrity of their contributions. Collaborating on a Wiki requires the admission by everyone that nobody is perfect and that all contributions could and should be improved, not only by the original author, but also by others. In a competitive institutional environment that requires clear attribution of output to individuals (e.g. authorship or co-authorship) this is a problem. While peers usually know the amount and quality of contributions within their group, supervisors and managers often do not. The reward and recognition mechanisms of hierarchical institutions are usually not geared towards highly collaborative work and processes, especially if it also involves contributors from outside the institution.

## **ISSUES OF ORGANIZATIONAL WIKI USE**

While applying a Wiki at IPGRI we've come up with what we think are the most important issues that should be considered when applying it in an organizational setting.

## **Applications**

The first thing to think about before applying Wiki to a task is if a Wiki is the appropriate tool. Wiki has certain strengths that we'd like to get the benefit of, but the strengths are not utilised in all situations. Wikis should be applied to appropriate tasks and in such a way that will take advantage of their strengths.

To do that we can start off by asking some questions about the context in which it will be used. We should have a clear idea of the purpose, the users, the features that will be needed and how administration will be handled. Having an understanding of these things makes it easier to make good choices about whether to use a Wiki, to know which Wiki to choose and how to configure it. There should also be a planning stage to setup the core structure and content in a way that will meet the needs of the users.

Wikis are especially suited to short periods of high activity collaboration as a brainstorming tool. In the long-term, reference information such as computer support, which might be distributed as email updates, could instead be stored in Wiki pages and updates given when content is added. With email, the knowledge doesn't accumulate and is lost to newcomers. A Wiki page is as easy to update as it is to send an email and it has the longevity and centralized accessibility of a webpage.

Findings of the CoWeb Wiki case study at Georgia Tech University suggest that Wiki was ideal for allowing users to explore how to use a collaborative space before developing the actual space, particularly when a special purpose tool is too complicated (often it's unclear what kind of collaborative environment is needed), expensive and time-consuming to develop. Wiki unleashes user creativity in finding ways to collaborate.

In our case, we used Wiki as a way of delegating control of data. Maintaining the data of multiple partners was too much for one administrator, and HTML pages were too inflexible. A Wiki provided users with the ability to easily maintain their own data.

## **Organizational Aspects**

Wikis are traditionally used in a very open way without clearly defined roles and structure, but since institutions usually have an organizational structure, the model needs to be adapted.

There are roles in institutions which aren't specifically designated in traditional Wiki environments.

The role of editor is particularly important in an organizational context. This role would have to be adapted to the Wiki in order to maintain openness while letting the editor do their job. In our installation, the editor cannot act as a barrier between submission and approval of content contributed by users because they have no technologically-defined means of control. Editors are simply responsible for the content in that they would keep the discussion on topic by suggesting direction and maintaining a coherent structure.

Wiki supports a flexible structure that can adapt to inevitably changing patterns of use. However, there should also be some initial structure, otherwise users feel it's too unstructured to make sense of and avoid contributing.

Structure doesn't have to be imposing. Some types of structure we have used in our configuration are help pages, searching functions, naming of pages based on their themes, and a central page of links to sub-pages. One strategy we used was to incorporate a set of help pages organized in the manner of a cookbook. We listed the specific, vital tasks like recipes. Each contained clear, concise and step-by-step instructions.

A notable finding of the CoWeb case study is that users were unlikely to contribute in general contexts. There is more participation in structured activities where it is clear what to post. We heeded this in our installation when we populated it with content by keeping the theme of the content in each page consistent and giving the pages descriptive names. Another finding was that overloading the interface with features confused users. We used a minimalist philosophy in configuring the interface, displaying only login, search, help and Wiki features. Other features can be enabled when the need arises.

We explored an alternative organizational scheme to decentralize an installation of Tiki. The goal was to have a consistent system where countries could store their data on local servers to better maintain its control. We successfully implemented and documented configuration of a sample of such a system where the data was distributed over a number of servers.

### **Encouraging Adoption**

If they aren't used correctly, Wikis can be subject to some of the same problems that discourage people from using other collaborative tools.

One issue seen in case studies is that users aren't informed what a Wiki is meant to be used for and how to use it effectively. Users might be afraid of using the Wiki since the idea of creating web pages can sound intimidating. Users may also not have time to learn how the Wiki works and are unprepared for its introduction.

The users of successful Wikis treat it as a tool for collaborative discussion. Users are aware that the page doesn't have to be written to completion the first time. It's a gradual process where users visit, edit and add content, and what is unnecessary is eventually removed.

Users might avoid using the Wiki when they know others will be able to change or remove their work or there may be disagreements between users about controversial content. The Wiki should be setup so that users understand how to communicate with each other about changes to content. To facilitate this, we enabled the Wiki comment feature that supports discussions for each page. Users should be reassured that any change they make to the Wiki will be stored automatically so they won't be concerned over their contributions being lost.

It proved useful in case studies to have someone to maintain the Wiki, promote it and coach users. As people use the system more and become more familiar, they are more willing to contribute. We familiarized the office with the Wiki by installing one for anyone to experiment with and presenting it to the staff.

Users can be reassured that contributions are worthwhile if extracts of Wiki content are regularly generated and distributed to users. We intend to use the 'recent changes' Wiki feature, which collects all new content since a certain date, to generate extracts. We also intend to use the Wiki feature which automatically sends email updates to users about new Wiki content. This can be useful for busy users who don't have time to check the Wiki frequently for changes.

It's also encouraging for users if there is already some content in the Wiki. We populated the system with content by transferring the content of the previous system, in our case HTML pages, to the Wiki.

## **Curation**

Maintenance is very important to keep the Wiki up-to-date with the demands of the users.

Some maintenance responsibilities are administrative tasks that don't require understanding the content. They include regularly making backups of the content, server maintenance and modification of Wiki software. The inner-workings of most Wikis can be understood by administrators with some programming knowledge.

Moderating the Wiki does require some understanding of the content. The moderator's main responsibility is to monitor use and observe what works best. They can then tweak structure, features and layout to optimize for the observed patterns of use. Some examples of modifications include adding help content, creating an initial hierarchical structure for content, creating links between pages, checking which pages are out of date and checking for duplicated content with different page names. The Wiki structure will evolve according to consensus as it is used more, but the moderator should also be careful that users are not censoring others by imposing their own ideas about structure.

One of the major structural problems with any content management happens with growing volume. As the number of pages in the Wiki grows it can become difficult to find information. In some previous case studies where this was a problem, volume growth wasn't anticipated and little was done to make things easier to find. Other problems were how users named the Wiki pages. Since naming has a lot to do with how content is searched for, we setup some naming conventions and published them on the Wiki alongside the help pages. We have also renamed pages that were named inappropriately.

The responsibility of promoting the Wiki would fall on the moderator. Moderators must be aware of those who aren't using the tool. Wikis provide tools which make it easy for moderators to see who is contributing and who isn't.

In moderating our installation, the 'recent changes' Wiki feature was particularly useful in checking what parts of the site were being used and by whom.

## **Access**

The first question to consider when thinking about limiting access to a Wiki, is if it's necessary at all. Wikis work best when all users have free access to contribute.

The openness inspires contribution. When users encounter obstacles, they feel pressured and some of the benefits of open collaboration can be lost. But there's a balance between necessary protection and openness.

Securing a Wiki against vandalism is usually not a big concern because of the automated backups. Wikis are also rarely vandalized since there is little challenge in it, making them an unattractive target. In case studies, as users become more comfortable with using the Wiki and make more contributions, they feel a sense of ownership towards the content and become a security force against damage. The 'recent changes' feature can also be used to regularly check for damaging changes.

The most common Wiki security scheme is a prompt for a user name and a password. After users enter them, they are free to modify any part of the Wiki. This is about the extent of permission restriction used in most successful case studies and also the configuration we used in our installation. The most successful Wikis also allow anonymous editing. However, more advanced Wikis such as Tiki, have the ability for very granular access restrictions, such as restricting particular pages to particular users.

Another option is to install multiple Wikis each with varying degrees of security and visibility. Installing multiple Wikis is useful when they're being applied to different tasks.

## **Ownership**

Ownership is one of the issues that arises when Wikis are used within an institution and users outside of the institution can contribute.

Most Wikis require that content be available to be copied, modified and redistributed and the originator of the new version grants the same freedoms and acknowledges the author. That is, the content remains accessible forever and can be used by anyone subject to the restrictions, most of which serve to ensure freedom of use and distribution.

V. Henson-Apollonio (personal communication, April 26, 2004) who works with intellectual property (IP) issues at IPGRI, notes that organizations often prefer to retain ownership over improvements or they may want to engage a private partner to join a distribution/delivery system or possibly to bring in funding through a revenue stream; in order to do that they must have the permission of the contributors.

If the Wiki is visible to everyone over the internet, the organization can write up a blanket letter of agreement where contributors automatically give this permission when contributing. The letter of agreement could appear as a footer on Wiki pages. Alternatively, if an institution wants to contribute to an open Wiki (e.g. Wikipedia) there must be a clear understanding by management that as soon as the contribution is made, it may no longer be controlled or recalled.

Another ownership issue might come up if someone at the organization adds to the Wiki software. It's likely because users of open source software often become contributors. In this case there might be a conflict with the organization's interest in ownership, since any contribution would be under an open license (e.g. GPL) even if it was made using time and effort paid for by the organization.

On a Wiki open to contribution within an organization, it is important to ascertain whether content is plagiarized, or whether the IP status of contributed content is incompatible with the license under which the Wiki operates. This is not only a question of ownership of content, but also a question of responsibility for content. A strong code of conduct, discipline, and possibly some self-regulation may be needed.

The preceding are issues that have relatively clear and technical solutions, but there are many whose solutions require more study. We still must answer the persisting questions:

- Are organizations inclined to producing open content?
- Can institutions survive (e.g. attract donor funds) by producing open content?
- Is open content compatible with the need for self-preservation?

## IN CONCLUSION

Perhaps the most interesting reason to investigate open source software, from an organizational perspective, is the model for collaboration used by the community. The level of participation it encourages and the powerful and popular tools it produces are evidence of its effectiveness.

In this paper, we've examined some of the issues and strategies we needed to consider while transferring one such tool and model for collaboration to an institutional context. We believe the experience and our technical documents logging our process will provide a starting point for similar future projects and can be generalized to other applications.

There is still much to do before we can be confident in applying Wikis in, and determining their compatibility with organizational settings. The first step in adoption could be to use a Wiki in a closed institutional context where all contributors are

employees of the institution and observe over the long-term. This approach would allow keeping control of the content and focusing on behavioural issues.

Installations at IPGRI are planned to serve a variety of projects and we will continue to observe its use and optimize the implementation. The Wiki itself is still a relatively new tool and judging by its rapidly growing popularity and successes, we see much unexplored potential and the possibility for new and unimagined uses.

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