

Image Case Study  
Community Led Engineering Image Collections

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# 1.0 Introduction

## 1.1 Summary of the CLiC Report and work plan

The Community Led Image Collections (CLiC) Report<sup>1</sup> made recommendations for image collections to enable sharing of resources and metadata within the community. The main recommendations were:

- A simple directory of community image collections be established on a subject basis. There are potential roles for HEA subject centres and for Intute and others.
- Metadata about images be shared. RSS was seen as likely to be more practical than OAI-PMH at the moment. 70% of respondents to the CLiC study said they'd be happy to share metadata as a means of driving traffic to their site.
- Images be shared.

On the basis of these recommendations, this study will focus on how applicable to engineering education these suggestions are specifically by:

- observing attitudes to sharing image resources within the engineering community
- examining potential barriers and enablers to sharing
- investigating the potential for a visual directory of image collections
- encouraging image collections to provide an RSS image feed for demonstration purposes.
- presenting the issues arising from the study and
- making suggestions for future practice.

The methodology for gathering the information presented in this study was, in summary, to:

- Commission reviews of selected Image collections relevant to Engineering in order to reappraise whether these collections are of interest to engineering educators.
- Create a prototype image RSS-aggregator as a proof of concept and demonstrator of a visual directory of relevant image collections.
- Engage with image collection owners to try to encourage them to implement RSS feeds to share image metadata.
- Evaluate the experience of this engagement to look at legal, technical and organizational factors.

## 1.2 Selection of image collections relevant to Engineering

This study will reappraise the collections identified as being relevant to Engineering. The CLiC website<sup>2</sup> includes a list of UK image collections which are classified by subject area, including nine relevant to engineering. Of these, most were either relevant to Civil or Mechanical Engineering, with 1 relevant to materials science, 1 to electronic engineering and 2 to Coal Mining/Mining Engineering. In order to appraise which of these were of interest to Engineering educators a request was put in the Higher Education Academy Engineering Subject Centre<sup>3</sup> e-bulletin for subject experts to review the various image collections. This offer was mostly taken up by Civil and Mechanical Engineers and Materials Scientists. There was no response to review the Electronics Engineering or the Coal Mining Image collections.

A summary of the nine collections listed by CLiC as relevant to Engineering and comments of our reviewers is given below. These summaries include information

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<sup>1</sup> CLiC Report <[http://www.jisc.ac.uk/uploaded\\_documents/CLIC\\_Report.pdf](http://www.jisc.ac.uk/uploaded_documents/CLIC_Report.pdf)>

<sup>2</sup> CLiC Website <<http://www.oucs.ox.ac.uk/lrg/projects/clic/matrix.html>>

<sup>3</sup> HEA Engineering Subject Centre <<http://www.engsc.ac.uk>>

obtained from the CLiC website, the image collection website and information from contacts at the image collection.

### **1.2.1 General points about the relevance of these collections to teaching and learning**

The reviewers were asked "what do you think images are useful for, in teaching and learning?" The main benefits discussed were that they can help in making concepts clear to students, especially those that were visual learners. Mixing images and text was found to meet the needs of more students than say text alone. Images can also help retain students' attention. One of our reviewers quoted:

*"Images make lectures more visibly appealing, attractive and interesting – anything that helps retain student attention is a good thing"*

Students can be given access to a collection as a reference resource, and then learning activities can be built around the collection. For example, where the main output of a laboratory session is an image which needs analysing (e.g. in microscopy), students can practice the analysis using images from a collection:

*"It is very important that students themselves can independently access and freely use DoITPoMS. Having a bank of micrographs to browse through is a good introduction to the subject. DoITPoMS could also be used as a resource in coursework etc, if students need to measure typical grain sizes, precipitate sizes etc. This may be particularly important for students in more general engineering subjects taking a materials module, and would be particularly valuable for materials modules which do not have a hands-on laboratory session."*

As for what type of image was considered most useful, there was a demand for standard technical diagrams, for examples phase diagrams showing the structure of materials at various compositions and temperatures, or electronic circuit diagrams. In Engineering disciplines such as Civil and Mechanical Engineering, images showing the different stages of a construction or process were considered particularly appropriate. Similarly, moving images such as videos and animations were seen as especially useful (but sadly lacking from collections). One of our reviewers, a Civil Engineer, felt:

*"An increasingly more important use of image in learning and teaching is moving images. Much of engineering is not static but dynamic, so dynamic images are not just flashy but actually useful. Students nowadays are also more conditioned to moving images rather than just stills. Short video clips (especially digital, so it can run on the computer without needing to switch to a DVD or VHS player), macromedia flash files, interactive manipulation of 3d images, panning/zooming of panoramic/3D images – all very useful."*

Most of the collections relevant to Civil and Mechanical Engineering were of historical importance; however our reviewers felt that these images would only be relevant to a very small part of their course. For example these images could be used to teach about the history of Civil Engineering but this may be as little as half of 1 module out of a 36 module 3 year degree course. It was felt that there was a distinct lack of up to date images. One possible reason for this is that it is much easier to use images where the copyright has expired, rather than trying to clear copyright of modern images.

*"Really the only use for these images would be in giving a historical perspective on civil engineering and the types of projects which were undertaken."*

*There is not much to excite a prospective student, nor to assist in the learning process for current undergraduates. In my view, only around five or six of the images [out of the 50 available online] would be useful for teaching and learning purposes"*

### **1.2.2 Specific comments about each collection**

#### **BuildNER/Herbe/London South Bank University Slide Collection<sup>4</sup>**

BuildNER started life as a JISC project to digitise the London South Bank University Slide collection. These slides were donated to LSBU over many years and are relevant to Civil Engineering. These digitised images were to be offered to VADS in order to make them available to the UK F&HE community, however, due to concerns over Intellectual Property Rights this never happened. A "slide finder" directory of these images is available to staff at London South Bank University and can be searched by individuals outside LSBU, however, the results only deliver thumbnails and descriptions, with the full scale image only available within LSBU. There is no browse function available, therefore the images can only be found by searching for keywords or slide number. The images themselves are mainly historical images of construction.

#### **ICE – Institution of Civil Engineers Image Gallery<sup>5</sup>**

This gallery contains a sample collection of digitised historical civil engineering images, with many more available upon request. These images can only be viewed by browsing through the seven pages of thumbnails. Clicking on a thumbnail opens a larger image. Images are available to purchase for reproduction and can be purchased in either print format or digital format. These images often appear on television or in newspaper and books.

Since the original review of the collection took place, the website has been updated to include more digitised images, however the format of the image gallery as a whole has changed. The image gallery used to be part of the knowledge library, only requiring three clicks from the home page to find. It has now been broken up into subject specific collections under the headings knowledge>library>specialist knowledge>[subject heading]>image gallery, requiring five clicks to visit a small subsection of the image gallery.

#### **Revolutionary Players<sup>6</sup>**

Revolutionary Players is a website based on digitised material from libraries, museums and archives across the West Midlands region relating to the development of the Industrial Revolution and significant individuals who contributed to it. The focus is on the period 1700 - 1830. One section of the website is an image gallery which can be viewed by searching or browsing through the topics. In relation to Engineering there are some useful images in the areas of civil and mechanical engineering. The terms of use are not clearly displayed on the website.

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<sup>4</sup> LSBU Slide Collection <[http://www.lisa.lsbu.ac.uk/008\\_dbresources/slides\(wam\).htm](http://www.lisa.lsbu.ac.uk/008_dbresources/slides(wam).htm)>

<sup>5</sup> ICE – Image Gallery <[http://www.ice.org.uk/knowledge/library\\_image\\_gallery.asp](http://www.ice.org.uk/knowledge/library_image_gallery.asp)>

<sup>6</sup> Revolutionary Players <<http://www.revolutionaryplayers.org.uk>>

### **IMechE - Institution of Mechanical Engineers Picture Gallery<sup>7</sup>**

At the time of commencing this case study this website featured a small browsable image gallery of historical mechanical engineering images. However after a redesign of the website, the gallery was unavailable while the work for this study was being carried out as it is being updated for a re-launch in July 2007. Originally it was accessible to all but when it is re-launched it will only be available to members of the IMechE.

### **Bodleian Library/Toyota City Imaging Project<sup>8</sup>**

The Toyota City Imaging project was created by digitising items from the John Johnson collection at Oxford University. This was funded by a grant from Toyota. The collection is now managed by Oxford University Digital Library and contains many historical images of transportation, which may be relevant to Mechanical Engineering. The images can be viewed by browsing the entire collection, by transportation type or by a random browse feature. These images can be used for educational uses only, i.e. private study, research or teaching. The source must be acknowledged. The images cannot be used for commercial purposes without the prior consent of the owner.

### **DoITPoMS Micrograph Library<sup>9</sup>**

DoITPoMS Micrograph library is hosted in the department of materials science and metallurgy at Cambridge University. The collection is acquired by donations from academic staff, mostly from within the institution but also from outside. The collection is very extensive offering over 1000 images of micrographs useful in the teaching of materials science and mechanical engineering. The resources can be used freely for educational purposes as long as the source is acknowledged. The resources must not be used for commercial purposes. DoITPoMS also has a collection of stand alone teaching and learning packages comprising text, images, videos, animations and simulations. DoITPoMS has a video library, but this is not yet publicly available.

### **Scots Guide to Electronics<sup>10</sup>**

Scots guide to electronics would be classified more as an online tutorial, teaching topics in physics and electronic engineering, rather than as an online image collection. All the images are diagrams, mostly circuit diagrams in GIF format. The images form part of the tutorial and cannot be browsed or searched separately. Although the images may be relevant, it is difficult to see how they can be reused as each one is labelled with a figure number as part of the image which would be confusing if they were used out of the context of their original tutorial. We could find no engineering academics interested in reviewing images from this site for their potential in teaching and learning. The resource is primarily intended for use by individuals visiting the website, however individuals and educational establishments may use, make copies and distribute the materials for non commercial education purposes under certain conditions.

### **Wind Jet<sup>11</sup>**

Windjet is a British challenge on the World Speed Records on Land, Ice and Water using wind power alone. The website contains a small image gallery of the vehicles they have

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<sup>7</sup> IMechE – Picture Gallery <<http://www.imeche.org/library/picturegallery.htm>>

<sup>8</sup> Bodleian Toyota City Imaging Project <<http://www.bodley.ox.ac.uk/toyota>>

<sup>9</sup> DoITPoMS Micrograph Library <<http://www.doitpoms.ac.uk/miclib/index.php>>

<sup>10</sup> Scots Guide to Electronics <[http://www.st-andrews.ac.uk/~www\\_pa/Scots\\_Guide/intro/electron.htm](http://www.st-andrews.ac.uk/~www_pa/Scots_Guide/intro/electron.htm)>

<sup>11</sup> Wind Jet <<http://www.windjet.co.uk/>>

produced in order to break these records. The collection is of somewhat specialist interest, and we could find no engineering academics interested in reviewing the potential use of images from it for teaching and learning. All images on this website are subject to copyright. During the course of this study the website for this collection was hijacked by hackers—this problem has since been resolved.

### **Roger Tiley Tower: Miners<sup>12</sup>**

This image gallery contains a collection of images of Tower Colliery in south Wales and is hosted by the National Library of Wales. The images contained in the gallery are all of miners and coal mines. Descriptions of the images are available in both English and Welsh. The collection is of somewhat specialist interest, and we could find no engineering academics interested in reviewing the potential use of images from it for teaching and learning. The gallery is subject to copyright.

### **Yococo: Coal Mining Industry<sup>13</sup>**

The aim of the Yococo project is to show images, which celebrate the coal mining industry and its communities, and to record the regeneration of coalfield communities in South and West Yorkshire. Many have been digitised and placed on the Yococo website. These images can be searched by typing keywords or browsed under various themes. As with the previous collection, the theme of the collection is of somewhat specialist interest, and we could find no engineering academics interested in reviewing the potential use of images from it for teaching and learning. None of the images from this database can be reproduced, unless for private study or research, without permission from the contributor.

### **1.2.3 Summary**

In summary, some of the image galleries listed by the CliC report are not particularly relevant to teaching and learning in Engineering. They are some of particular historical significance and may be useful for teaching the historical background to the subjects. This highlights a distinct lack of Engineering image collections relevant to modern practices.

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<sup>12</sup> Roger Tiley Tower: Miners <<http://www.llgc.org.uk/ardd/rtiley/rt001.htm>>

<sup>13</sup> Yococo : Coal Mining Industry <<http://www.yococo.org.uk>>

## 2.0 Prototype Visual Directory

One of the recommendations of the CLiC report was that the concept of visual image collection directories be investigated. Metadata about a selection of images from a collection can be provided by the image collections along with thumbnails of the image using RSS<sup>14</sup> (Really Simple Syndication). RSS is a lightweight XML format, generally used to publish frequently updated content such as news stories. RSS 2.0 feeds can include enclosures, which can contain items such as music, images and videos; in the case where the enclosure contains music, the feeds are sometimes referred to as podcasts. These RSS feeds could be aggregated to create a visual directory listing image collections and showing a sample of the contents of each collection. The hope is that the visual directory will provide a low-barrier entry into metadata sharing and encourage further development of image discovery services based on more sophisticated metadata aggregation. In order to illustrate the concept of a visual directory and show how RSS feeds could be used in creating one we built a prototype visual directory. One of the advantages of using RSS is that it is a widely adopted standard for which there is a great deal of existing software that can be used to create an aggregation service.

### 2.1 FEED2JS

Our first approach used the Feed2JS<sup>15</sup> script which uses JavaScript to display an RSS feed as HTML. This tool is very useful for displaying text-only RSS feeds, such as news stories. This tool does not directly display images contained within the enclosure, instead it displays a "play" button and the mime type (i.e. JPEG, GIF) of the enclosure to be played. The image is displayed only when this button is clicked. We felt that this did not really constitute a visual directory so decided against using this tool for our prototype. This tool did however display images when they were included in the description fields of the RSS feed, however this is not a standard method for RSS feeds. Feed2JS illustrates how, although there is a great deal of RSS aggregation software available, much of it presupposes a certain application for the RSS aggregator, in this case podcasting.

### 2.2 RSS2HTML

Our second approach was to use the RSS2HTML<sup>16</sup> PHP script which can be downloaded and hosted on your own server to display RSS feeds on your own website. This script is extremely flexible allowing control over which elements are included and how they are displayed on screen. However the script only allowed one RSS feed to be displayed per web page; therefore we felt that we could not use this to create a directory showing feeds from multiple image collections.

### 2.3 RSS2HTML with iframes

In order work around the above problem using the RSS2HTML PHP script we created an HTML page which used inline frames, each displaying an RSS feed from a single source using the PHP script. This allowed multiple feeds to be displayed on one web page. We designed the HTML page so that each feed was displayed as a film strip allowing viewers to get a quick overview of the images available, one feed is shown below in figure 2.3.1, the prototype built with this script can be viewed at <http://www.icbl.hw.ac.uk/images/images.html>.

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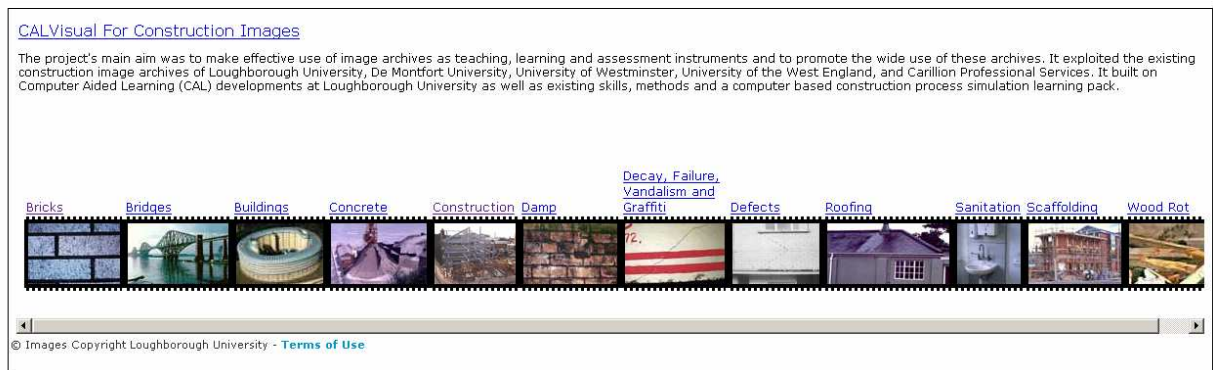
<sup>14</sup> RSS2HTML < <http://www.rss2html.com/> >

<sup>15</sup> Feed2JS < <http://feed2js.org> >

<sup>16</sup> RSS2HTML < <http://www.rss2html.com/> >



## RSS Image Aggregator Demonstrator



**Figure 2.3.1 - Screenshot of Demo 1 - Using RSS2HTML PHP Script with iframes.**

While visually appealing, and technically functional, it was felt that this approach could create accessibility problems due to the use of iframes. The page could also be slow to load since it has to load every image from every feed in order to display the one web page. If many feeds were aggregated it would require a great deal of scrolling, not only scrolling the page vertically to browse the list of feed but also horizontally and sometimes vertically within the iframes to scroll through the images of each feed.

## 2.4 Grazr

Grazr<sup>17</sup> is a JavaScript tool that can display RSS or ATOM feeds containing text, hyperlinks, images held within enclosures or indeed any other format of enclosure such as audio or video. It can also accept an OPML outline file listing several RSS feeds and display each of these. The script can be embedded into any website, blog or other pages such as an iGoogle<sup>18</sup> or netvibes<sup>19</sup> page. The prototype built using Grazr can be viewed at <http://www.icbl.hw.ac.uk/images/engimages.html>. Again, this is functional, and avoids some of the delays associated with the RSS2HTML approach, however Grazr will only show one image at a time and the result did not seem as visually appealing as the above method.

<sup>17</sup> Grazr <<http://www.grazr.com/>>

<sup>18</sup> iGoogle <<http://www.google.co.uk/ig>>

<sup>19</sup> Netvibes <<http://www.netvibes.com>>

## RSS Image Aggregator Demonstrator

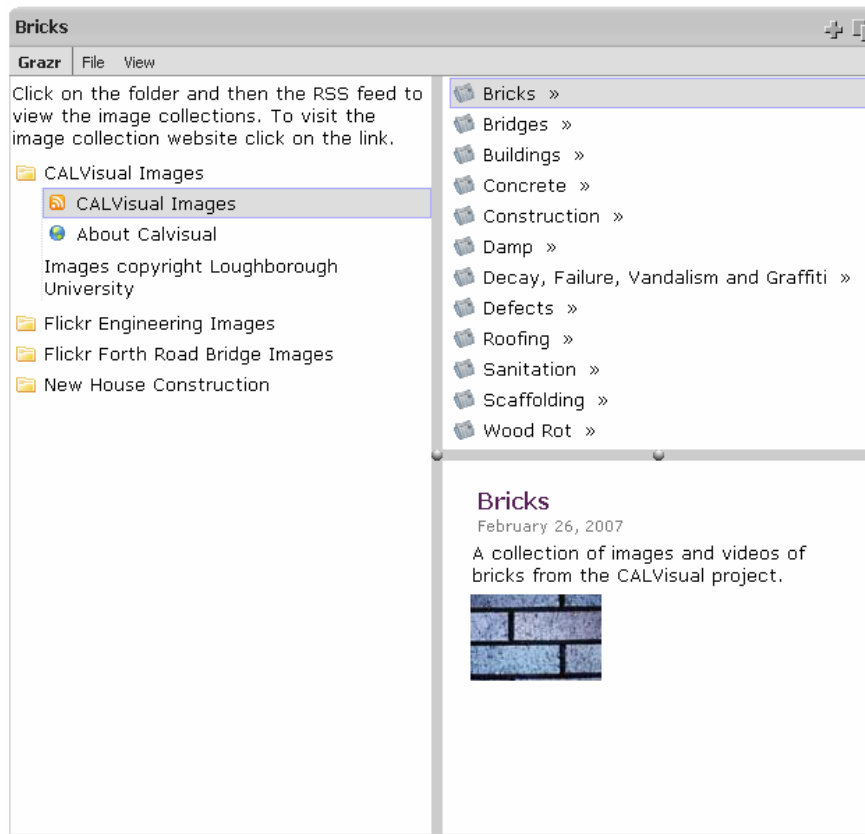


Figure 2.4.1 - Screenshot of Demo 2 using Grazr

## 2.5 Outcome

Since both Grazr and RSS2HTML implemented with iframes had their advantages and drawbacks it was decided to pilot both on the Institute for Computer Based Learning<sup>20</sup> Website. These were populated with various feeds taken from Flickr<sup>21</sup>, 23HQ<sup>22</sup> and an RSS feed from CALVisual for Construction<sup>23</sup> which we set up on behalf of the Engineering Subject Centre as a demonstrator RSS feed.

## 2.6 Discussion

Images can be very difficult to find on the internet, so any method that increases traffic to an image collection can benefit the collection. There are many methods of increasing traffic to your website, getting a high rank in a search engine is one and proving high quality metadata can help this. Having incoming links to your site also increases awareness of a website and can improve ranking on search engines.

An RSS image aggregator hosted on a portal site such as the Engineering Subject centre website would increase awareness to those collections providing an RSS feed. If the RSS feed also contained images rather than simply a textual description then a visual directory might encourage users to click through to the collection. For example, the description "rail bridge" may be too generic and may be easily skipped over, whereas if

<sup>20</sup> ICBL Demonstration Image Aggregators <<http://www.icbl.hw.ac.uk/images>>

<sup>21</sup> Flickr <<http://www.flickr.com>>

<sup>22</sup> 23HQ <<http://www.23hq.com/>>

<sup>23</sup> CALVisual <<http://www.engsc.ac.uk/resources/calvisual/>>

the viewer saw a picture of the forth rail bridge then they may be more inclined to follow the link thus increasing traffic.

Depending on how the RSS feed is implemented by the image collection, users may subscribe to the RSS feed using their own RSS aggregator and be alerted, say, when new images are added that match their interests, rather than have to revisit the site every so often to manually check for new images.

We did however encounter some problems in implementing the prototype aggregator. Feed2JS illustrates how, although there is a great deal of RSS aggregation software available, much of it presupposes a certain application for the RSS aggregator, in this case podcasting. All the solutions that we tried rely to a greater or lesser extent on loading and interpreting RSS feeds from the image collection each time the web page was fetched from the server. This reflects the expectation that RSS is used to syndicate rapidly changing content, such as news items, however it may be problematic for several reasons. The quality of the aggregator becomes dependant on the reliability of the RSS feed provider: if the provider is slow or if the feed becomes unavailable then the visual directory service will appear to function poorly. Certainly this was our experience when using RSS2HTML to display feeds from multiple collections. An alternative approach is to pre-fetch feeds and store them in a database instead of fetching them in real time while displaying the web-page. This approach has been implemented by the TechXtra OneStep Jobs<sup>24</sup> and Industry News<sup>25</sup> services with some success: the service is quicker because the data to be displayed is stored on the host server and more reliable because if an RSS feed becomes temporarily unavailable then there is still something to display.

There is an important distinction between the PHP and JavaScript aggregators that we did not investigate directly but should mention here, that is the difference between server-based and client- or browser-based aggregation. A PHP aggregation script such as RSS2HTML runs on the host server of the visual directory, this has the advantage of being a technical environment under the control of the implementer, however it means that the computational load of fetching and aggregating RSS feeds in real time is borne by server. Pre-fetching and caching feeds also has the advantage of reducing this load since a feed can be read, say, once a day rather than once for every page view. JavaScript aggregation scripts are run in the users' web-browser, distributing the computational load but also increase the level of variability. We did not investigate this directly, however browser based solutions using XML formatted data interpreted by JavaScript are increasingly popular in creating interactive websites, as exemplified by the AJAX (Asynchronous JavaScript and XML) technique. Typically, to avoid delays in displaying the webpage while the XML (e.g. RSS feeds) is downloaded, an AJAX-based implementation will display information incrementally, for example displaying a list of available feeds, while downloading the contents of the feeds. This is how Grazr works, and it does avoid the worst of the delays, however the result is not as visually appealing as when the sample of images is immediately available.

In summary, functional visual directories were created based on existing RSS aggregation software with minimal technical effort, however we are not convinced that they represent a viable basis for production services. That said, we do recognise that should suitable feeds be available there is great potential for more sophisticated directories based on similar technology that could deliver dynamic, visually appealing, and interactive visual directories that could be tailored to the visitor's interests.

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<sup>24</sup> TechXtra OneStep Jobs <<http://www.techxtra.ac.uk/onestepjobs/>>

<sup>25</sup> TechXtra OneStep industry News <<http://www.techxtra.ac.uk/onestepnews/>>

### **3.0 Attempts to encourage the provision of RSS feeds and issues arising**

In order to populate the prototype visual directory with feeds from community image collections relevant to Engineering education, individual contacts at the collections identified in section 2.0 were requested to participate in a telephone interview to explore the possibility of sharing metadata and resources. Contact was first made by email in order to briefly explain what we were hoping to achieve from the study, to present our image aggregator demonstrators and to invite them to be interviewed about their collection. It was decided that a scheduled telephone interview would be the best method of communication as it allowed open ended questions with the possibility of expanding on questions and for more explanation to be given if it were required. Each interview lasted approximately 30 minutes.

Of the nine collections approached four were willing to be interviewed with one further respondent providing detailed information by email. The respondents were:

- London South Bank University Slide Directory
- Toyota City Imaging Project/Bodleian Library (Oxford University)
- DoITPoMS Micrograph Library (Cambridge University)
- Institution for Civil Engineers
- Revolutionary Players

The interview (see appendix II) consisted of a brief synopsis of the purpose of the interview followed by questions on the themes cultural, legal and technical. These issues will each be discussed individually below. After these questions all the telephone respondents were asked if they would be willing to implement an RSS feed. The general consensus was that they would be, subject to the following conditions:

- It did not involved a lot of resource and working hours
- They be given some guidance on how to implement this (i.e. a step by step recipe)
- It did not involve repetition for each image.

The respondent by email informed us that there was no technical expertise available to provide such a feed, but that their collection would allow others to use the data and images available on the website to produce a feed for aggregation.

On the basis of this, we produced a fairly lightweight guide (see appendix III) on how to produce an RSS 2.0 feed with image enclosures using the Feed for All<sup>26</sup> tool which has a 30 day free trial. The guide showed step by step a method of producing such a feed. Each collection was also sent a copy of the CALVisual feed which was set up earlier to demonstrate the usage of a feed in this context. Of course, the XML could be hand coded or extracted by some method specific to the infrastructure used by collection in question, but it was thought the users would prefer a quick and easy solution to participate in this study. If the guide were followed we estimate that a sample RSS feed containing around 10 items could be produced in approximately 30-60 minutes. This is not a significant amount of effort.

At the time of writing RSS feeds have not been implemented for any of the image collections. A follow up email was sent a month after the initial consultation, asking whether any were likely to be forthcoming. There were two replies, both of which said that there were no concrete plans to implement an RSS feed, but it was would likely one would be commissioned at some indefinite point the future.

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<sup>26</sup> Feed for All <<http://www.feedforall.com>>

## **3.1 Cultural Issues**

### **3.1.1 Aims of the collections**

Our contacts at the collections were asked why they were involved in the image collection and what they hoped to achieve. Some collections were maintained to serve internal purposes, e.g. one collection of images was set up for teaching and learning purposes within a University department, and was then expanded to serve the wider community. Other institutions had archive collections of physical photographs which they digitised since they often received requests from the public for access to these. Displaying digitised images on their website was seen as an easy meet way the demand for access to their collections.

### **3.1.2 Funding**

Many of the collections were created as projects and were funded originally by either JISC/HEFCE funding or by grants from private companies. Therefore the owners of these collections felt that they were morally obliged to share their resources as widely as possible. One collection adopted a different approach to funding the collection by charging for using the images to fund digitising new images. Many of the collections which started life as projects now have no or very limited funding so the costs of maintaining access are absorbed by the host institutions.

### **3.1.3 Collection Maintenance and Development**

Whilst some of these collections were committed to maintaining access in perpetuity, others were not able to place guarantees on this due to lack of current funding and staff issues. Most hoped to be able maintain them in their current form without any additional funding. Some of the collections were not actively being maintained and could be considered static with no additional images being added. Those that were actively being maintained seem to have a steady stream of images being added. One of the collections accepted images from outside contributors to add to their collection.

### **3.1.4 Culture of sharing**

All of our contacts at these collections said that they would like to see their images shared as widely as possible, however one of the collections were particularly concerned about their images been used without permission or used in a defamatory sense. Many of the collections had originated as the outputs of publicly funded projects and so the collection owners felt morally obliged to share the outputs of their collection at least to academics and students within the UK.

### **3.1.5 Relevance to Teaching and Learning**

Some of the collections themselves commented on the lack of relevance their images had to teaching and learning. This was especially true for the collections solely comprising historical images. The images were however of historical importance and therefore should be made available. Some collections found it difficult to find images of the modern practices relevant to engineering for which they were able to ascertain the copyright status.

The DoITPoMS collection was, by design, highly relevant to teaching and learning, and there was some evidence to suggest images from it are well used in the materials science community.

### **3.1.6 Responsibility for the collection**

It was clear that in many cases the person we were talking to at an image collection was not in a position to make an executive decision that an RSS feed should be implemented. In nearly every case the person who expressed a willingness to provide an RSS feed would not themselves be implementing it and had no direct managerial control over the person responsible for technical maintenance of the collection.

Each collection was different, some were ongoing projects or services offered by large organisations, some were the product of completed projects, and some were the work of individual enthusiasts. However, it seems that typically image collections are the product of several individuals representing a collaboration between academic, library and IT staff, each being responsible for different aspects of access to the collection. While a collection is being actively developed it may be possible to influence the technical implementation of a service such as an RSS feed if the right person or people can be convinced of its merits. However finding the right person or people is extremely difficult and would require a level of understanding of the internal structure and dynamics of the organisation behind the image collection which is almost impossible for an outsider to acquire. In the case where funding for the image collection had ceased, maintenance of access to the collection frequently becomes the responsibility of the library or IT partners. In such cases there seems often to be separation between the driving force behind the creation of the collection (for example the individual who secured project funding to make it available) and the person responsible for its continued availability.

## **3.2 Legal Issues**

### **3.2.1 Intellectual Property Rights, Copyright and Licences**

One of the main barriers to sharing any type of resource is the issue of who owns the intellectual property rights to the resource and the terms of use that they enforce. Each collection had different issues in relation to IPR. Some collections could assure us that they owned the images as they had been digitised from still images from their own collection. Many of the collections comprised historical images due to the fact that it is relatively easy to be sure of the copyright status of such images. Many were unable to provide the effort required in clearing the copyright of images of modern practice. Other galleries hosted images created by their own staff so had no issue over copyright clearance. However one collection could not offer any assurance about IPR status as the images had been donated from a number of sources which could no longer be traced. Another collection asks users who contribute images not to place additional restrictions on how they are used but does not have an official licensing agreement to document this.

Each collection was asked under what terms they would be willing to licence their images and most seemed to agree on the terms of use which would be appropriate. They would be happy to licence the images with the following conditions: attribution, non-commercial, for educational purposes only. Many had heard of creative commons licences and would be willing to adopt such licences if they met their requirements. One of the collections did not want to enter into formal licence agreements and instead would just prefer a terms and conditions page linked to their website, they were presumably unaware that a creative commons licence would meet this requirement.

### **3.2.2 Other Legal Issues**

One of the collections was concerned about defamation or inappropriate use of their images. This included using the pictures for commercial purposes without permission, not properly referencing the source of the images or degrading the pictures in some way.

None of the collections foresees any additional legal issues concerning their collections such as database rights.

More than one of our informants felt there was little point in being too possessive about the images in their collections since they probably would not be able to pursue a case if the images were used inappropriately.

### **3.3 Technical Issues**

#### **3.3.1 Resources available**

The collections contained images in a variety of formats but were mostly JPEG or GIF files. Some of the images were born-digital but most were scanned from historical slide collections or from portraits. The resources were generally well described with most of the collections using their own metadata schema to describe the images.

#### **3.3.2 Technical Infrastructure**

A simple HTML webpage linking to images in a file store was the most common technical infrastructure used to display the collection. Others used a very simple database containing the images (or pointers to images in a filestore) and descriptions of the images. For the collections in question none used any machine-to-machine interfaces.

#### **3.3.3 Knowledge of Metadata, OAI-PMH, RSS**

When asked during the interview about RSS feeds, most of the respondents were aware of what they were and how they could be used, but didn't have any personal experience of using them. One of the interviewees had been asked previously about supporting RSS for some of their other collections and was in the process of looking into that. Another is in the process of purchasing a new library management system and envisaged setting up RSS when this is implemented. In relation to metadata, most had been aware of various flavours such as Dublin Core and UK LOM Core but had opted for their own schema to meet their own requirements. Only two of our contacts knew about OAI-PMH, in one case this was used by some of their other collections, but not the one in question, and it was unlikely that they would go back and implement OAI-PMH for it.

#### **3.3.4 Technical Expertise Available**

The technical expertise available for each collection was limited, some more so than others, but all telephone interviewees commented that they would be able to spare a little time to implement new functionality. The email respondent concluded that they were only able to maintain the collection and did not have the staff to add new technical functionality.

## 4.0 Summary and Discussion

The prototype visual directory was shown to the maintainers of the collections, who all seemed to appreciate the purpose of the directory and agreed that it may drive traffic to their image collection should they provide an RSS feed. If this directory was placed on an Engineering portal such as the HE Academy Engineering Subject Centre website it would give Engineers an overview of what types of images were available. This however would only be successful if enough feeds were to be aggregated. We were unsuccessful in encouraging the production of any RSS feed, during the timescale of this study.

There is no technical problem with this approach of creating a visual directory based on aggregating RSS feeds that have images as enclosures. However, we did not find that the widespread use of RSS aggregators for news stories or music was of as great a benefit as might be hoped. While RSS aggregation software is widely available, it tends not to be ideally suited to building an image directory. The issues we encountered when using generic RSS aggregation software to create an image directory included the length of time the directory took to read-in live feeds and how the enclosures were displayed (i.e. hidden behind a "play" icon). We do not doubt that such issues could be overcome. Furthermore, we do not think that any technical approach that relies on implementation by the image provider could involve significantly less effort on the part of the image provider (or for that matter, on the part of the directory provider).

The functionality that could be offered by a visual directory based on static feeds is limited, however we see a clear line of development that could allow a more dynamic service where, for example, the images displayed for each collection are selected to match a query entered by the user<sup>27</sup>. However, given their failure to produce even static RSS feeds we have doubts about the wisdom of going back to any of these image collections with additional requirements once they had created a feed, and therefore we have doubts about the feasibility of incrementally developing a more dynamic service.

While there was some evidence that legal issues were perceived as a barrier to building image collections relevant to engineering education, and while any legal concerns on the part of the end users of these images are beyond the scope of this work, we found no evidence of legal problems inhibiting this approach to syndicating metadata and images.

There is evidence from both the reviewers of the collections and the collection providers of a cultural willingness to share images and recognition of the benefits of sharing. There is some mismatch between what is available for sharing and what is desired, but (while clearly of utmost importance in the general scheme) that is incidental to the specific focus of this work. Sharing of metadata and thumbnails through RSS was well received with representatives of four of the nine collections being that they would be willing in theory to provide an RSS feed for their collection.

We have come to the conclusion that the failure to elicit any RSS feed is due to organisational, that is to say cultural, barriers to technical development. We think the root of this is in the fragmentation of expertise and responsibility and the lack of

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<sup>27</sup> Enhancing the image directory in interesting ways (e.g. allowing the user to enter a search term describing what they are looking for and show in the directory sample images that relate to that term) relies on being able to get dynamically generated RSS feeds or being able to cache thumbnails and descriptions of a large enough sample of the collection. Such a directory would perhaps have some advantage over Google Images Search (as it currently exists) in that it maintains a community (discipline/HE) context and is acceptable to those who want to keep tight control over what is exposed from their collection onto the open web.



engagement with machine to machine interoperability. The individuals with an interest in sharing and using images for engineering education largely have an attitude that if they put an image onto the web then it is available, and others can use it as they please. While they are open to other suggestions for how images might be shared via machine to machine interoperability they do not have the technical expertise to appreciate the full implications of such approaches or for that matter to implement them. The technical staff with the necessary expertise to do this seem to be in short supply.

There are striking parallels between our experience here and those of the PerX project<sup>28</sup>, based at ICBL, which developed a pilot service that provides subject resource discovery across a series of repositories of interest to the engineering learning and research communities by cross-searching repositories using OAI-PMH, Z39.50 and non-standard protocols. This pilot was used as a test-bed to explore the practical issues that would be encountered when considering the possibility of full scale subject resource discovery services.

The PerX project encountered many challenges to sharing metadata, including communication with the data provider. They were often unable to communicate with the individual responsible for providing the data, which mirrors this case study in that four of the image collections provided no response whatsoever to a request for information. They also found that where communication was established with repository owners and a willingness to become a data provider was expressed there was no obvious progress towards implementing the necessary technical interoperability. PerX was successful in gathering metadata from many repositories, often where an existing mechanism existed at the repository but it found that "while a minority of OAI-PMH services are professionally set up and maintained, many others are relatively immature, inadequately tested and are not well supported"<sup>29</sup>. Furthermore, successfully harvesting metadata on a single occasion did not, in the experience of the PerX project, provide any indication that routine automatic harvesting would be possible in the future.

In our view these findings from PerX act as a warning for what can happen if a technical interoperability solution is attempted without the necessary organisational commitment on the part of the data provider: Paul Miller referred to this as "political or human interoperability"<sup>30</sup>. An element of long term commitment is required to maintain interoperability, which, on the evidence of those image collections which became closed to subscribers only or were put offline by hackers, was not always present in the image collections in this study. If a feed were to be provided, it would require the service provider (aggregator host) to test the feed to ensure it was compatible with the aggregator. There would also have to be regular checks to ensure that when a feed was updated that it remained compatible.

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<sup>28</sup> PerX <<http://www.engineering.ac.uk>>

<sup>29</sup> M Moffat, (2007) PerX Setup and Maintenance Report.  
<<http://www.icbl.hw.ac.uk/perx/setupmaintenance.htm#part25>>

<sup>30</sup> Paul Miller (2000) "Interoperability. What is it and why should I want it" Ariadne Issue 24. <<http://www.ariadne.ac.uk/issue24/interoperability/>>

## 5.0 A way forward?

The main issues arising in this case study were cultural as opposed to technical or legal issues. The collections indicated that they were willing to share metadata and images, however a lack of understand about what this requires technically is apparent. Most of the collections shared images by placing them on their own website, which means sharing is only possible if the user happens to find the website and if they can ascertain from the terms and conditions whether they can legally use the image. The collections currently have no provisions for machine to machine interfaces such as OAI-PMH or RSS feeds. These m2m interfaces could drive more traffic to their website from Engineering portals such as the Engineering Subject Centre, Intute or a cross search service like PerX. By increasing traffic to each collection the potential for sharing would be raised.

We believe that the concept of a visual directory has potential, however this potential needs to be demonstrated without the image collection owners being required to undertake technical work in creating an RSS feed. This means working with what is already available and using web-crawling and/or screen scraping technology to harvest selected images (in much the same way that Google Image Search acquires data). We *speculate* that a successful image directory will hopefully be something that new and developing projects will want to be listed in, and given time they may provide RSS feeds, hopefully to the requirements of the image directory. At the same time, advocacy work and policy directives should be used to ensure that new and developing image collections provide suitable interoperability and recognise the benefits of maintaining them.

## Appendix I – Image Collection Review Form

<b>Image Collection</b>	CALVisual
Url	<a href="http://www.engsc.ac.uk/resources/calvisual/">http://www.engsc.ac.uk/resources/calvisual/</a>
Instructions	Browse through sections, for larger images download zip files.

<b>Personal Details</b>	
Your Name	
Position	
Discipline	
Institution	
Email Address	

For the following questions please mark one box with a cross [ X ] and explain your answers

<b>Q1 – Relevance</b>	<b>Not Relevant</b>			<b>Very Relevant</b>	
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
How relevant are the images in this collection to the topics taught in Civil Engineering? (Please explain your answer)					

<b>Q2 – Extensiveness</b>	<b>Not Extensive</b>			<b>Very Extensive</b>	
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
How extensive was the coverage of the collection? (Please explain your answer)					

<b>Q3 – Ease of to finding images</b>	<b>Not Easy</b>			<b>Very Easy</b>	
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
How easy was it to find images in the collection? (Please explain your answer)					

<b>Q4 – Resolution and format</b>	<b>Yes</b>	<b>Possibly</b>	<b>No</b>	<b>Don't Know</b>
Are images available in suitable formats and resolutions? (Please explain your answer)				

<b>Q5 - Quality</b>	<b>Yes</b>	<b>Possibly</b>	<b>No</b>	<b>Don't Know</b>
Are the images of a suitable quality?				
(Please explain your answer)				

<b>Q6 - Intellectual Property Rights</b>	<b>Yes</b>	<b>Possibly</b>	<b>No</b>	<b>Don't Know</b>
Are the terms and conditions of use appropriate?				
(Please explain your answer)				

<b>Q7 - Usefulness</b>	<b>Not Useful</b>			<b>Very Useful</b>	
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
How useful is this image collection for use in teaching and learning in Civil Engineering?					

<p><b>Please write 2-3 paragraphs about the image collection, detailing how these images might be used in teaching and learning.</b></p> <p><i>Examples of use may include:</i></p> <ul style="list-style-type: none"> <li>• <i>Use in PowerPoint presentation</i></li> <li>• <i>Extra reference material for students.</i></li> </ul>
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<b>Additional Comments</b>

## **Appendix II – Telephone Interview Schedule**

### ***Ask permission to record.***

### ***Ensure to record the name of who I am speaking to.***

I'm a research associate at the Institute for Computer Based Learning at Heriot Watt University and I'm currently writing a case study on Engineering Image Collections on behalf of the Higher Education Academy Engineering Subject Centre.

I'm hoping to conduct a telephone interview with the owners of these Image collections in order to gauge willingness to share metadata within the community.

This case study will follow on from the CLiC report, which examined willingness to share in general across image collections in many disciplines.

I'm asking more or less the same questions about large collections maintained by well-funded institutions and smaller collections run by individual enthusiasts, so it may be that some of the questions seem less relevant than others. Also, we're not about making a judgement on whether a collection is being well-maintained or not.

I'll ask questions under various themes, the first being:

### **Policy/organisational**

1. Why are you/your organisation maintaining an image collection?
2. What is the motivation for doing this/what do you hope to achieve from this?
3. Is there a long-term commitment to maintaining access to the collection?
4. Do you want these images shared as widely as possible?
5. Who is responsible for the image collection? (a society? Individual academic? University? Part of job? Own time?) # of staff
6. How does/did your collection acquire images?
7. Who is/was responsible for describing them?

### **Legal**

1. Do you own or licence copyright of these images?
2. What are the terms of use?
3. If images are contributed by individual do you have a formal licence agreement?
4. Who owns the copyright of the descriptions?
5. Are there any other legal issues? (Database rights, design patents, consent etc...)
6. Other issues (i.e. university owning the IPR)

### **Technical**

1. What types of resources are available?
2. How is the image collection funded? (External funding etc?)
3. What type of database (if any) do you use to host the collection?
4. What scripting languages (if any) are used?
5. Do you know about RSS?
6. Do you know about Metadata?
7. Have you heard of OAI-PMH?
8. [What technical expertise are available, would it be easy to get programming time to implement new functionality, e.g. RSS feed.]

## **Sharing metadata**

As I said in my email, we are following up from the CLiC report, investigating willingness to share image resources, focussing on Engineering collections. One method the CLiC report suggested in facilitating this would be sharing descriptions and thumbnails of images using RSS feeds.

We have set up a pilot image aggregator which would accept these RSS feeds and display the thumbnails and descriptions. At the moment it is just a demonstrator, to show what the possibilities are. If successful the Higher Education Academy Engineering Subject Centre may be interested in hosting such an aggregator.

1. Would you be interested in contributing an RSS feed showing a small selection of images available?
2. Would you be in a position to set up an RSS feed (with some advice from us if necessary)? (We would be able to test the feed in our aggregator.)
3. If not what are the issues? [Time, cost, expertise, not what they are trying to achieve]
4. If your collection were to set up a feed, which licences would you be happy with?
5. Do you know about creative commons?

## Appendix III – Lightweight Guide for Creating an RSS Feeds

Various tools are available.

Feed for all. Download a free 30 day free trial. <http://www.feedforall.com/>

A wizard will start on running the software for the 1<sup>st</sup> time, this is the easiest way to produce an RSS feed. The wizard can also be running by selecting wizard from the feed menu.

On running wizard:

**Feed Type** = "Standard Podcast" (This includes an enclosure which can be used for attaching files such as music, videos and in this case images).

Now we shall enter the information about the feed.

**Title** = "Name of Image Collection".

**Description** = "Description of the image collection"

**Feed Link** = "http://www.exampleurl.com"  
(This url should link to the home page of the image collection).

Now add items to the feed by clicking next.

**Title** = "Title of image"

**Description** = "Description of image"

**Item Link** = "http://www.exampleurl.com/page1.html"

(This link can either be the url of the larger image, the url of a page the image is displayed on, or a page showing a collection of similar images).

**Item Enclosure** (Contains information about the image)

**Url** = "http://www.exampleurl.com/image1.jpg"

(This is the actual url of the image or thumbnail)

**Length** = "123456" (size of image in bytes)

**Type** = "image/jpeg" (Mime type)

Click Add more items to use the wizard to add more items.