

Engaging the Public to Increase Accessibility to Museum Collections

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Abstract

Museums have invested substantial sums of time and money to digitize and publish their collection data. Results of this effort can be found on an increasing number of museum web-sites where they are available to a wide public for research, information and enjoyment. In many instances, museum consortiums have linked their digital collections through portals, so that the information seeker can access wider thematic collections than that held at any one of the participating museums. While this is a decided advantage for the information seeker, there remains the problem of locating relevant material. Though museums have invested substantial time in annotating and cataloging their material so that it is retrievable, the terms used in the annotations do not necessarily include the search terms used by the general public. This language gap can prevent the user from locating interesting material.

Folksonomies, defined as *a collection of terms used by the general public to describe digital artifacts*, are currently being advocated to address the language gap between a museum's professionally constructed artifact documentation and the terms that the public uses to search for information. Folksonomies are a relatively new idea (from 2004) and there are still numerous questions concerning museum utilization of them. For example: Just what is a folksonomy and how is it created? Should a folksonomy be edited? How? What kinds of terms are found in folksonomies and how do they relate to museum taxonomies? Should a museum incorporate non-expert annotations, and if so how? Will the public 'really' participate? ... This paper explores various aspects of these issues with the intention of setting a framework for discussion.

1 Searching for information in Digital Collections

Museums have been early users of the Web, creating web-sites that advertise events, provide maps over museum localities, support the museum store, present multiple virtual exhibits, provide communication and learning spaces between museum staff and the public and give public access to content databases with information about artifacts within the museum collection. Collectively, a museum's web-sites constitute a virtual version of and/or supplement to the physical museum, established on the Internet and open to world-wide public access. As such, it is important to provide good tools to support that access.

1.1 Preparing a museum collection for the Web

Museums invest substantial sums in annotating and cataloging their artifacts so that they are retrievable. Both libraries and museums have developed standardized forms for description of their artifacts. A simplified description of an image of Bergen's Fantoft stave church, shown in Figure 1a, is shown in Figure 1b, retrieved from the image collection of the US Library of Congress on The Commons on Flickr¹.

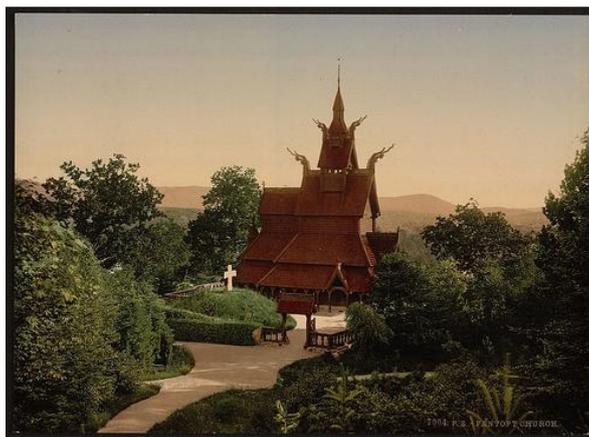


Figure 1a: image retrieved from LoC/Flickr² on 9.7.09

Fantoft Church, Bergen, Norway	between ca. 1890 and ca. 1900.
Subjects:	Norway--Bergen.
Format:	Photochrom prints--Color--1890-1900.
Rights Info:	No known restrictions on publication.
Repository:	Library of Congress, ... hdl.loc.gov/loc.pnp/pp.print
Part Of:	Landscape and marine views of Norway (DLC)
Persistent URL:	hdl.loc.gov/loc.pnp/ppmsc.06109
Call Number:	LOT 13432, no. 007 [item] ...
Notes:	Title from the Detroit Publishing Co., ..., 1905. Print no. 7004. Forms part of: Landscape and marine views of Norway ...

Figure 1b: Library of Congress image documentation (simplified), retrieved from Flickr on 9.7.09

¹ <http://www.flickr.com/commons/>

² http://www.flickr.com/photos/library_of_congress/3175010584/

Note that most of the fields describe aspects of the artifact context: identification/call #, storage location, date of origin, original medium, copyright and collection membership, while only a few, such as the title and subject fields, give information about the artifact's semantic content or interpretation. While this is a 'natural' emphasis for the museum/library that is charged with maintaining the objects, it leaves few fields with content that will match a general public request for information.

Access to Web material is through pre-defined embedded links and/or Google-type search engines. However, search engines are limited to the language used in the web-site which can lead to communication difficulties since the user's search terms may not be contained in the museum artifact documentation. This *language gap* is most clearly displayed in the differences between the professional, taxonomy-based language used for artifact documentation and classification and the language used by the general public when they search for information from a museum site.

1.2 Information gatherers

There are a multitude of potential users of a museum's digital collections spanning from artifact owners, museum curators and researchers to school children searching for information to support a school assignment. Persons with professional interest in the collections and knowledge of the collection terminology can search the current catalogues without major problems. However, the casual visitor and/or young student will likely be unaware of the catalogue structure and terminology. S/he will typically search for information using a semantic description of the artifact(s) of interest will potentially miss interesting information because of the terminology used in their search requests.

For example, a tourist might want to find information about the "*stave churches in Norway*". Looking again at the description in Figure 1b, we see that this information is not in the image documentation, even though it is a potentially interesting image of a stave church³.

1.3 Addressing the language gap

Many museums are currently exploring the utility of "folksonomies" as an approach to bridging the language gap, perhaps most notably through the Steve.museum project⁴ (Trant, 2009). Studying the characteristics and utility of folksonomies has also been an interest area at the Dept. of Information and Media Sciences, at the University of Bergen, resulting so far in several masters theses. This paper reviews some of these studies and presents several research findings from comparisons between formal taxonomies and user created folksonomies.

³ Clearly, stave churches will be found in a search for Norwegian churches, but the result will be much larger than necessary.

⁴ The Steve project, formed in 2006, is a collaboration between 10+ art museums and research institutions. Project documentation can be found at <http://steve.museum/> (Trant, 2009)

2 Folksonomies – a supplement for collection annotation.

The term *Folksonomy* was coined by Thomas Vander Wal in 2004⁵ as a combination of the terms folk (public) and taxonomy (word list). At a fundamental level, a folksonomy is a collection of terms, called *tags*, created by multiple viewers of Internet artifacts with the intent of being able to find these artifacts again. The process is called *social tagging*. A single *tag* describes some aspect of an artifact which can be any item of interest, such as a web-page, a song, image or text document. Each unique term in a folksonomy references the set of artifacts that have been tagged with this term. An example of a set of tags for the image shown in Figure 1a is shown in figure 2⁶.

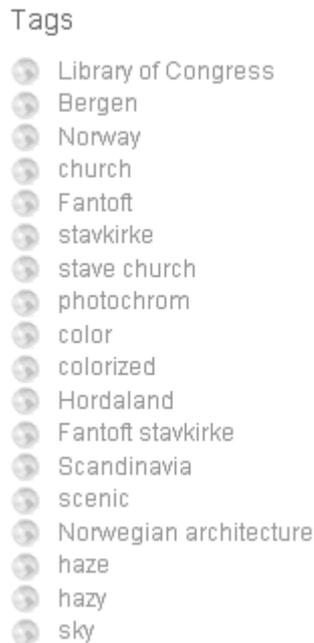


Figure 2: Image tags retrieved from Flickr.com
for the Image of Fantoft stave church
In Fig.1.a

Some observations:

- More than half (11 of 18 or 61%) of the tags are ‘new’, i.e. not included in the Library of Congress’ annotation shown in Figure 1b.
- The terms in the tourist’s query in section 1.2 exist in the tag list of Figure 2.
- Norwegian names are included in the list, providing some support for non-English information seekers.
- Tags, as defined by the general public, are unlikely to contain the artifact context information (ownership, storage location, format, age, etc), illustrated in Figure 1b, that is needed by the artifact owner.
- The tags provide a supplement to the artifact documentation as ‘seen’ by Flickr’s users.

⁵ <http://vanderwal.net/folksonomy.html>, ref. 26.7.09

⁶ taken from Flickr.com on July 9th, ‘09

2.1 Collecting tags – public descriptors of Web artifacts

Tags or descriptors of Web artifacts defined by the public are typed into a tag collection system, which runs as a front-end system to an artifact collection. This system may limit tags to single terms or support specification of phrases as tags. The *Steve.museum.tagger*⁷ is one such system that has been developed as a prototype for art museums (steve.museum, 2008). Flickr, Delicious and Last.fm⁸ are other commercial tagging systems for images, bookmarks, and music respectively. Typically, the tagging system displays the object to be tagged, some instructions for the viewer, and a back-end tag collection system which produces/updates the folksonomy.

There are basically 2 forms for tagging systems: ones that show no previous tags and ones that provide the tagger with information about the artifact to be tagged, including the formal documentation and/or previous tags. Figure 3 shows the interface of the tagging system developed by the steve.museum project in which 3 tags have been defined. This system provides both museum documentation and previous user tags assigned to the image and accepts multiple-term tags. The system also accepts multiple entries of the same tag (both *bird* and *Islamic art* had been entered earlier). In this example, the museum annotation contains 2 semantic terms – *spotted forktail*, while the current tags have added an additional 21 semantic descriptors.

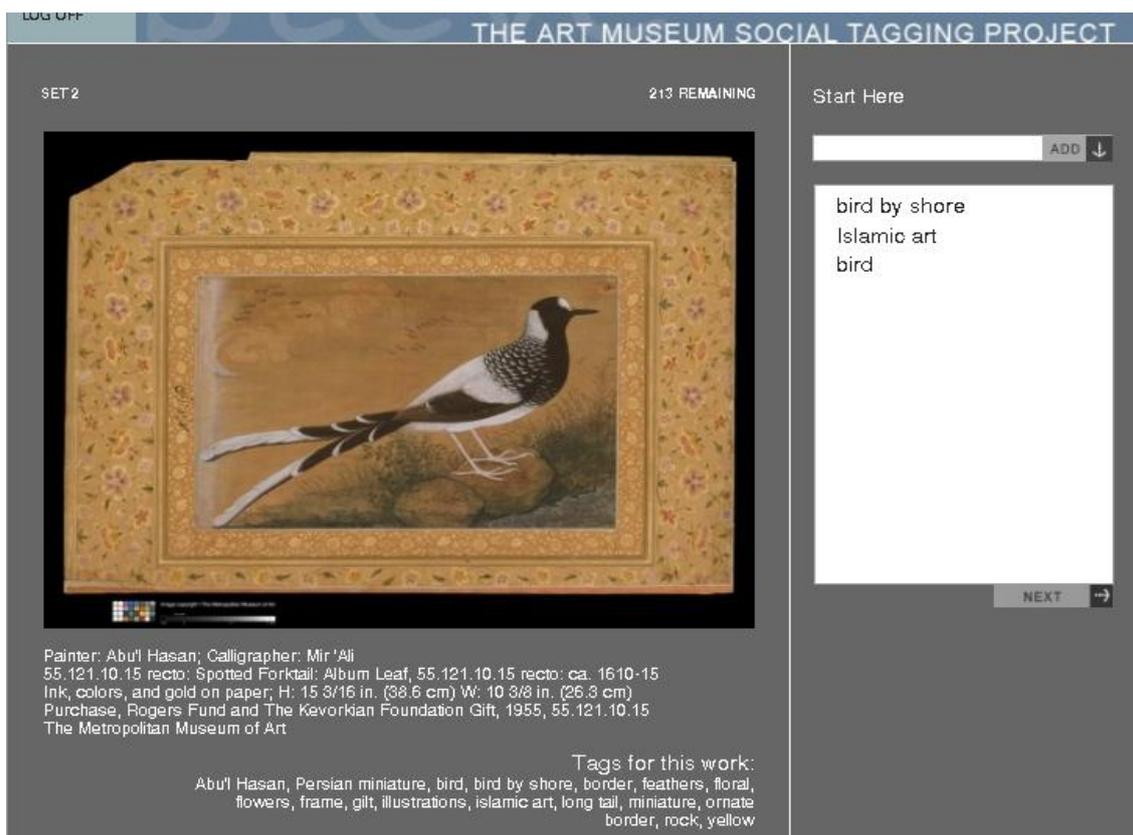


Figure 3: steve.museum tagger interface⁹
retrieved from steve.museum on 22.8.09

⁷ <http://tagger.steve.museum/>

⁸ <http://www.flickr.com/>, <http://delicious.com/> and <http://www.last.fm/>

⁹ http://tagger.steve.museum/steve.php?task=randomizedCollectionController_viewImageset&mimeId=464&imagesetId=16

2.2 Developing a folksonomy

Tag collections – raw Folksonomies – are generally ‘flat’ in the sense that their terms are not interrelated into formal taxonomies of broad and narrow terms or synonym groups. They may include duplicates, misspellings and terms that are not useful for assisting information retrieval. For example, a comment for the image in Fig.1a, has been formed as several sentences: “*Bourgeoisie from the center often came on weekends for picnic or tours. It is located 6km from the center...*”¹⁰, which could give up to 19 terms, depending on the folksonomy creation system.

The terms in a folksonomy are used to create an index to the images in the collection. Commonly, the term list will be reduced by eliminating *stop words* – terms that are not deemed useful for search (Baeza-Yates,1999). For example, an edited folksonomy could contain 5 terms: *bourgeoisie, center, weekends, picnic, tours*, from the sentence description above, or elimination of the term “*by*” from the tag: “*bird by shore*”, illustrated in Fig.3. Each index term will have a list of references to the items for which the term was assigned and may have both an application usage frequency associated with the term and with each url of the image. An example of a possible term entry in Flickr.com’s folksonomy, generated using the tag “*Fantoft stave church*” for a search in Flickr could be:

<i>Term</i>	<i>frequency, list of <reference url, frequency></i>
“Fantoft stave church”	460 ¹¹ , <url- image-1:f ₁ >, <url- image-2:f ₂ >, ... , <url- image-460:f ₄₆₀ >

Since generation of a folksonomy is a fully automated process, maintenance and updating of the reference lists, frequency counters and deletion of non-useful terms is an on-going automated process. If a system for pruning terms using the stop-word list and terms with low frequency usage exists, tags representing spelling errors or inappropriate tags will be deleted after a period of disuse and no manual intervention is necessary.

3 Evaluation of folksonomies in museum contexts.

Since Folksonomy usage in museums and libraries is quite new and still in an experimental phase, little formal evaluation of their effectiveness in improving information retrieval has been possible, though anecdotal reports have been positive. Most initial evaluations have focused on the relationships between the terms in folksonomies and formal annotations – the artifact documentation made by professional curators/librarians.

Two studies, the steve.museum project (Trant, 2006) and a recent master’s theses from UiB (Bråthen, 2009), will be reviewed in the following. The steve.museum study analyzed tags for 30 images of museum objects – artifacts and paintings – collected from the Metropolitan Museum of Art in NYC. The Bråthen study analyzed tags collected for 20 images from a photo collection held by the Bergen University Library. Table 1, gives the framework data from these 2 studies. Note that well over 80% of the tags provide terminology not found in the museum/library documentation.

¹⁰ Tag on the Stave church image in Fig.1a, http://www.flickr.com/photos/library_of_congress/3175010584/

¹¹ Flickr.com, 26.7.09. Note that Flickr does not give the application frequency for each tag for each image.

# <i>images</i>	# <i>taggers</i>	# tags <i>Total/ unique</i>	% new <i>terms</i>	<i>Image source</i>	<i>Reference</i>
30	35	6679 3780	88	Metropolitan Museum of Art, NYC	Trant, 2006
20	20	1711 1051	91	Bergen Univ. Library ¹² Bergen photo collection	Bråthen, 2009

Table 1: 2 studies of terms gained from tagging.

The high number of new terms has not been analyzed in these studies. However, both studies used multiple term tags, giving rise to variations of a concept, such as {NY, New York, New York City, New York City winter, New York City in winter} (for a winter photo of NYC), which have been counted as 5 tags. Tags for the same photo also included multiple grammatical versions of several terms, for example {city, cities, cityscape} which have been counted as 3 tags. Since these variations represent different perspectives, keeping them in a vocabulary list can be expected to improve precision for individual user queries.

3.1 Folksonomy term analysis

J.Trant (2006) presents an analysis of the 6679 tags collected for 30 images by 35 administrative personnel (non-professional curators) from the Metropolitan Museum of Art in NYC. The images were presented for tagging in 3 forms: without any annotation, with a caption and with a request for tags for a randomly selected category (Colors; Emotions; Events; People (real or fictional); Places; Themes; Things; and Time). The category tags were difficult to analyze since no attempt was made to assure that the image actually ‘fit’ into the given category (Trant,2006).

As expected, some descriptive tags were assigned repeatedly. In this study, the 5 most common tags were ‘reused’ by ca. 35% of the taggers, while the 3 most popular tags were reused by ca. 42% of the taggers (Trant, 2006). Duplicate tag reduction gave 3780 unique tags for the 30 images, an average of 126 tags/image or 3.6 tags/image/tagger. A comparison of these tags with the terms used for museum documentation gave 3343 new term/tags, 88%, provided by the taggers – an average of 111 new tags/image. The study also evaluated the ‘usefulness’ of the tags, defined as “*terms that accurately described the work of art*” and found that more than 75% of the new tags were useful (Trant, 2006).

J-E. Bråthen (2009) studied 1711 tags assigned for 20 images of photos from the city of Bergen by 20 master-degree students at the Dept. of Information and Media Sciences. Each participant tagged each of the images with at least 3 tags. The taggers were divided into 2 groups. The 1st group tagged images that were presented without any annotation or tag information. The 2nd group tagged images for which the 3 most popular tags assigned by group 1 were shown. The interface for group #2 was similar to that used by Steve Tagger, shown in fig.3. Again there was about a 40% tag duplication giving 1051 unique tags for the analysis (Bråthen,2009), which is an average of 52.5 unique tags/image or 2.6 unique tags/image/ tagger.

¹² About 20,000 digital images are available at <http://www.ub.uib.no/bilder> of a total collection of nearly ½ million historical photographs.

Bråthen's study focused on the differences between annotations (terms used by professional librarians) and tags, in particular on which characteristics of an image were described. He defined 5 categories of image characteristics: objects and their properties, activities, abstractions (interpretation and emotional), locations and structural descriptors. Both tags and annotations were assigned to these categories. Figure 4, from Bråthen's thesis shows the term distribution in his study.

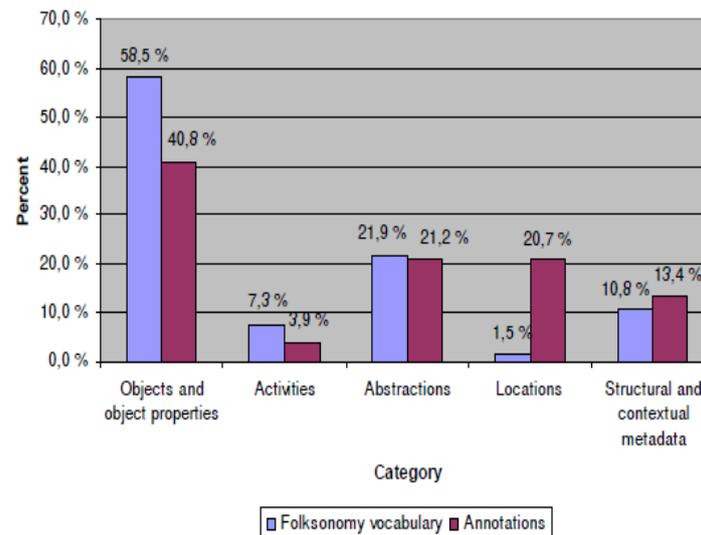


Figure 4: Term distribution between taggers and professional annotators (Bråthen, 2009, Fig.29.)

Note that nearly 60% of the user tags described aspects of objects shown in the image. The library annotations also focused on object description, but included more detailed location data. This was reasonable, given that the photo collection was taken from local city images.

An analysis of the overlap between annotations and tags, shown in Figure.5, indicates that about 20% of the tags replicate terms in the annotations, while the folksonomy more than triples the number of descriptors for the image set. These results are also illustrated in the single example given in Fig.1 and 2 above, of the Library of Congress annotation vs the tags collected in Flickr.com.

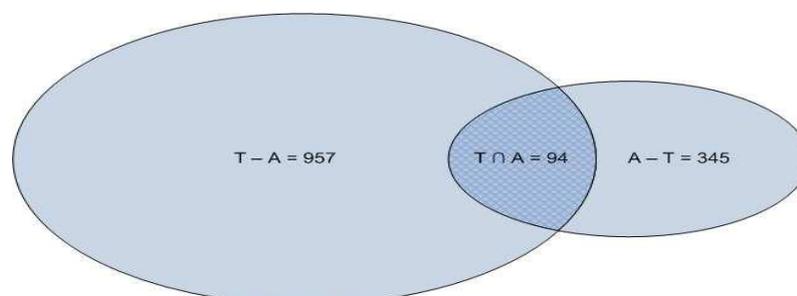


Figure.5: unique terms from the folksonomy (T-A) and the annotations (A-T) (Bråthen, 2009; fig.22)

3.2 The impact of the tagging systems' interface design

Evaluation of the effect of tagging system interface on the number and type of tags provided is mixed. Trant's study (2006) reported that more new terms were specified when the caption of the artifact was given than when the image appeared without a caption. However, Bråthen's study indicated that systems that display existing metadata/tags elicit fewer tags with fewer new terms. However, the new tags appear to complement existing tags by focusing more on identification of the activities and emotions shown in the images. Clearly more research is needed here.

4 Summary – are folksonomies worth the effort?

From the above, we have learned that:

1. Folksonomies add a significant number, up to 90%, of new terms/phrases to the descriptions of artifacts specified by curators/librarians, thus increasing the possibility of locating materials in a digital collection.
2. A higher percentage of tags describe objects and details in an image than that given in the formal documentation, thus providing a more detailed semantic description of the objects in an image collection.
3. Capturing tags and creating/maintaining a folksonomy can be an automated process, thus, after establishment of the software, will require little of no further effort for the museum staff.
4. More research is required to determine the 'best' interface for a tagging system.

A number of further questions have been raised, particularly in the Steve.museum project (Trant, 2009) as a focus for future research. A few of these questions have been addressed in the 2 studies reported above. Others are addressed below, on a more theoretic level.

4.1 Do tags work?

The primary motivation behind tagging is to increase access to digital collections, by addressing the language gap between the formal/professional language used for artifact documentation and the general language used by casual information seekers. To date, use of folksonomies in museum contexts is in an initial, test and evaluation phase (Trant, 2009) with only a few experimental tag collection systems available for general public use. It remains to be tested and evaluated if incorporation of a folksonomy will actually provide improved access to museum materials for the general public.

Intuitively, an evolving folksonomy, by adding more descriptors to the indexing set, should improve the quality of text-based image retrieval as measured by the recall rates in the result set. However, given the nature of language and individual perception, one would also expect that the precision (early relevance) of images in a result set could drop. Indeed, a very small study¹³ reported by Kristiansen (2009) indicates that the use of tagging can enhance recall, with only a minor drop in the precision of the result set. However, confirmation of these observations will require a large, known set of images and queries with relevance sets.

¹³ Using an image collection of 10 images

4.2 *Should a folksonomy be restricted or edited? If so how?*

Several studies (Trant, 2006 and 2009; Kristiansen, 2009) note that museum professionals are skeptical to inclusion of folksonomies into museum documentation. Two approaches to address their concern include:

1. Requesting museum curators to review folksonomy terms for suitability before use in a museum context (Trant, 2009) and
2. Restricting taggers to adding tags to existing taxonomy hierarchies (Kristiansen, 2009).

Clear problems with these strategies include the limited capacity of museum professionals to perform the control process, thus limiting scalability of folksonomy construction. Restricting tags to existing taxonomy hierarchies limits the ability of adding new interpretations to the artifact description.

Perhaps this concern overstates the visibility of the folksonomy, since it is a supplementary index intended to facilitate information retrieval from a general public. It need not be made public and thus will only be 'seen' through the images in the result sets. Assuming that the folksonomy contains a frequency of use indicator for each tag, the system could prune out low usage tags, leaving only those that had demonstrated usefulness for retrieval of information. Inappropriate tags, could be added to the stop work list and thus not enter the system at all. Both of these strategies can be automated and thus are scalable to large collections.

4.3 *Will the public 'really' participate?*

Development of a folksonomy is based on the idea that casual museum users will devote some of their time to tagging collection material. Chan (2007) reports that viewers of the Power House museum's digital catalog submitted 3391 tags for 2246 objects during a 6th month study period in 2006. This gave an average of 1.5 tags per object ranging from 1 to 10. The objects receiving the highest number of tags were minimally documented making the tags an important addition to their history and semantic interpretation.

There are numerous ways to advertise that one wishes public help for artifact tagging, Two options include:

- One can ask for help from registered users of the museum or through museum organizations. These users are already 'within' the museum community and there is experience that these persons are interested and willing to help with museum projects.
- One can place (some of) the digital collection on Flickr Commons, <http://www.flickr.com/commons>, as 27 museums and libraries¹⁴, including both the US library of Congress and the Power House museum in Australia have done.

Tagging is becoming a popular activity among Internet users who share their content. Presumably, these persons will also assist in tagging museum collections.

¹⁴ From the home page of The Commons on Flickr, retrieved 24.8.09

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