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Using Open Source Tools to Support Collaboration Within CALIBRE.

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Abstract – This paper describes the deployment of Plone, an Open-Source content management system, to support the activities of CALIBRE, an EU-funded coordination action integrating research into Libre software. The criteria by which Plone was selected are described, and the goodness of fit to these criteria is analysed.

As a coordination action, CALIBRE involves 12 partners with different requirements and characteristics. The CALIBRE Working Environment (CWE) must therefore support a variety of users with different levels of technical expertise and expectations.

Implementation of the support infrastructure for CALIBRE is ongoing, and has provided some interesting insights into the benefits of the use of libre software. Although Plone has not been explicitly developed as a collaboration infrastructure, with its wealth of plugins, it has proven highly adaptable for this purpose.

I. INTRODUCTION

The Coordination Action for LIBRE software (CALIBRE) is an EU 6th framework coordination action project, involving 12 partners from across Europe and China. The CALIBRE project aims to facilitate collaborative research and interactions between the academic, industrial and libre software communities in order to establish a base of knowledge in libre software engineering.

Open Source Software development projects are typical of large collaborative software projects involving individual developers distributed round the globe. There is a long history of research into environments to support collaborative software engineering. More recently, with the advent of wide scale open source software development, a number of web based environments, such as SourceForge¹, GForge², Freshmeat³, and Savannah⁴, have been created to host and support these projects. Within the European Framework 5 IST research programme, there were two projects funded to develop software engineering environments as open source: GENESIS and Ophelia [1]. Both of these projects released their software as Open Source. Within the GENESIS consortium, the environment was evaluated by some members of the consortium to support the collaborative writing of a project report; and the consortium members recognised that the environment being built could partially support collaborative research. When the CALIBRE proposal was being developed, an opportunity arose to propose the development of specialised collaboration support for the distributed research teams involved in the project and their collaborators in the open source community, building on the experience of the GENESIS project. Naturally, it was proposed from the start to use open source components and processes to develop this support.

¹<http://www.sourceforge.net/>

²<http://www.gforge.org/>

³<http://www.freshmeat.net/>

⁴<http://savannah.gnu.org/>

In section 2, this paper briefly describes the context of this research including an overview of the high level requirements for collaboration support tools within CALIBRE.

Section 3 discusses the detailed requirements for the Collaborative Work Environment (CWE) as gathered from the partners within the CALIBRE project. These requirements were gathered from discussions with the CALIBRE partners at the kickoff meeting. Further requirements were either inferred from these or became apparent during the development and initial deployment of the CWE.

Section 4 outlines the implementation of this collaboration support, the current monitoring provisions in place to evaluate its usage, and describes the issues that arose during implementation.

Finally, section 5 provides an analysis of the lessons learnt during this development and discusses the benefits that other projects and industry can gain from similar collaboration support. Potential future research and development activities are also discussed.

II. RESEARCH CONTEXT & HIGH LEVEL REQUIREMENTS

CALIBRE concerns itself with more than encouraging interaction between different elements of the software community. Under the auspices of the project, research is also being performed in the areas of agile methods, distributed software engineering, and project management from a libre software perspective. CALIBRE plans to examine hybrid models of development and best practices to enable innovative reorganisation of software development within both SMEs and large institutions. It also aims to construct a comprehensive research roadmap to guide future open source software research.

Consequently, collaboration, communication and dissemination within CALIBRE needs to be both informal, e.g. via email discussions, and formal, e.g. via organised workshops with published proceedings.

For its part, the University of Lincoln as well as contributing to the overall research within CALIBRE has been charged with the development and evolution of the web-based infrastructure to support collaboration, communication and dissemination within CALIBRE.

In the Description of Work [2], three distinct types of collaboration functionality were identified:

The CALIBRE Work Environment (CWE) The CWE is the main web-based collaboration environment for CALIBRE. It is required that this be a "leading-edge technological infrastructure" [2] for supporting collaboration, with particular focus on controlled dissemination and experience reuse.

The CALIBRE Software Repository (CSR) As a supplement to the CWE, the CSR must provide the CALIBRE partners with a distributed software engineering support environment.

The CALIBRE Research Repository (CRR) Also as a supplement to the CWE, the CRR is required as a public-facing source of all completed CALIBRE related research products, especially papers.

Thus, the everyday work of the CALIBRE consortium should be supported by the CWE. Moreover, the project proposal contained requirements for a software development environment and an archiving system for research output.

III. DETAILED REQUIREMENTS FOR THE INFRASTRUCTURE

Many of the collaboration and communication infrastructure's high level requirements were outlined within the CALIBRE project proposal and Description of Work. Additional requirements were then gathered informally at a meeting of CALIBRE partners. The communication requirements were addressed first, in order to facilitate the development of the collaboration infrastructure.

A. Mailing Lists

Due to its flexibility e-mail is an important communication medium within distributed projects; it provides fast communication (like telephone), but without requiring concurrency. Crucially, this allows project staff to communicate without too much disturbance to their normal working practices. To contrast, arranging telephone or video conferences is time consuming and requires finding a mutually agreeable time. This can be problematic, especially when collaborators are distributed across time zones.

Consequently, mailing lists were a key requirement for the collaboration infrastructure. Furthermore, another important reason for using mailing lists is to support easy archival of communications. Mailing list software, such as Sympa⁵ or MailMan⁶, keep archives of all messages sent to the list. These archives can have their level of dissemination controlled (usually restricting access to members of the list) and save the list members from having to keep their own records. It was desired that the archives of the CALIBRE mailing lists were available within the CWE. Each work package within CALIBRE possesses its own list, allowing users to join only the lists most relevant to them.

B. Forums

Within the CALIBRE project, most communication is conducted through mailing lists. However, a further requirement exists to support archived communication with interested parties who are not CALIBRE partners. Such communication is characterised by being frequently of less urgency than that conducted on the mailing lists and

requiring occasional moderation to prevent abuse. Although this is possible using mailing lists, forums also integrate smoothly with the rest of the web-based infrastructure and permit anonymous reading and posting of messages where this is appropriate for achieving the wider goals of CALIBRE. By using lightly regulated public forums alongside mailing lists, it is possible to encourage potential contributors who may dislike the use of closed mailing lists.

C. Content Management and Accessibility

Many of the CALIBRE partners have significant numbers of non-technical staff involved in the project. In addition, CALIBRE wishes to encourage contributions from a variety of contributors outside project. Therefore, easy content creation and management within the CWE through a range of pre-prepared templates is necessary. However, the more technically inclined members of the consortium must also have more powerful content creation functionality to satisfy their needs. Consequently a well documented Content Management System (CMS) with a reasonably shallow learning curve was required.

D. Calendaring

It was required that the CWE contained a feature for displaying the dates and details of important, CALIBRE-related, events such as conferences.

Forums and archives of emails ensure that communication data is not lost. However, they cannot ensure that data is remembered! Therefore, a visible calendar within the CWE was required, so that dates could be marked with important events, ensuring that important dates for CALIBRE are more likely to be remembered.

E. Internationalisation

As an international coordination action, it was of particular importance that the collaboration infrastructure (and in particular, the CWE) could support multilingual interfaces and content. English is not a first language for many of the partners and potential collaborators. While most internal CALIBRE collaboration is conducted in English, the CWE as the main collaboration tool within the project, must support multilingual content in order to encourage participation and as an aid to dissemination.

The internationalisation toolkit was also required to separate the development of each different lingual version of a document from that of the source document. Consequently, revision control was required to support internationalisation as well being a useful feature itself.

F. Control of Dissemination

The collaboration environment has to support varied levels of dissemination as it is not always desirable (or appropriate) to allow all users of the CWE to see all of the content. Permissions management is required to control two different activities: editing (including addition and deletion) of CWE content and viewing of CWE content.

G. News Posting

⁵<http://www.sympa.org/>

⁶<http://www.gnu.org/software/mailman/>

Adjunct to the calendaring requirement described earlier, a dated news posting system is required to store and disseminate press releases, details of reports or papers produced by CALIBRE partners and otherwise publicise the consortium's activities through the CWE.

IV. IMPLEMENTATION

As part of the CALIBRE project, it is important that implementation of the project's collaboration infrastructure is, in itself, a showcase for the potential of libre software within the research community and industry. The development of the collaboration infrastructure has focused on repeatability and has required libre software components deployable on modest hardware.

A. The CWE

At its most basic level, the CWE (<http://hemswell.lincoln.ac.uk/calibre>) is a simple installation of Zope with Plone on a GNU/Linux box, using Apache as the web server (see figure 1). It is this simplicity that has been the most important factor in developing the CWE. Once the base installation of these components was completed, the CWE has been developed by incrementally adapting and enhancing the Plone installation while users have continued their work using the environment.

The selection of a suitable content management system has been crucial to the success of the CWE. The system had to be powerful enough to meet the demands of the CALIBRE requirements, but also flexible enough to allow for continuous development of the environment. In choosing a content manager for the CWE, six different tools were evaluated. A comparison of the features of these tools against the requirements of the CALIBRE infrastructure can be found in table 1. The content manager chosen for CALIBRE was Plone as it best satisfied these requirements. Plone is a Libre content management system, based on Zope, a Libre application server which is targeted towards building CMSs. Plone is customisable and extensible, using plugins to provide extra functionality such as calendaring.

Support for news posting and calendaring are provided as standard within the Plone content management system. Mailing lists are provided by the CMFBoard tool, which also provides support for forums (see Figure 2). Control of dissemination is provided by the mxmWorkgroup plugin for Plone (see Figure 3) and internationalisation is provided by the I18NLayer and I18Layer tools.

B. Current Monitoring of CWE Usage

In order to assess the impact of the CWE on the wider community, some monitoring of user activity is being conducted. At present requests to the hosting webserver are collected, archived to preserve the raw logfiles for later examination, and analysed with analog⁷ and Report Magic⁸. This allows the consortium to determine the following:

- Which organisations (by domain and IP block) are accessing the CWE. This allows us to broadly

⁷<http://www.analog.cx/>

⁸<http://www.reportmagic.org/>

	<i>g</i> <i>F</i> <i>o</i> <i>r</i> <i>r</i> <i>e</i>	<i>Z</i> <i>o</i> <i>p</i> <i>e</i>	<i>P</i> <i>l</i> <i>o</i> <i>n</i> <i>e</i>	<i>p</i> <i>h</i> <i>p</i> <i>W</i> <i>i</i> <i>k</i> <i>i</i>	<i>e</i> <i>G</i> <i>r</i> <i>o</i> <i>u</i> <i>p</i> <i>W</i> <i>a</i> <i>r</i> <i>e</i>	<i>M</i> <i>a</i> <i>m</i> <i>b</i> <i>o</i>
<i>Quick to Implement</i>	Y	N	N ‡	Y	Y ♠	Y ♣
<i>File upload/Web publishing</i>	Y	Y	Y	N ◆	Y	N *
<i>News system</i>	Y	N	Y	Y †	Y	Y
<i>Web interface</i>	N	Y	Y	Y	Y	Y
<i>Templating</i>	Y	Y	Y	N	Y	Y
<i>Access Control</i>	N	N	Y	N	Y	N
<i>Calendaring</i>	Y	N	Y	Y †	Y	Y
<i>Version Control</i>	Y	N *	N *	Y ♥	N	N
<i>Fora</i>	Y	N *	N *	Y †	Y	Y
<i>Internationalisation</i>	Y	Y	Y	Y	Y	Y

KEY:

- * A plugin is available to provide this functionality
 - † Implemented by standard Wiki functionality
 - ‡ Requires Zope installation
 - ♠ Effort required to remove surplus features
 - ♣ Considerable post-installation configuration required
 - ♥ Non-CVS
 - ◆ Files hosted remotely and linked in
- Table 1: CMS Comparison Matrix

differentiate between consortium and non-consortium traffic and in particular disregard traffic related to system maintenance.

- The most popular areas and items within the CWE.
- The demographics of operating systems using the CWE. At present we see an unusually large number of Free operating systems compared to other sites hosted at Lincoln that are monitored with the same system.
- Traffic broken down into per-hour, per-day and monthly graphs. It appears that most interaction takes place in the late afternoon, Tuesday-Friday.
- Which search keywords frequently bring users to the CWE, determined by referrer analysis. This helps the

consortium to position the CWE in search engine rankings by judicious use of keywords.

The limitations of this approach are obvious: we can determine what the mass of users are doing with the CWE but not the order in which they do it. Nor can we determine if users fall into specific categories (for example "just browsing", "heavy user" etc) or how users in those categories might be expected to behave. To extract this type of information, individual user sessions with the CWE must be tracked. Obviously before any such data is



Figure 1: CWE Home Page

collected the privacy implications must be considered and users of the CWE informed. Session data such as this will enable the CWE developers to identify specific user groups and modify the system to fit their specialist requirements; its collection forms part of our future work as this will enable a more comprehensive evaluation of the CWE.

C. The CSR

The everyday work of the CALIBRE consortium is currently supported by the existing CWE. However, requirements for a software development environment and a research output archiving system were also present in the project proposal.

Currently we plan to base the CALIBRE software repository on gForge with modifications to support integration with the CWE. Each software product developed will be associated with a particular CALIBRE work package and consequently will share mailing lists etc with that work package. Other features of the CWE (e.g. forums) will also be useful to support user feedback.

D. The CRR

The CRR system is based on GNU ePrints. ePrints is a Libre archiving system developed by the University of Southampton and is designed to support institutional self-archiving. The system is already in use at Lincoln and consequently adding a second archive to contain CALIBRE's research output is simple. At present no requirement to modify the upstream ePrints software has been elicited.

E. The Effect of Open Source on the development

Use of Libre components had several effects on the development process. An organisation known as The Collective has assumed responsibility for several Zope and Plone products including the forums tool and some behind-the-scenes infrastructure components. Though this is a

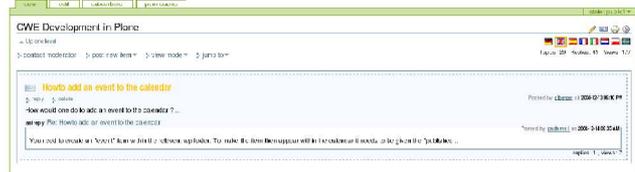


Figure 2: CWE Forum Tools

sensible idea, The Collective seems unable to coordinate development of the products they maintain, even when interdependencies exist between the products. Consequently, though installing any individual Collective product has been easy, the more products one installs the greater the likelihood of an unresolvable conflict arising. This type of difficulty has slowed the development of the CWE considerably. Similarly, the wildly inconsistent versioning strategies employed by the various Open Source projects used in the CWE have also led to some confusion. This irregular employment of versioning methods in open source projects points perhaps to a need for a more standardised approach to versioning within the libre software development community. Paradoxically it is hard to see how this could be achieved within such a diverse and open community without some overarching support for coordination of work on the various products. At the very least, some agreement by all developers to use common conventions for versioning would be a start and improved support for distributed configuration management might offer a longer term solution.

Limitations in the available products also have become apparent as development of the CWE has continued. Therefore two contributions to the community have been made: firstly some modifications to the Plone stylesheet and secondly a plugin to process Mailman archives (in mbox format) and to display them within the CWE⁹.

The planned integration with gForge to achieve the CSR remains as future work. Currently, it is not anticipated that this will be problematic.

V. CONCLUSIONS AND FURTHER WORK

While the use of open source components has enabled the development work described here to proceed rapidly, it has not been without problems, such as those associated with versioning described above. In the CALIBRE case, the use of Open Source components to build an infrastructure of this type has been much cheaper and more flexible than purchasing and deploying similar COTS products (e.g. Microsoft Sharepoint). However, developing such an infrastructure requires considerably more time and determination than deploying a COTS solution. Therefore we cannot recommend that cash-rich time-poor organisations necessarily use the Libre software solution to solve their collaboration problems at this time.

One of the goals in the development work described here has been repeatability. Although initial development has

⁹ However, this functionality is not used within the current version of the CWE. Instead, mail aliases have been associated with the CMFBoard tool, allowing the combination of archive and forum-type functionality.

been focused on the specific needs of CALIBRE, these are not so different from other international consortia engaged in collaborative research projects, particularly in software engineering research which often involves collaborative software development as part of its research activities. At the time of writing, a new collaboration environment for the British Computer Society's Open Source Specialist Group is being developed at Lincoln using concepts and technologies proven in the development and deployment of the CWE. Having built one CWE, building another has not required substantive effort on the part of the developers here at Lincoln. It remains to be seen how easily, other developers will be able to repeat our developments and reuse the work described here. One part of our planned

id	full name	email	group member	manager	member	owner	reviewer
bfitz	Brian Fitzgerald		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
cboldyreff	Cornelia Boldyreff		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
dnutter	David Nutter		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
dweiss	David Weiss		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
amh	Fabrizio Corbelli		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
emurphy	Eric Murphy		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
garciaosorio	Gerardo Garcia		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
beatuzsall	Geoffrey Beatuzsall		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
garciaos	Gerardo Garcia		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
jb	Jesús M. González-Banahon		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
plaherty	John O'Flaherty		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
joepfaller	Joseph Fallner		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
oberger	Olivier Berger		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
paderna1	Paul Adams		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
pross	Paul Pross		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
perault	Phil Perault		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
orank	Stephen Rank		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Figure 3: mxmWorkgroup Dissemination Permissions

future work is an abstraction of our current work into a project agnostic collaboration infrastructure, a kit that could be used by other research consortia and professional groups in creating their own collaboration support. This would allow a simplified instantiation process, enabling projects to create their own working environments without having to learn and configure Plone for themselves.

VI. REFERENCES

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