



Social media application in digital libraries

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Abstract

Purpose – The purpose of this paper is to investigate the applications of social media in digital libraries and identify related problems.

Design/methodology/approach – A total of ten institutions were selected from the following cultural institution types – public libraries, academic libraries, museums, government, and international organisations – to represent a variety of digital libraries developed or sponsored by different types of organisations. The social media applications were examined with regard to the following aspects: types of social media, placement of social media, updating social media, types of interactions, and types of functions.

Findings – This study presents the types of social media applications in the selected digital libraries and further characterises their placements, update frequency, types of interactions between digital librarians and users, as well as various types of roles they played. In the process of analysis the authors also identified problems related to lack of standards, creating two-way communication channels, and the lack of education functions.

Research limitations/implications – Further research needs to expand the selection of institutions and digital libraries to have more representative sampling, in particular institutions that are outside North America and Europe. It is also important to perform in-depth content analysis of social media to identify patterns and functions that social media perform. Moreover the authors will compare specific social media tools, such as Twitter, Facebook, etc., across institutions. In order to explore fully the reason why certain social media tools are implemented in digital libraries, it is important to survey or interview digital librarians of digital libraries in different types of cultural institutions. In addition users can be interviewed to solicit their perspectives about their usage of social media in digital libraries.

Originality/value – This study not only examines the current status and problems of social media application in digital libraries but also offers suggestions on making good use of social media to connect users and digital libraries.

Keywords Social media, Twitter, Digital libraries, Facebook, Blogs

Paper type Research paper

Introduction and literature review

Social media is a means of communication through the internet that enables social interaction. It is an effective approach for people to use in communicating and interacting with each other. Simultaneously more organisations are applying social media to promote their services and interact with their users or patrons. In this study cultural institutions' use of social media as applied to their digital libraries is analysed. Cultural institutions are defined as libraries, museums, and archives. The primary focus is to define various social media applications and to research existing literature regarding how and why libraries, museums, and archives have implemented social media applications in their institutions. In particular the aim is to identify digital libraries and their associated institutions that have implemented social media as a part of their services.

There are different variations of social media. The most popularly applied social media in digital libraries include blogs, Facebook, photo sharing, podcasts, RSS feeds,



Twitter, YouTube, and wikis. There is some cross-classification as a few social media applications have more than one function. For example Twitter is a social networking site, but at the same time, it also serves to share photos and is classified as a microblog. Based on relevant literature Table I defines different types of social media.

Few studies have looked specifically at social media and its usage in digital libraries. Instead the majority of literature focuses on social media usage in cultural institutions as a whole and not their associated digital libraries. While the focus is not directly on digital libraries, some important information can be learned from these studies. For example Buigues-Garcia and Gimenez-Chornet (2012) concentrated on social media's impact on national libraries to find the types of services and technologies that were most appropriate for library web sites. The libraries were located from URL repositories and social media tools. The study found that out of all national library web sites in the world, only a quarter can be considered Library 2.0; a significant portion of the web sites are located in American and Europe. Buigues-Garcia and Gimenez-Chornet (2012) identified the most implemented social media tools in libraries such as Facebook or Twitter and user information services such as RSS, publication of bulletins, blogs, or digital/virtual libraries. The study did not identify the popularity behind the use of social media from a user's perspective, only from the digital librarian side. In relation a study conducted by Gerolimos (2011) reviewed the framework of academic libraries' use of social media. He argued that social media might be disconnecting the library's functions into too many different facets of information.

As many cultural institutions have already implemented social media in other facets of services, it seems natural to begin to add social media to digital libraries, especially since social media was created to enable users to communicate and connect with each other. In addition scholarly communication can take place via social media. Cho (2013) asserted that academic libraries should be using specific social media applications that allow new ways of communication. Gu and Widén-Wulff (2011) found that researchers have a variety of information practices, and suggested that librarians need to incorporate social media in ways to further scholarly communication. Perhaps one of the ways that librarians could potentially strengthen information practices is through the incorporation of social media in digital library collections. One example of integration of social media in a digital library is demonstrated by the Denver Public Library. The Denver Public Library's digital collections allow users to share information via a social media application when they are viewing the individual items; as opposed to the Colonial Williamsburg Digital Library, which does not allow users to share information found in the digital library at the collection level. The Denver Public Library allows users to share information found in the digital library via a multitude of social media applications, from popular applications such as Facebook to more user driven applications such as Reddit. There are a number of potential benefits from integrating social media with digital libraries; however, few institutions have made the step to include social media that link directly with their digital library collections. The literature suggests several reasons to include social media in digital library collections. A study conducted by McDonnell and Shiri (2011) found that the integration of social media search applications into digital libraries made users feel more comfortable when using the digital library. As a result users achieved better search results. Russo *et al.* (2009) found that education is now encompassing traits of new media, shifting from a traditional focus on print material to digital materials. Studies need to be conducted in order to gain knowledge and expertise as to how digital libraries are portraying and displaying social media in conjunction with digital collections.

Table 1.
Definitions of different
types of social media

Types	Definitions	Example	Related literature
Blogs	Allow a user to share thoughts and opinions on subjects in a diary-like fashion in a series of posts. Create discussions or an informational site published online and consisting of discrete entries or "posts"	Blog	Buigues-Garcia and Gimenez-Chornet (2012), Schrier (2011), Samouelian (2009), Kroski (2008)
Micro blogs	Allow users to communicate with a handle or username that the user creates, and can write short messages, typically 140 characters that are sent to the user's followers	Twitter	Grabowicz <i>et al.</i> (2012), Starr (2010), Kroski (2008)
Photo sharing	Online image and video hosting site that allows users to share, comment, and connect through posted images	Facebook; Flickr;	Buigues-Garcia and Gimenez-Chornet (2012), Taraborelli <i>et al.</i> (2009), Taraborelli and Roth (2008)
Podcasts	Multimedia digital file that is stored on the internet and is available to download, and is similar to a radio broadcast that is available freely online	Podcast	Buigues-Garcia and Gimenez-Chornet (2012), Russo <i>et al.</i> (2009), Samouelian (2009), Kroski (2008)
RSS feeds	Rich site summary or really simple syndication comprises frequently updated web feeds that indicate news, events, and blog entries that a user can subscribe to and follow. RSS takes current headlines from different web sites, and pushes those headlines down to your computer for quick scanning	RSS feeds	Buigues-Garcia and Gimenez-Chornet (2012), Schrier (2011), Kroski (2008)
Social networks	Online platform that allows users to communicate and connect with each other via interests, backgrounds, and activities that are part of a large social network	Facebook; Twitter; Reddit	Ahn (2011), Knuttila (2011), Yang and Ng (2011), Kroski (2008), O'Reilly (2007), Boyd and Ellison (2007), Dwyer <i>et al.</i> (2008), Millen <i>et al.</i> (2007)
Video	Content distribution of videos, typically available for free to the public	YouTube	Cho (2013), Buigues-Garcia and Gimenez-Chornet (2012), Kroski (2008)
Wikis	Allow users to create and edit webpage content online. Hyperlinks and crosslinks connect between pages. Users are allowed and encouraged to edit wikis	Wiki	Buigues-Garcia and Gimenez-Chornet (2012), Lightle (2010), Samouelian (2009), Kroski (2008)

Digital collections do contain a lot of information, and not all of them may appeal to all users. A few cultural institutions have already begun to implement specific social media applications for certain areas and have adopted mission type statements. The New York Public Library began an organisation called NYPL Labs which took a broad “user-focused approach to [the] ever-evolving digital environment and [the] challenges it represents for service centric cultural institutions” (Taranto, 2009, p. 30). Likewise the California Digital Library (Calisphere) made the decision to implement a Twitter account as a communication tool after discussions with colleagues that Twitter offered avenues to new audiences (Starr, 2010). NYPL and Calisphere are both examples of potential ways to market or promote collections and services through social media. Khan and Bhatti (2012) conducted a study that explored how different types of social media applications can be utilised to market library services. Librarians and LIS school academics at two universities in Pakistan identified which social media applications were viewed as positive for the promotion of library services. Facebook, wikis, LinkedIn, blogs, and YouTube were all recommended. While this study only surveyed information professionals to gather popular opinions of social media, it does shed some light on how social media is viewed among other professionals. However, the user perspective is equally important when selecting social media applications for library service use.

The focus on the user is becoming more important, and more cultural institutions are already focusing and thinking of users in regard to other aspects of new programmes. In 2012 OCLC conducted a survey to learn more about users of archives and their social media use within the context of archival research. The findings indicated that e-mails and word of mouth were the main ways that archival researchers share information. Interestingly social media features such as tags, reviews, recommendations, and user comments were only viewed as useful by fewer than half of the respondents. OCLC’s findings are echoed by Gu and Widén-Wulff’s (2011) recommendation that librarians need to figure out a better way to integrate and communicate scholarly information to the user through social media. For example Taranto (2009) noted that library outreach programmes have been extended to digital activities, including digitisation and the integration of social media. However, other than offering guidance principles, no empirical data are provided in Taranto’s study. From a museum perspective Charitonos *et al.* (2012) used a mixed methods approach to determine whether social and mobile technology would improve the visitor experience in school field trips. What is interesting about the study is that the museum curators specifically sought new ways to integrate social media use into the experience of the visitors. The study used descriptive numerical analysis, created a network map of tweets (microblogging) produced by students, and participant interviews concluded that microblogging increased interest for the students (Charitonos *et al.*, 2012).

Social media was created to enable the user to communicate and connect with others. The increased development of digital libraries has resulted in many institutions treating digital libraries as an extension of their institution. However, it is important for digital librarians to know their users in order to provide appropriate digital outreach services. As many cultural institutions have already implemented social media in other facets of services, it seems natural to begin to add social media to digital library interfaces. However, successful engagement in social media requires that, within the context of this study, a cultural institution follows a number of people as well as being followed by users. That is because social networks are only as strong as their network size and network quality (Sacks and Graves, 2012). Granovetter’s theory

of the strength of weak ties predicts that social networks are only as strong as the communities behind them and information bridging across different networks will only extend as far as the strong ties between the individuals (Granovetter, 1973).

Social media has been established a stronghold in society for a number of years. Cultural institutions have implemented these applications in various services. Consequently social media applications are beginning to be incorporated into digital libraries. As social media continues to become further integrated into society, digital libraries, and other elements within cultural institutions will have to change in order to comply with user needs and expectations. The changes that will need to be made to ensure that digital librarians are engaging with their users in a suitable manner can only be properly made if it is known what changes did not work from the beginning.

Current research demonstrates that many cultural institutions are engaging in social media applications. Research on digital libraries and social media is at the very beginning of understanding the possible benefits and problems behind incorporating these applications into a digital library environment. There are many questions that need to be answered regarding the application of social media in digital libraries.

Research problem and research question

Social media research has primarily focused on their usage in cultural institutions. Very few studies have concentrated on social media application in digital libraries. This study attempts to assess how social media has been applied in selected digital libraries. In particular this study intends to answer the following research question and associated sub-questions.

What are the characteristics of social media applications in digital libraries? More specifically:

- What are the types of social media applied?
- Where are the different types of social media located?
- How often are different types of social media updated?
- What are the types of interactions that social media has created between librarians and users?
- What are the types of roles that social media has played?

Methodology

The objective of this study is to assess how social media are applied in digital libraries. In order to have a stratified sample, two institutions were selected from each of the following cultural institution types: public libraries, academic libraries, museums, and government and international organisations. The criteria for inclusion are as follows:

- (1) Each institution selected for this study had a digital library.
- (2) The institution had publications about its digital library development and/or use of social media and implementation process.
- (3) Each institution had to have at least one social media application installed before the study began.
- (4) Each institution's digital library had its own social media application outside of its parent institution.

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- (5) Each institution actively maintained and updated its social media applications. The social media applications are created and maintained by staff of the institution.

The social media selected for evaluation were social media tools that were implemented in at least three institutions. This study was conducted in 2012-2013. Table II presents the sample data.

In order to evaluate the use of social media in digital libraries, the authors collected data related to active social media applications in each institution. Based on the research questions, data collection and analysis focused on the following aspects:

- (1) Types refer to the types of active social media applied in the chosen digital library. All social media applications in the selected digital libraries were selected and analysed based on the definitions discussed in Introduction. The following types of social media were identified from the data set: blogs, Facebook, Flickr, Pinterest, podcasts, RSS feeds, social news web sites, Twitter, and YouTube.
- (2) Different names are used for social media in different institutions. Some social media applications have their unique names presented in the digital libraries, while others just use the generic names. If specific names were used, these specific names were identified and presented, such as NYPL Blogs, Jefferson's Blog, etc.
- (3) Icon placement refers to first where the icons for social media applications are located: institution homepage, digital library homepage, or the collection homepage, and second where the icons are placed: top left, top centre, top right, bottom left, bottom centre, and bottom right. Icon placement was studied to verify at what points during the search process users could have access to social media. Often social media icons are available on the homepage of the institution's digital library, but upon entry into the collection, the accessibility to social media diminishes, thus not allowing users the ability to share information via common social media tools. In addition it is also important to survey the most popular location of icon placement.
- (4) Update frequency refers to how frequently the social media applications are updated. The following update frequencies were identified from selected digital libraries: hourly, daily, weekly, monthly, and sporadic. The latter include posts that happen in succession followed by two or three months in between subsequent posts. In some of the digital libraries, frequency of posts is dependent upon the digital project or library. Posts can range from daily to monthly. For newly implemented social media applications, it is too early to assess frequency. Two further categories were: recent updates are maintained by users but not institutions, or that some updates are not entirely related to the digital library but to the entire institution.
- (5) Functionality refers to the functions through which social media allows librarians and users to interact with each other. A total of ten functions were available for them to choose from: check in, comment, friend, following, like, news feed, notifications, post, share, and tweet.
- (6) Role refers to the roles that social media play related to the management and promotion of digital libraries. The following roles played by social media emerged from the data: information, marketing/promotion/outreach, peer-to-peer connection, and information sharing. Definitions of the types of roles are discussed in the results section below.

Table II.
Sample data

Name of digital library	Name of institution	Type	Digital library web address
NYPL Digital Collections	New York Public Library	Public Library	http://digitalgallery.nysl.org/nypldigital/index.cfm
Denver Public Library Digital Collections	Denver Public Library	Public Library	http://digital.denverlibrary.org/
South Carolina State Library Digital Collections	South Carolina State Library	Academic Library	www.statelibrary.sc.gov/digital-collection
Calisphere	California Digital Library	Academic Library	www.calisphere.universityofcalifornia.edu/
Ringling Art Library	Ringling Art Library	Museum	http://ringlinglibrary.contentdm.oclc.org/
CW Digital Library	Colonial Williamsburg	Museum	http://research.history.org/DigitalLibrary.cfm
Smithsonian Digital Library	Smithsonian	National Government	http://library.si.edu/digital-library
National Archives Online Exhibits	National Archives and Records Administration	National Government	www.archives.gov/exhibits/
Toronto Public Library Digital Archive	Toronto Public Library	Public Library	www.torontopubliclibrary.ca/digital-archive/
National Library of Scotland Licensed digital collections	National Library of Scotland	Public Library	https://auth.nls.uk/ldc/

Two researchers coded the data independently. If there was disagreement on coding, researchers discussed them based on the definitions of the coding categories until agreement was reached.

Results

The results of this study reported the applications of social media to digital libraries regarding the following aspects: types of social media, placement of social media, updates of social media, types of interactions, and types of roles.

Types of social media

In the data set multiple types of social media applications were implemented in the selected digital libraries. Table III presents the distribution of social media applications in the ten selected digital libraries. Among them the most popular social media applications were Facebook and Twitter; all ten institutions used both. The second most popular application used was Flickr with nine institutions. The third most popular was blogs with eight institutions. RSS feeds and YouTube were fourth equal with seven institutions. Pinterest was fifth with six institutions, while podcasts came seventh with three institutions.

Out of all the cultural institutions selected for the study, very few had social media applications completely dedicated to the digital library. Blogs were the most specific social media application chosen for dedicated digital library postings. All of them selected blogs to convey digital library-related information. Flickr was another popular choice; nine institutions used Flickr, but only six of those institutions used Flickr as a way to promote their digital library exclusively. Other social media applications found on institutions' sites were Google + , Tumblr, and LinkedIn. As well as only being utilised by a few of the institutions selected for this study, none of those applications were directly being used for digital libraries. Consequently the applications were not included in the study.

There were eight institutions that employed blogs. Each one of the blogs has a specific name which alludes to the content of the blog. The Denver Public Library

	Blogs	Facebook	Flickr	Pinterest	Podcasts	RSS feeds	Twitter	YouTube
NYPL ^a	X	X	X	X		X	X	X
DPL	X	X	X				X	
RADL	X	X	X	X			X	
CW	X	X	X	X	X	X	X	X
TPL	X	X	X	X		X	X	X
NLS	X	X	X			X	X	X
SCSL		X	X	X		X	X	X
CDL		X					X	
Smithsonian	X	X	X		X	X	X	X
NARA ^a	X	X	X	X	X	X	X	X

Notes: ^aThere were multiple ways to share/save information via social media formats, but the institution did not actively maintain all of these sites; The institutions had ways for users to share/save the information posted in the digital library. However, the institution did not actively engage in maintaining their own social media sites; X, indicates the types of social media that are being used by each digital library

Table III.
Types of social media

Digital Library is the only institution to have a digital library specific blog entitled “Western History and Genealogy”. All of the other institutions have subject areas as blog topics. Digital library-related posts are posted to the blog that most closely matches the subject of the collection added to the digital library. Depending on the institution, blog topics range from healthcare professionals, banned books, and local artists to historical topics of interest. The Smithsonian, Colonial Williamsburg, and NYPL blogs are categorised by subject topics. Within each one of the subject-specific blogs, appropriate digital library posts are made to the most closely aligned blog. For example at the NYPL a new digital collection about photographs of an old New York neighbourhood may be to the blog entitled, “How and Where People Live: Upcoming Programs at the Mid-Manhattan Library”. At all of these institutions, users are encouraged to browse the blogs to find topics that interest them. Toronto Public Library has a wide selection of blog topics ranging from topical subjects to area-specific branch blogs. The branch blogs are blogs created by individual libraries within the Toronto Public Library system. Each library branch is encouraged to create blog posts that may interest their local users. TPL also has subject-specific blogs like other cultural institutions and blogs about specific collections, programmes, and services. For example topical blogs range from Arts & Culture to New to Canada, and branch blogs are available from 11 different branches.

Of course not all digital libraries have their own specific blogs; instead they share their institution blogs. The Ringling Museum Digital Library does not have a specific blog for the digital collections. Updates made on the blog are utilised by the entire Art Library, not just the digital collections. Likewise the National Library of Scotland does not have a specific blog for its digital collections. NLS blogs range from Bartholomew Archive blog, Family and Local History Resources, Medical History of British India blog, New to the Catalogue blog, Rare Books blog, Modern Scottish Collections blog, Rare Books blog, Modern Scottish Collections blog, and John Murray Archive blog to the Official Publications Unit blog. Each one of these blogs can post pertinent information regarding digital collections as it applies to the subject matter. For example, if a rare book was recently digitised, information would be posted to the Rare Books blog to inform users. NARA has a number of different blogs ranging in subject areas: archivist of the USA, The Carter Chronicle, The Federal Register Blog, FOIA Ombudsman, Media Matters, Narrations, National Declassification Center, Prologue: Pieces of History, Records Express, Rediscovering Black History, The Text Message, Transforming Classification, and Washboard the CIO blog. Again each one of NARA’s blogs could potentially share information regarding the digital collection mixed with other information on the blog that corresponds to the subject matter.

Placement of social media

The placement of social media on the institution’s web site influences the interactions between users and librarians or digital collections. Basic web design assumes that the more opportunities that are available for users to engage in different aspects of the web site, the better. In this case the opportunity is social media. As it is unknown when a user may have an opportunity to share information via social media, better web site design will provide social media icons throughout the site to allow interactions at any moment.

This study reviewed the placement of social media applications related to digital libraries. Table IV presents the placement of social media. Since the location of the

Table IV.
Social media web site placement

	NYPL	DPL	RADL	CW	TPL	NLS	SCSL	CDL	Smithsonian	NARA
Institution homepage	X	X	X	X	X	X	X	X	X	X
Digital library homepage		X	X		X	X	X	X	X	X
Collection homepage		X	X		X		X			
Top left										
Top centre										
Top right									X	
Bottom left							X			
Bottom centre										
Bottom right	X	X	X	X	X	X		X		X

Note: X, indicates the digital library location on the web site

social media was not decided by type, and all the social media applications that the institutions use on their web sites are located in the same location, Table IV was created by presenting social media locations in the rows and the digital libraries in the columns. The locations identified for social media application placement were: the institution homepage, digital library homepage, and the collection homepage of the digital library. All of the institutions provide users with the means to share information at the institution level of the web site. However, at the institution level there is no direct linkage to the digital library's social media. Half of the institutions allow users the opportunity to share information via social media at the digital library's collection level: Denver Public Library Digital Library, Ringling Museum of Art Digital Library, Toronto Public Library, South Carolina State Library, and the Smithsonian. California Digital Library and the National Library of Scotland do not provide users with the means to share an item found at digital library collection levels, but do allow users to share at the digital library homepage level. NARA, Colonial Williamsburg, and the New York Public Library do not provide a direct way to share information at the digital collection level; instead sharing capabilities are provided in a number of other ways, for example through placements on the homepage of the digital library. In addition some social media applications allow users to share information through other social media applications. For instance Flickr allows users to share images posted via Twitter and Facebook.

As to the locations of social media icons within one page, it seems that bottom right is a common location the social media icons are placed except for SCSL which places its social media icons at bottom left of the page. Again some of the institutions place different social media icons at different locations. For example NYPL places blogs at top right and other types of social media icons at bottom right. Only Smithsonian Libraries' homepage offers social media applications at both the top right and left of the page. The top right offers some social media icons while the news feed on the left of the page offers updates regarding all the social media posts. For example the latest tweet, latest blog entry, and recently digitised collections are all frequently updated. The homepage for the Smithsonian Digital Libraries offers the same icons at the top right of the page.

Updates of social media

Overall the frequency of updates to the social media applications is complicated. Very few of the institutions have specific social media applications that are completely dedicated to the digital library. Some of the institutions such as the National Library

of Scotland and New York Public Library have a selected number of social media applications (e.g. blogs) that have posts dedicated strictly to the digital library while other applications such as YouTube cover the entire institution. None of the institutions involved in the survey have social media policies related to updating. However, the Toronto Public Library, Smithsonian, and National Archives and Records Administration did have policies posted to their respective Facebook pages and/or their web sites in regard to policies concerning comment conduct. Consequently verifying the frequency of updates about digital libraries in a social media application is tedious. Some institutions such as NARA and the Smithsonian have specific social media applications devoted to various topical subject areas. There is not necessarily a specific digital library topical area; instead the “digital material” is posted within relevant subject areas. In contrast the Denver Public Library is one of the institutions that have dedicated social media pages for its digital library.

Table V presents updates of social media by types of social media and Table VI presents updates of social media by institution. This study found that Twitter is updated hourly, and blogs tend to be updated less frequently, ranging from weekly to monthly. Facebook shows the most diverse updating information, ranging from hourly to sporadic. This study found that it is difficult to identify patterns of social media

Table V.
Updates of social media by type of social media

	Blog	Facebook	Flickr	Pinterest	Podcasts	RSS feeds	Twitter	YouTube
Hourly		X		X			X	
Daily	X	X	X	X	X	X	X	
Weekly	X	X	X			X		
Monthly	X	X						X
Sporadic	X	X	X	X			X	X
User-based updates only					X			
Updates not related solely to digital library	X	X	X		X	X	X	X

Note: X, indicates the frequency of the updates to each social media type

Table VI.
Updates of social media by institution

Digital Library	Blog	Face-book	Flickr	Pinterest	Pod-casts	RSS feeds	Twitter	You-Tube
New York Public Library	D, W, M	H	S	H, D		D	H, D	S
Denver Public Library	W	D	W, M			W	D	
Ringling Art Digital Library	M	D	N	N			D	
Colonial Williamsburg					D			M
Toronto Public Library		H	D	D			H	S
National Library of Scotland	W	H/D	S			M	H, D	M
South Carolina State Library		D	N	D, W			H	S
California Digital Library: Calisphere		S					S	
Smithsonian						D		
National Archives and Records Administration			S					

Notes: D, daily; H, hourly; W, weekly; M, monthly; S, sporadically; N, new to social media format; X, indicate the type of interaction that the digital library takes part for each type of social media

application updates in institutions. The updates are sometimes sporadic, meaning there are posts that happen in succession followed by two or three months in between subsequent posts. This finding holds true for all of the applications, even the most popular (Facebook and Twitter). Frequency of posts is dependent upon the digital project or library.

The study also found that many institutions had recently added many of the social media applications at the time of the study; therefore frequency was too early to tell. Overall the social media applications that had the most current updates maintained by the institutions were Twitter followed closely by Facebook.

In addition some social media applications are left to the user group, and the institutions do not intend to maintain them. Many of the social media sites had recent updates but were maintained only by user groups or followers. RSS feeds, Flickr, and Pinterest were the three social media applications that institutions had made available to their users, but their staff were not actively engaged in the site.

Types of interactions

There are a number of tools that the digital librarian can use to interact with users via social media applications. Librarians and users have different types and levels of interactions with social media. In addition it is up to each cultural institution to decide how much and what kind of interactions take place on each social media application. Cultural institutions can decide whether or not to mediate the social media site or to allow users free rein on the site. Table VII breaks down the basic interactions with social media by social media type, whereas Table VIII describes the institutional and user interactions of social media. Among all the interaction types, comment and news feed can be applied in different types of social media applications while “check in”, “friend”, and “tweet” are more social media specific. A check in feature allows patrons to share with their friends or followers where they are and what they are doing. For example if a patron arrives at the library, the patron may decide to login to their Facebook account and check in. Within the context of the digital library, patrons may decide to check in to inform their friends or followers what digital library they are currently browsing and what collection they are currently looking at. Typically librarians and users can comment, like, add information to the news feed, notify (notifications), post, and tweet with users/librarians to engage in communication and interaction regarding news about the digital library. The levels of interactions

	Blog	Facebook	Flickr	Pinterest	RSS feeds	Twitter	YouTube
Check in		X				X	
Comment	X	X	X	X	X	X	X
Friend		X					
Follow	X		X	X	X	X	
Like	X	X	X	X	X		X
News feed	X	X	X	X	X	X	X
Notifications	X	X	X	X	X	X	
Post	X	X	X	X	X		
Share			X	X	X	X	X
Tweet						X	

Note: X, indicates the role that social media plays for each digital library

Table VII.
Interactions with social media by social media type

Table VIII.
Institutional and user
interaction with
social media

	Blog	Facebook	Flickr	Pinterest	Podcasts	RSS feeds	Twitter	YouTube
NYPL	C, P, S	C, L, NF, N, P, S	C, P	C, FO, S		NF, S	FO, T	C, S
DPL	C, P, S	C, L, NF, N, P, S	C, P					
RMDL	C, P, S	C, L, NF, N, P, S	C, P	C, FO, S			FO, T	
CW	C, P, S	C, L, NF, N, P, S		C, FO, S	NF, S	NF, S	FO, T	C, S
TPL	C, P, S	C, L, NF, N, P, S	C, P	C, FO, S		NF, S	FO, T	C, S
NLS	C, P, S	C, L, NF, N, P, S	C, P			NF, S	FO, T	C, S
SCSL		C, L, NF, N, P, S	C, P	C, FO, S		NF, S	FO, T	C, S
CDL		C, L, NF, N, P, S					FO, T	
Smithsonian	C, P, S	C, L, NF, N, P, S	C, P	C, FO, S	NF, S	NF, S	FO, T	C, S
NARA	C, P, S	C, L, NF, N, P, S	C, P	C, FO, S	NF, S	NF, S	FO, T	C, S

Notes: CI, check in; C, comment; F, friend; FO, following; L, like; NF, news feed; N, notifications; P, post; S, share

between digital librarians and users can be classified as very strong, strong, or weak connections.

Some of the institutions created very strong connections between digital librarians and users. A very strong connection would be one in which on at least a daily basis interaction is taking place: for example a digital librarian makes a post to Facebook regarding a new addition to a digital collection. The interaction that follows that first post should also be continuous, so if a user posts a subsequent question about the collection, the digital librarian should respond in a timely fashion. For example RMDL digital librarians interact with users through the following features: comments, following, like, news feed, notifications, posts, and tweets. What is interesting about RMDL is their use of Pinterest; not only do librarians “pin” new material to the museum’s board, but they also follow a number of other users on Pinterest. Thus the interactions create a very interactive space. RMDL also interacts with their users through Flickr, often by posting images and asking users to make comments or guess what is going on in the photograph and even tagging people they may know. TPL follows its users on Twitter and Pinterest. Like RMDL TPL interacts with users through Flickr to encourage online discussion of images. The California Digital Library Calisphere (CDL) encompasses a number of interactive tools through Facebook and Twitter applications, and on Twitter CDL is following 1,081 users and has 999 followers. CDL follows slightly more users than it has users who follow it; it is important to take note of the number of users or followers that the institution is making connections and interacting with. A common misperception that is associated with social media is that one simply needs to post and post often. However, social media is not just simple promotion. It is a two-way street of communication practices. It is the context of the message that is important; users should want to respond to what librarians post and librarians should respond to their users. The point of social media is to engage and facilitate connection. The significance of CDL following more users than follow it, is that CDL is striving to build their user community by engaging with those who may find the information they are posting interesting. Once an institution builds a profile through social media, it is the users who view that institution as an interacting entity. Therefore the institution needs to build a profile that demonstrates “likes” and interests to which users can relate.

Some institutions have a strong connection between digital librarians and users. For example NYPL does not have dedicated digital library social media posts;

significant stories relating to the digital library are shared through the social media applications that the library has chosen to use. As a result there are few ways for the librarian to post relevant information about the digital library. However, updates are made frequently to the social media applications, from hourly to daily. NYPL uses many social media communication tools, except check in features, though this feature is more on the user end of the interaction, except in instances where check in features are used for promotional features. Librarians also “follow” their users on Twitter, but the lack of specific posts about the digital library does make it difficult to follow specific updates as a whole.

The Denver Public Library also has a strong connection with their user community. Librarians interact with users through Facebook, Twitter, a news blog, and Flickr. The level of interaction involves librarians commenting on users’ posts, e.g. notifying users of new information, and exchanging tweets with users. Librarians also “follow” their users on Twitter. DPL does not use the check in feature, nor does it host social media applications that use that feature. Updates are made frequently to different social media applications from daily to monthly, depending upon the application being utilised.

Of course not all institutions build a strong connection between librarians and users. Some of them demonstrate a weak connection, which is defined as only one-way communication instead of two-way communication. The National Library of Scotland has a number of ways that the librarians can interact with users: comments, following, likes, news feeds, notifications, posts, and tweets. However, much of the interaction is one sided with users. This means that NLS posts information regarding the library, digital library, etc., and users post comments or “like” the information on the page, but there is very little interaction that goes on after this point between the user and librarian. There is not a two-way street of active interactions. For example on Twitter NLS has 5,640 followers but is only following 523.

Overall user interaction is similar to interactions that are led by librarians. Two levels of interactions with social media by users are visible within the social media applications. Both strong and weak interactions were observed in this study. There are variations within these two categories: strong user interactions and weak user interactions.

In instances where librarians do not encourage strong connections or interactions amongst the user groups, users build relationships and facilitate interactions amongst themselves. Some users form large user groups that support themselves without the “help” of interacting with a librarian. These interactions would be considered very strong. NARA is one of these cases. NARA participates in a number of different social media applications and posts or tweets a substantial amount of new information about the institution and its varying collections. Once the information is posted, there is little interaction from the institution regarding that initial post, but users are able to connect and interact with one another. The Smithsonian is another example of strong connections among the users themselves. The Smithsonian has divided various aspects of the institution into different topical areas and created social media application profiles around each topic. This allows users to find the interest groups and follow the posts as they wish. Like NARA there is little posting by the institution about a single post after the initial post takes place. Even though there are strong connections among users, there is a lack of interaction between librarians and users.

There are also other types of strong interactions that take place in instances where the users are equally as involved as the librarians. Calisphere is a good example

of what would be considered strong interactions on both sides for the user and librarian. Calisphere makes posts to Facebook typically every few days and when these posts are made, interactions amongst the user group and between the users and the librarian were observed. For example, if a user made a comment on a particular image posted, the librarian would make a connection to that user, and an interaction would take place.

Weak user interactions were also observed. In these cases digital librarians may be observed as building the foundation to create a strong interaction setting, but the users are just not interacting on a daily basis. It was observed that the Ringling Art Library closed their Facebook and Pinterest page and merged with the main Ringling Museum Facebook page. The Ringling Art Library made note of the lack of followers on Facebook in their Twitter account, by noting that all of the library posts would now be made through the main museum's Facebook page and that they would be deactivating the individual Art Library Facebook page. However, the Ringling Art Library has maintained their blog, Flickr, and Twitter accounts. The library posts frequent information and the Ringling Art Library follows more users than there are users who are currently following them; this observation may be an indicator that the institution needs to promote more of their social media applications or more posts need to be added before users begin to take notice.

Types of roles of social media

Social media applications can play a number of roles within a cultural institution. This study specifically analysed how institutions were using social media applications in relation to their digital libraries. Providing information, marketing/promotion, peer-to-peer connections, and information sharing, are all different functions of social media related to digital libraries. Table IX illustrates the roles played by social media applications by each social media type while Table X presents different types of roles that social media applications play by each institution.

Social media applications can provide different functionalities that manage, promote, and communicate with users. Some applications can play more roles than others. For example blogs can provide information sharing, peer-to-peer connections, and marketing and promotion. Conversely Pinterest provides peer-to-peer connection opportunities, but would not serve as the best social media application to promote a new digital collection. This is not to say that an institution should not announce a new digital collection by creating a new board for users to re-pin and follow, but other social media applications may be more efficient channels.

Informative (information) posts can be made through any type of social media application. However, there are applications that are more appropriate for informative

	Information	Information sharing	Marketing/promotion	Peer-to-peer connection
Blog		X	X	X
Facebook	X	X	X	X
Flickr		X	X	X
Pinterest				X
RSS feeds	X	X	X	X
Twitter	X	X	X	X
YouTube		X	X	X

Table IX.
Roles of social
media applications

	Blog	Facebook	Flickr	Pinterest	Podcasts	RSS feeds	Twitter	YouTube
NYPL	IS, M/P, PP	I, IS, M/P, PP	IS, M/P, PP	PP		I, IS, M/P, PP	I, IS, M/P, PP	IS, M/P, PP
DPL	IS, M/P, PP	I, IS, M/P, PP	IS, M/P, PP	PP			I, IS, M/P, PP	
RADL	IS, M/P, PP	I, IS, M/P, PP	IS, M/P, PP	PP			I, IS, M/P, PP	
CW	IS, M/P, PP	I, IS, M/P, PP	IS, M/P, PP	PP	IS, M/P, PP	I, IS, M/P, PP	I, IS, M/P, PP	M/P, PP
TPL	IS, M/P, PP	I, IS, M/P, PP	IS, M/P, PP	PP		I, IS, M/P, PP	I, IS, M/P, PP	IS, M/P, PP
NLS	IS, M/P, PP	I, IS, M/P, PP	IS, M/P, PP	PP		I, IS, M/P, PP	I, IS, M/P, PP	IS, M/P, PP
SCSL		I, IS, M/P, PP	IS, M/P, PP				I, IS, M/P, PP	
Smithsonian	IS, M/P, PP	I, IS, M/P, PP	IS, M/P, PP		IS, M/P, PP	I, IS, M/P, PP	I, IS, M/P, PP	IS, M/P, PP
NARA	IS, M/P, PP	I, IS, M/P, PP	IS, M/P, PP	PP	IS, M/P, PP	I, IS, M/P, PP	I, IS, M/P, PP	IS, M/P, PP

Notes: I, information; IS, information sharing; M/P, marketing/promotion; PP, peer-to-peer connection

Table X. Institutional roles of social media

material. For example, if the library were closing early due to inclement weather, digital library maintenance, power outage, etc., a post of this nature would be best disseminated through a social media source that works well with frequent updates that may appear in a user's news feed, such as Facebook, Twitter, or RSS feeds. All institutions use social media to convey important or instant information related to their library or digital library activities or status.

Marketing/promotion for digital library promotions were indicated in all social media applications but were intermingled with other postings regarding the entire institution. Marketing/promotion posts were made with regard to developmental status or upcoming events at the institution and its digital library, for example if new items were added to the collection. The Denver Public Library, which has dedicated social media for their digital library, was able to communicate announcements about their digital collections very clearly. Thus one could conclude that this method would serve as a more measurable marketing tool. In order to discover more about a specific image or aim at sparking a group discussion about a specific subject area, some institutions will actively engage their user group on Flickr. This function allows institutions to resolve issues, for instance promoting a "mystery image" on Flickr and asking users to post what they think or know about the image. Furthermore the institution could potentially be able to identify which collections the users found more interesting. It also offers an opportunity for digital librarians to engage actively with the user group, thus creating a new level of outreach.

Outreach is another important aspect of marketing and promotion. Social media applications that allow for fast updates seem to be the best way for digital librarians to reach their user groups and expand outreach. For example Facebook allows administrators to post information about their institution. After each post is made, if a user has "friended" that institution, the post will appear in the user's news feed, thus making it possible for the digital library to appear accessible to the user on an hourly, daily, or weekly basis. Institutions that post more frequently are more likely to have more successful outreach and interactions taking place.

Peer-to-peer connections are enabled through all of the social media applications reviewed in this study. Depending on the needs of the cultural institution and its digital library, any one type of social media could work, though the two most popular means of peer-to-peer connections were Facebook and Twitter. In this instance communication is a huge factor in peer-to-peer connections. Communication was noted in instances where the librarian/institution was directly responding to the user via the social media site. Each application allows users the potential to involve themselves with various aspects of the digital collections and meet other users who share similar interests. Larger institutions are managing these connections by creating specific subject areas; this allows users to find their interests much more quickly. One aspect of establishing peer-to-peer connections is the location of social media in relation to the digital collection. A user is much more likely to "share" an image that the user feels a connection to if social media is accessible at the item level of the collection.

Information sharing was an observed tactic of institutions that employed social media in digital libraries. Within the context of this study, information sharing was defined as institutions sharing and linking their digital collections with other digital or physical collections within the confines of social media. For example, when an institution adds a new digital collection to their home web site, the institution will not only add a link to the digital collection but also associate the digital collection

with other related digital collections or physical collections via social media. In a sense posting digital collections to Facebook is similar to posting digital collections to the institution's web site. Information sharing is closely connected to marketing/promotion; however, the difference is that information sharing serves as more than another platform for institutions to share their digital collections. Moreover it also organises and makes associations of knowledge within the institution. Within the context of this study, we observed institutions using blogs, Facebook, Twitter, Flickr, RSS feeds, and YouTube as means to inform users about their information sharing.

Discussion

The authors tried to select a sample that represents different digital libraries sponsored in different types of cultural institutions. The main objective of the study is to survey the current status of social media applications in digital libraries, not to compare social media applications across digital libraries. The findings of this study highlight the characteristics of social media applications in digital libraries. Simultaneously the results also show several problems of social media applications in digital libraries. First there is a lack of standards in terms of how digital librarians are posting information via social media applications. Social media applications are not consistently located at different levels of the site. Generally much of the information posted is loosely oriented with the purpose of promoting the digital library or making connections. However, there are inconsistencies amongst many posts when evaluated across organisations. Additional evidence is found from Samouelian (2009), who conducted an exploratory study and discovered in interviewing archivists who had implemented social media at their archive that little to no planning was done prior to implementation, although the repositories did receive initial positive feedback from users. In order to reach both the users and potential users of digital libraries, it is important to use social media consistently at all levels of the site including the institution site, library site, digital library site, as well as the digital collection site, so users can receive, follow, and comment on the information at any page of the institution.

At the same time the importance of identity cannot be overestimated in an online setting. In the case of digital libraries the sense of identity is even more important because they do not occupy a physical space. One of the criteria for selecting digital libraries to be a part of this study was that each digital library has its own social media application outside of its parent institution, meaning that if a digital library was within an academic library, the digital library must have its own Facebook page separate from that of the library. However, there are social media posts that cross-linked institutions, for example a digital library that is part of a larger institution such as an academic library and frequently posts information on their social media site regarding the academic library's activities, in addition to the digital library's activities. This could possibly be confusing to users and pose potential problems when creating an online identity. Just as in social settings, people behave differently when with different groups. In a sense it is the same online. The integration of social media into a number of different avenues in our lives makes the implementation of social media in cultural institutions seem almost natural due to its popularity. The user decided to "follow" or "like" the digital library site to see information about the digital library, not the parent institution. In that sense it is a good idea for the library site to post information related to the digital library, rather than vice versa unless they are associated with each other.

Second it is still a challenge to create a two-way communication channel between digital librarians and users. Social media has become so natural and integrated into society, it is sometimes difficult to take a step back and fully evaluate the information being made available to users. It is important to remember that social media interactions can help users or consumers discover new information. Magngold and Faulds (2009, p. 359) found that one should not underestimate the power of today's users, and "consumers' ability to communicate with one another limits the control companies have over the content and dissemination of information". Taking advantage of how your users are already using social media makes the transition even swifter for an organisation. In addition evaluation of not only what institutions are posting but what users are indicating through their posts (or lack of posts) can provide strong evidence of users' expectations and needs. The findings of this study show that many institutions still have difficulty facilitating a two-way communication channel. While digital librarians actively engage in applying social media to connect users, users do not follow them or actively participate in the interactions. Informing and educating users with a variety of social media applications is the first step. Providing workshops about how to use different types of social media applications is a big help. Offering incentives for users to engage in interactions is an effective approach to attract users. Of course responding to users' postings is the best advertisement for the promotion of users' use of social media in digital libraries.

Third, even though social media has played important roles in informing users of digital libraries, there is still an important role that is missing: education. Currently few institutions have applied social media to educate their users. Social media can be used to give users an overview of a digital library, teach them how to use digital libraries, introduce different features of digital libraries, and recommend different digital libraries based on subjects, formats, and other criteria. In discussions of museums' incorporation of social media, it is seen as a tool for informal learning and has the potential to encourage participation (Russo *et al.*, 2009). Social media has become the main avenue of societal interactions and expectations. For example Facebook is a social network that had a large user base of over one billion users as of September 2012 (Fowler, 2012). With this level of activity, incorporating education on digital libraries and social media is a necessary transition, especially as students' reliance on social media is even higher: it is estimated that 73 per cent of teens use social networking sites (Lenhart *et al.* (2010).

Conclusion

There is no "one size fits all" when it comes to social media and cultural institutions. The findings of this study identify the characteristics of social media application in digital libraries including the types, placement, update frequency, interactions, and roles of social media. The results, on the one hand, help researchers and practitioners understand the usage of social media in the digital library context, while on the other hand, also identifying the problems in applying social media in digital libraries related to a lack of standards, lack of two-way interactions between digital librarians and users, and a lack of education functions. Offering social media applications at different levels of sites, offering incentives to engage users and different types of education functions are the possible solutions to overcome these problems.

This study focuses on the exploration of social media applications in digital libraries. There are limitations of this study, many of which can be further resolved by conducting more research. For instance further research needs to expand the selection

of institutions and digital libraries to have broader representation in the sample, in particular of institutions that are outside of North America and Europe. It is also important to perform in-depth content analysis of the social media to identify patterns of social media usage and different functions that social media serves. Moreover the authors will compare specific social media tools, such as Twitter, Facebook, etc., across institutions. It is important to survey or interview digital librarians in different types of cultural institutions in order to explore why certain social media tools are implemented in digital libraries. In addition users can be interviewed to solicit their perspectives about their usage of social media in digital libraries.

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