

Wikis supporting PLM and Technical Documentation

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Abstract

Over the last years, Wikis have arisen as powerful tools for collaborative documentation on the Internet. The Encyclopaedia Wikipedia has become a reference, and the power of community editing in a Wiki allows for capture of knowledge from contributors all over the world. Use of a Wiki for Technical Documentation, along with hyper-links to other data sources such as a Product Lifecycle Management (PLM) system, provides a very effective collaboration tool as information can be easily feed into the system throughout the project life-cycle. In particular for software- and hardware projects with rapidly evolving documentation, the Wiki approach has proved to be successful. Certain Wiki implementations, such as TWiki, are project-oriented and include functionality such as automatic page revisioning. This paper addresses the use of TWiki to document hardware and software projects at CERN, from the requirements and brain-storming phase to end-product documentation. 2 examples are covered: large scale engineering for the ATLAS Experiment, and a network management software project.

.1 Introduction

CERN is currently reaching the installation and commissioning stage of the Large Hadron Collider (LHC) accelerator project as well as the completion of the LHC Experiment Detectors (ATLAS, ALICE, CMS and LHCb) "large as cathedrals". Along with the Accelerator and Detector hardware, there is the LHC Computing Grid project LCG, to build a worldwide computing grid to allow for simulation and analysis of all the data from the LHC physics experiments by physicists scattered all over the world. Along with the Grid software, an extensive range of physics simulation, analysis and monitoring software tools are developed at CERN and in the High Energy Physics (HEP) research community. All of these activities require effective collaboration and documentation tools.

As the birthplace of the Web, CERN has extensive usage of intranet web tools for all kinds of purposes, ranging from Web interfaces to monitoring of physics experiments to simple web pages with documentation. Furthermore there are web-based document management applications for scientific publications, as well as conferences and meetings. For technical documents at CERN and Engineering activities for the LHC, a Product Lifecycle Management (PLM) system, CERN EDMS, based on Eigner PLM is in use since 1997. (*Ref. 2 and 3.*)

Motivation

Software projects tend to generate different types of documentation, ranging from initial user requirements and specifications to user guides and system documentation and the code itself. Code is typically managed within a software framework or code management system, such as CVS. At CERN, the Savannah (GNU Savane) bug-tracker is used along with CVS for issue tracking in software projects. Formal (paper) documents such as specifications and user-guides would typically be stored in a PLM or document management system, but these are not suitable for Web-pages and guides and "as you go along" documentation. To fill the gap, a centrally supported Wiki for software project documentation was requested by the software team in the ATLAS Physics experiment collaboration in 2004.

.2 What is a Wiki

A Wiki (pronounced "WeeKee") is a Web collaboration platform, web-based post-it, "Blogging" tool, or document collection. In a Wiki, web-pages can be edited directly from the browser and thus corrected and updated easily. The original Wiki was the WikiWikiWeb of Ward Cunningham. (Wiki wiki is Hawaiian for "super quick".) In a "pure Wiki", any user on the Internet can freely edit web-pages. However, for traceability and to counter risks of abuse, many Wiki installations require user authentication. Wikis have become extremely popular over the last years and a number of Wiki implementations are available. Wikis are used in corporate intranets, on the Internet for software development projects and all kinds of forums. You may participate in Wiki-powered forums on subjects ranging from AutoCAD development to how to stop spam. There is also a shared Encyclopaedia, the Wikipedia, which has become a reference.

Blogs and Wikis have made editing of web-pages easy for anyone, and the appearance of these tools have been lauded as "Web 2.0" in the press. But in reality these tools just empower users to edit pages on the Web-server and are very much in the same spirit as the original Web browser/editor for the NeXT-Step platform developed by Tim Berners-Lee in 1990. The Web was intended as a 2-way communication media to share and distribute information in a democratic manner, enabling everybody to participate. This concept was orthogonal to traditional tightly controlled document management and publishing, although Web technology has been widely used as a tool for publishing corporate publicity, documents and reports. Wikis and Blogs have given the web back to the users and thus greatly facilitate contribution of knowledge to a shared documentation space. There are now hundreds of different Wiki implementations, some very basic ones, and others with full document revision history and many features of a document management system. Compared with traditional document management or PLM systems, a Wiki helps to capture knowledge from ALL participants in a project, not only those with access rights or who are skilled PLM users. Use of a Wiki for project documentation allows for improvements to documentation throughout the project life cycle, as one can always update and edit page.

.....2.1 TWiki - a tool for collaborative Web documentation

Looking at different Wiki implementations, and following a trial period to document engineering- and software system support procedures, we have chosen TWiki that also had been used by a Finnish team involved in Grid activities at CERN. TWiki is a flexible, powerful, secure, yet simple web-based collaboration platform. This is an Open source WIKI using RCS, Perl and Apache, distributed under the GNU/GPL licence. TWiki has an open architecture and many custom plugins, for anything from spreadsheets to SNMP monitoring. TWiki was originally written by Pete Thoeny, and has now matured into a well coordinated open-source project with many contributors. You can use TWiki to run a project development space, a document management system, a knowledge base or any other groupware tool on either on an intranet or on the Internet.

Advantages of TWiki:

- Shared Web portal and document workspace
- Allows for direct editing of web-pages with revision control, keeping full change history
- Divided into "Webs", with local templates for layout and look and feel, access control and other preferences for each web. (One web may be used for one project organisation.)
- Really easy to set up, can run on standard Web-servers
- Powerful for writing documentation "as you go along"
- Simple and unbureaucratic tool for e.g. "How-to"s, developer notes and discussions
- Possible to use knowledge database for FAQs

TWiki is targeted to corporate Intranets, and allows for easy integration with different authentication schemes. It is used by many different software companies (e.g. BT, SAP, Wind River and Yahoo) for internal documentation as well as on multinational projects like the AstroGrid and CERN's world-wide physics collaborations.

Among different Wiki implementations, TWiki comes well out for typical engineering and software documentation purposes. (Confluence and MediaWiki, used for Wikipedia, are other leading

contenders. See the Wikimatrix: <http://www.wikimatrix.org> for information about Wiki implementations and their capabilities.)

.3 Use cases at CERN

TWiki is used at CERN to document a number of software projects, notably for the LHC experiments and for central IT services, ranging from Grid user guides, to documentation of CAD-software installation. As the TWiki portal is divided into “Webs”, the CERN TWiki portal contains numerous webs for LHC detector collaborations, IT-projects and support groups as well as control systems. Each web has local settings; some are used as internal documentation workspaces and keep the default layout, while others have been customised to a different Web-layout for the particular project or group.

The following use cases describe the use of a Wiki within a very large scale engineering project and a typical internal IT project.

.....3.1 Case: ATLAS Experiment detector

The ATLAS Experiment is one of the 4 main LHC experiments and the ATLAS detector, situated 90 m under ground, is the largest of the LHC physics detectors. The detector itself, dominated by the large Toroid Magnets and Muon chambers is roughly the size of a 6 stores building. (Note the humans in the schematic layout in fig. 1.1.) The collaboration, who designed, built and will operate the ATLAS experiment spans 164 institutions in 35 countries and includes more than 1900 scientific authors.

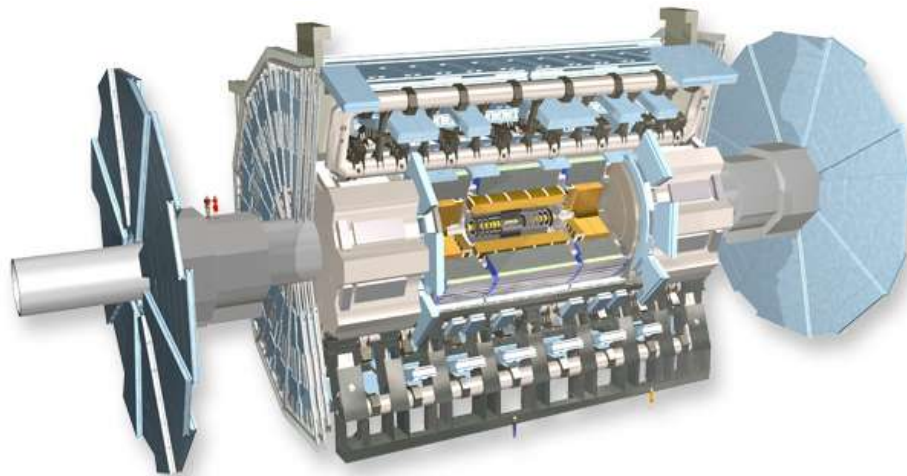


Fig.1.1 Schematic view of the ATLAS experiment detector

The use of TWiki in the ATLAS collaboration originated in the ATLAS software community. This community is responsible for development of analysis and simulation software to handle all the physics data from the ATLAS experiment. TWiki is used to document software modules, test procedures, user- and installation guides and so on. Due to the ease of use, TWiki was also adapted by physicists for the “Inner detector” and by other teams of the experiments to document procedures and operations. The TWiki pages are used as a space for shared project documentation, with hyper-links to Engineering specifications, drawings and CAD-models in EDMS (the CERN PLM system) for the detector groups. In total, the ATLAS community have more than 4000 active TWiki “topics” (Web pages).

Given the size of the ATLAS project collaboration and the “free for all” aspects of the Web and Wikis, data quality is an issue and recently an effort has been made within ATLAS to ensure

quality control on the information in the ATLAS Wiki pages, with validation tagging of pages from a central documentation team. The ease of editing and knowledge capture in a Wiki is not enough, as with any information system, it is essential to ensure that the information is valid and up-to-date. Use of TWiki in the ATLAS collaboration is therefore considered as a complement to the traditional document management and PDM processes.

.....3.2 Case 2: Firewall and network management project

For the analysis of data that will be produced by the LHC experiments, high speed connectivity is required between CERN and remote physics institutes and universities for easy access to the LHC Computing Grid (LCG) and the physics data. As part of the preparation for the LCG, CERN had to re-design its whole network infrastructure, from the detector pits to the connections to remote sites scattered around the world.

An aggregate WAN bandwidth that already exceed 20Gbps, dozens of servers accessible world wide, data to be pushed to remote sites at the highest possible throughput, hundreds of freshly deployed applications, these are factors that have posed new challenges to the computer security at CERN and that require a powerful but still flexible firewall infrastructure. The firewall upgrade project was launched in 2006 and the new firewall system put into production in 2007. TWiki was already in use to document software development within the Communication Systems group, responsible for Network Infrastructure at CERN. The Wiki document workspace was therefore a natural environment to start collaborating on the Firewall requirements and specification. In addition to the software- and network engineers involved with the project, external project customers from the operations and computer security team were invited to use the Wiki to give feedback on project specifications, add user requirements for the work flow for approval of firewall rules. The Wiki user community for this particular project consisted of 8 contributors from the project team and 3 contributors from the "customer" side. Furthermore a few other people were granted read access for information.

From the Wiki page with the original project outline and user requirements, the TWiki workspace spawned a complete set of firewall documentation, from a description of the system architecture and documentation of software modules and components, to user guides for system administrators and operators. This documentation is kept up to date also now after the new firewall has been put into production. (The main Wiki page for the firewall project currently has 75 revisions.) The TWiki workspace was also used for initial drafts of a conference paper about High Throughput Firewalls for the TERENA networking conference.

Summary and conclusions

Use of Wikis for project documentation greatly facilitates communication and knowledge capture from project contributors. A true Wiki implementation allows authenticated users to edit and add information and corrections to every page. Thanks to the open approach and simplicity of use, Wiki usage grows organically, without needs for training sessions or system coaching like for PLM systems. In particular for projects spanning multiple organisations in several countries a shared documentation and communication medium on the Internet that is easy to keep up to date can be of great value. However, a completely open approach can also lead to chaos. For larger projects that generate lots of documentation, it is essential to enforce some structure to keep information in the right place. As with any web site or information system, there should be someone in charge of the maintaining the project documentation and ensure that the contributed information is valid. Wiki use within engineering projects with product data should have a well-defined scope. Wiki pages are for web documentation and notes and should contain links to PDM/PLM or similar for product data and documents under configuration control. The web is about linking knowledge!

An interesting question is whether the Wiki-approach from the Web could be applied to PLM tools, ranging from CAD/CAM to PDM/ERP? Technically this should be easy to implement if web-technology is fully leveraged for PLM. A good combination of configuration management and knowledge capture may be to baseline product versions and allow for free editing and revising of *supplementary* information and documents attached to the formally managed baseline.

References:

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