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Executive Summary

The CVMA website (www.cvma.ac.uk) was set up with AHRC funding in 2004, providing access to over 17,000 images of medieval stained glass in British buildings and collections. Developed by the Centre for Computing in the Humanities (CCH) at King's College, London, it presented photographs taken for and by the British Corpus Vitrearum Medi Aevii (CVMA), part of an international research project dedicated to the recording and publication of medieval stained glass.

Although this was a fantastic resource for scholars and for members of the public alike, its usefulness was constrained by the absence of subject classifications for the images. This meant that it was effectively only possible to search and browse by location, and that the information available for each image was limited. Users had identified the addition of subject classifications as a priority and were also keen to see more images. An outdated technical infrastructure made it very difficult to refresh and update the website content. As a result the website was fast becoming a static entity, unresponsive to user needs.

The Enhancing Stained Glass Studies project sought to address user concerns by enhancing the metadata associated with the images and by improving the usability of the website, allowing subject-based searching for the first time.

It rebuilt the underlying database, enabling content to be added and updated by multiple users via the web, and it trialled a facility to create and manage user-generated content.

As a result the project has created an enhanced online resource for users, with relevance beyond stained glass studies. The addition of iconographic classifications, based on a rigorous but evolving taxonomy developed for the project, opens the online image archive to art historians in all media, as well as to members of the wide public.

The project has also delivered a tool which supports the CVMA in its research and dissemination activities. It allows CVMA researchers to update and refresh the content of the website, thereby ensuring its currency and continued relevance to users. An unforeseen outcome of the project was a substantial simplification of data creation and image upload processes. In addition the facility for managing user-generated content has the potential for wider community involvement in the ongoing development of the website.

The project was undertaken by a consortium of four partners:

University of York
Centre of Computing in the Humanities (King's College, London)
CVMA (GB)
English Heritage

1. Background

- 1.1 The CVMA website (www.cvma.ac.uk) was set up with AHRC funding in 2004, providing access to over 17,000 images of medieval stained glass in British buildings and collections. Developed by the Centre for Computing in the Humanities (CCH) it presented photographs taken for and by the British Corpus Vitrearum Medi Aevii (CVMA), part of an international research project dedicated to the recording and publication of medieval stained glass.
- 1.2 Although the website was a fantastic resource for scholars and members of the public alike, its usefulness was severely constrained by the following limitations:
 - There were no iconographic and few date classifications for the images. This meant that it was effectively only possible to search and browse by location, and that the information available for each image was limited. From the first, users identified the addition of subjects and dates as a development priority. They also wanted access to more images.
 - It was very difficult to add new images and metadata to the database which lay behind the website, as only one user could access the interface at a time, on a specially adapted PC. The interface itself was in any case no longer fit for purpose. Developed in MS Access 97, many of its features had been dropped in subsequent versions of the product.
- 1.3 Taken together, these factors meant that the website:
 - was not meeting existing users' needs;
 - could not develop in response to user feedback;
 - could not renew or refresh its content;
 - did not reflect new findings emerging from the CVMA's research programmes;
 - could not fulfil its potential by attracting users from related academic fields and the wider public.
- 1.4 JISC's Enriching Digital Resources strand provided an opportunity to address these issues. Most significantly, in addition to improving the metadata, search facilities, and the technical infrastructure, it would allow multiple users to update content simultaneously via the web. This included a facility for managing user-generated content, with the potential to extend very considerably the community of those contributing to the website.

2. Aims and Objectives

2.1 Aims

The project aimed to deliver:

- ***enhanced metadata***
In response to users' need for more contextual information, the project aimed to add subject (iconographic) and, where possible, date tags to 10,000 records. This was to be done by a combination of paid staff and unpaid volunteers, thereby enabling us to explore the issues involved in managing user-generated content (see below).
- ***improved searching for website users***
Enhancements were primarily designed to reflect the possibilities offered by the enhanced metadata, which now allowed users to search by subject. During the project, however, usability testing and focus groups identified a number of other improvements, principally relating to the user journey and to results display, which were accommodated where possible.
- ***the facility to create and manage user-generated content***
The CVMA research programmes are undertaken by volunteers, who generally produce hard copy publications only. There is enormous potential for enabling them to disseminate the results of their work online, thereby ensuring that the website content is continually improved and refreshed. Beyond the CVMA research community, there is also the possibility of engaging a broader public in the creation of data for the website. The project undertook to pilot this in relation to metadata enhancement, inviting CVMA volunteers to assign iconographic tags to images.
- ***greater efficiency for editing digital publications***
The CVMA recently began to trial online publication of its Norfolk survey (<http://www.cvma.ac.uk/digpub/index.html>) and sought to simplify the editing processes.

2.2 Objectives

The project set out to achieve these aims by:

- establishing and maintaining the project management framework;
- improving the server infrastructure;
- replacing the existing system with a web-based database management interface;
- enhancing metadata for 10,000 records;
- improving the public interface;
- improving the digital publications editing process.

3 Methodology

3.1 General

The project aimed to deliver significant technical improvements to the database/website and a large number of enhanced records. In order to maximise the resources available, the work programme was structured to allow work to proceed independently on technical development and metadata enhancement (specifically the addition of subject 'tags'). This was to prove an invaluable approach, given the delayed recruitment of a technical developer.

3.2 Database Management Interface (DBMI)

In order to enable simultaneous browsing or editing by any number of authenticated users, the new DBMI was designed to be accessible via HTTP through a web browser requiring no proprietary software. The CVMA database was originally developed using MySQL, and it made sense to continue its use for this project. However the database has been substantially restructured and optimised, and the DBMI has been developed upon a Hibernate persistence layer, and implemented using Java Server Pages (JSP) and servlets. The development cycle for the DBMI has been highly iterative and the project team have been closely involved in, and consulted during all stages of the process.

3.3 Metadata enhancement

The tagging tool was developed at an early stage in the project and was designed as a lightweight, primarily client-side application (developed in XHTML, CSS and JavaScript) which 'sits on top' of the existing CVMA public website without requiring it to be substantially altered. This approach allowed the tagging tool to be developed more quickly. The tool is designed to help users negotiate the subject hierarchy, which is extremely large – comprising several thousand terms organised into a deeply nested and cross-referenced hierarchy – and it was therefore extremely important that the tool was intuitive and easy to use. Work to prepare the subject hierarchy itself predates the ESGS project, and as such the subject taxonomy was supplied initially in MS Word format: the document was converted in the XML and then imported into the CVMA database. As subject terms are applied to images or new terms added (all of which takes place away from the live website on a staging server), the activity can be seen and managed from within the DBMI, which includes an admin interface and editorial workflow for the subject tagging.

3.4 Website

Development of the website was informed by user consultation, as well as by CCH's experience with building similar interfaces to complex taxonomic data. The development process itself was supported by a process of wireframing and storyboarding. The revised web application, whilst functionally similar to the previous version of the CVMA website, has been completely rewritten to take advantage of the optimisations made as part of the DBMI work. This has made the website significantly faster. End users now have access to stained glass images at the full resolution of the original photographs via integration of the Zoomify zoom/pan tool.

3.5 Digital publications

A plugin for the oXygen XML editor was developed using the oXygen plugin framework which is based on Java/J2SE. The plugin is designed to simplify the process of editing the XML documents for the prototype Digital Publications, which are authored in XML using the oXygen editor. The new plugin performs a database lookup allowing the editor to easily insert a reference to a database image via direct assertion of a record ID in the database, rather than (as in the past) via insertion of a URL to the appropriate page on the CVMA picture archive website, thus greatly improving the integrity of the XML documents. The database links are automatically included when the digital publication is republished onto the server.

4 Implementation

- 4.1 First, as a prerequisite for all subsequent project activities, a new server infrastructure provided higher performance, increased stability and, crucially, distinct production, staging and development environments.
- 4.2 Next, a classification schema and tagging tool were developed. The classification schema, an extended version of the existing CVMA taxonomy, can be developed by users as part of the metadata enhancement process. The tagging tool sat above – and was accessed through – the existing CVMA website, pending completion of the technical work on the database development, when it was integrated into the new system. Users were thereby able to create tags ahead of, and alongside, the technical development. This proved to be particularly invaluable when the technical work was delayed, enabling us to reach our metadata target of 10,000 records. It also helped us to trial QA procedures and issues arising from user-generated content, including the submission of new classification terms by users. The tagging was undertaken by a combination of paid project staff and volunteers from the CVMA community.
- 4.3 By far the most substantial technical element of the project was the development of the database management interface. The analysis, specification and implementation were carried out by CCH, in close consultation with the CVMA. The design and build process was iterative, with frequent (sometimes daily) contact between CCH's specialist developers and the CVMA project manager, himself an expert user. Issues which could not be resolved in this way were referred to the Project Board, an effective group which met regularly (around once a month).
- 4.4 The project initially aimed, as a minimum, to improve online search facilities. Given that the CVMA website was five years old, however, the project team recognised that user expectations and needs should be reviewed. The views of a wide range of users were canvassed. English Heritage kindly funded usability testing, which trialled the website with non-users. This was extremely useful, drawing attention to those parts of the website which were not intuitive or accessible enough. The project team undertook detailed consultation (through one-to-one interviews and focus groups) with existing users, who varied from specialist art historians to picture researchers and interested members of the public.

The resulting user requirement collated the findings of the various user evaluation exercises. Wireframes were successfully used as the focus for discussion, enabling developers and users to prioritise desired changes and to reach a consensus about the form and function of the website.

- 4.5 A relaxed timetable was allowed for Digital Publications (Work Package 6), a reasonably simple piece of work with minimal impact on the project's other activities.
- 4.6 The frequency of Project Board contact and the collaborative nature of its membership made it properly responsive to issues. The impact of slow recruitment was felt later in the development process; the Board responded by prioritising and re-programming work. It also found alternative ways of achieving some objectives. For example, rather than waiting for the completion of the DBMI before entering metadata for new images, the project team compiled a spreadsheet containing data for several thousand images, which CCH then semi-automatically converted and imported into the database.

5 Outputs and Results

5.1 Database Management Interface (DBMI)

As intended the new interface permits simultaneous editing of data by any number of users, who in turn require only a web browser and an internet connection. It offers the user much simpler metadata creation and image upload processes. Data entry rules have been clarified, formalised, documented and - where appropriate - 'hard-wired' into the system to minimise the occurrence of future errors and inconsistencies.

5.2 Iconographic classification schema

A classification schema was developed for use by those CVMA officers and volunteers engaged in assigning subject classifications to images (see 5.3 and 5.4 below). A survey of existing iconographic thesauri revealed the need for a hierarchy of terms which better reflects – especially at a detailed level – the range of subjects found in stained glass panels. The scheme, created in consultation with art historians and taxonomy specialists, peer-reviewed and cross-referenced to ICONclass, is designed to allow the insertion of new terms as they are required by researchers. It continues to be used by contributors to the CVMA project, and evolves as new material is identified and studied.

5.3 Enhanced metadata

The project exceeded its target of delivering 10,000 enhanced records, principally through the addition of subject classifications.

5.4 Cleaner metadata

An additional – and unforeseen – output was the comprehensive audit and correction of existing metadata. This emerged from the technical analysis, which identified a number of inconsistencies and errors. These were corrected by the project officers.

5.4 Managing user-generated tagging

The management of user-generated subject tags was successfully trialled. Subject classifications are assigned to images by authorised users, who base their tags on the terms in the classification schema (see 5.2 above). New terms can be submitted as part of the classification process and moderated by the CVMA Editor.

5.5 Website

The new website offers more intuitive searching, including a new subject search. It also provides greater flexibility in terms of refining and displaying search results, better performance, cleaner URLs, and access to higher quality images.

5.6 Digital Publications

The oXygen plugin significantly improves upon the ease and fidelity with which images from the CVMA database can be embedded within the digital publication.

6 Outcomes

6.1 Overall

The project achieved all its aims and objectives, namely:

- improved searching for website users;
- enhanced metadata (10,000 records with iconographic classifications);
- the facility to create and manage user-generated content (new web-based database management interface);
- greater efficiency for editing digital publications.

It also succeeded in:

- substantially improving data quality and consistency;
- improving the usability and functionality of the website.

6.2 Outcomes for end users

The website is consulted by a wide range of users, all of whom benefit from the enhanced metadata, as well as the improved search and display tools. Specifically, the project has:

- substantially increased the relevance and usefulness of the stained glass images to academics and students in the field of art history. The addition of iconographic classifications, many of which apply across related media (including manuscripts, sculpture, paintings) makes the website a fantastic resource for teaching and research.
- improved access to comparative imagery for stained glass conservators. The use of archive images and data by accredited conservation studios is an increasingly widespread aspect of best practice, as recommended by international stained glass conservation guidelines.
- made the data and images far more accessible to a wider range of users, including members of the public with a general interest in stained glass or historic churches. Stained glass is of interest to an extensive community of amateur enthusiasts, many of whom view it, often as part of a church visit, for pleasure. Some may be members of local or special-interest societies (eg. the British Archaeological Association), or engaged in volunteering, such as church guides or leaders of the national network of young archaeologists' clubs (YAC). Others may be actively engaged in recording church fittings (eg. members of the National Association of Decorative and Fine Art Societies). Free access to 'what' and 'when' information is now available to this wider community, improving understanding and supporting the work of volunteers in guiding, educational and recording activities. In the longer term such users might even participate in metadata creation.

6.3 Outcomes for the CVMA project

The project has transformed the way in which images and metadata can be added to the database. It is now possible for any CVMA researcher upload and edit material as they undertake fieldwork, which means that the database content will continue to develop in line with new research and photography. While having the obvious benefits associated with sharing knowledge and interpretation, it will provide a more sustainable means of disseminating the fruits of research. CVMA authors are committed volunteers who are already maintaining their own records, often in digital formats. The facility to enter this data onto the CVMA database through a web interface will become a natural part of the volunteer research process. *Enhancing Stained Glass Studies* will therefore help ensure the long term sustainability of the website, allowing content to be generated by its users and streamlining the process of preparing the digital publications for integration with the rest of the website.

7 Conclusions

- 7.1 The most serious challenge for the project was the impact of slow recruitment. The principal technical developer was not in post until March 2009, six months after the project began. This meant that the largest and most complex work package – concerned with redesigning and building the database management interface – was severely delayed.
- 7.2 Lengthy recruitments are always likely to be a risk for projects with short lead-in times, especially where particularly specialist skills are required. Project managers and boards should ensure that they have sound risk strategies in place to mitigate the effects of delayed recruitment.
- 7.3 Applicants to such funding schemes should do everything they can to ensure that their institutions are ready to initiate recruitment at the earliest possible date after the funding award. They should also allow a realistic amount of time for recruitment, perhaps based on averages recorded for projects funded under similar schemes.
- 7.4 Project managers should also consider reducing the level of interdependency between work packages, where possible, in order to allow some progress in the face of delay. The project plan for ESGS was designed in this way, meaning that work on metadata enhancement, user evaluation and website wire-frames could progress as planned, despite delays to the DBMI.
- 7.5 Also critically important is regular and thorough communication between members of the project team and board. An excellent working relationship developed between the ESGS technical and CVMA officers, enabling a collaborative approach to problem-solving. The ESGS project board met monthly for much of the project, in order to respond to the impact of the delayed recruitment, re-prioritising work and finding work-rounds in order to ensure that the project delivered.

8 Implications

- 8.1 The ESGS project has substantially contributed to ensuring the future sustainability of the CVMA and its website, by allowing CVMA volunteers to manage and refresh content independently, assimilating this work into their research programmes.
- 8.2 The project demonstrates the potential for the future expansion and democratisation of the effort required to maintain a resource like the CVMA. The metadata enhancement strand proves the value and efficiency of sharing out some of the procedural work inevitable in a project of this size amongst a group of gated users – knowledgeable about stained glass, but with no experience of the substantial subject hierarchy employed by ESGS.
- 8.3 This further raises the possibility of drawing upon the goodwill of the user community at some point in the future; in the same way that the Library of Congress Flickr Commons initiative has successfully harnessed the public to help with the cataloguing of images, there is a good chance that this approach could work well for further metadata enhancement of CVMA in the future. The ESGS project ensures the credibility of user-generated data by subjecting it to a light-touch editorial process, and this would of course continue to be a consideration in order to continue to ensure the credibility of the CVMA web publication.
- 8.4 In addition, metadata about the tagging activity of individual users (rate at which tagging took place, which terms were applied, etc) may form the basis for a small-scale CCH research project at a later date.

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9 References

Library of Congress Flickr Commons initiative
<http://www.flickr.com/commons>