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Social Network Analysis on Wisconsin Archival Facebook Community

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SOCIAL NETWORK ANALYSIS ON WISCONSIN ARCHIVAL FACEBOOK COMMUNITY

by

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ABSTRACT

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by

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The purpose of this study was to understand how Wisconsin archives are using Facebook (Wisconson archives Facebook community, WAFC). Few archive studies use quantitative measurements to draw conclusions from social media application use. Quantitative data is needed in order to identify the various ways that social media is being used in an archive. Without the data behind the assumptions, it is impossible to improve service and outreach to the archive users. This study proposed a mixed methods approach to aid in the process, using social network analysis, inferential statistics and thematic analysis. This study measured the effects of implementation of social media in areas of archives in order to begin to identify and evaluate social media for future use by the archive community. These methods provide a better understanding of archives' use of social media, thus enabling researchers and practitioners with a foundational point to continue research. Social networks allow individuals to connect with individuals and groups with whom they share common interests either personally or professionally. Four research questions and six hypotheses were developed to determine the main actors, the role of the actors, content of each online activity ('tagging', 'sharing', 'commenting', and 'liking'), and post characteristics. Unique findings of this study were found regarding the information flow of the WAFC and the content. For instance, the research questions determined that archives are a central hub within the WAFC; however, other affiliations like cultural

institutions and universities are other contributors to the information flow. Four different themes were discovered by the thematic analysis: *archive story, communication, information,* and *outreach*. These findings have theoretical, methodological, and practical implications.

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CHAPTER I
INTRODUCTION

Archivists communicate in a number of ways. Within the archival community, archivists use a plethora of different forms of communication from face-to-face interactions, online forums, and social media to discuss issues in the profession. Traditional interaction with archive patrons used face-to-face discussions, phone, mail, websites, and email. In the past decade, social media became a part of the communication channel. However, unlike the slower addition of email and websites, the use of social media has quickly become a part of the communication spectrum. Embedded in our communication and daily interactions is social media; some generations have never been without it. In addition, the access to social media is constantly and quite literally right at our fingertips with the widespread access to mobile devices and cheaper computing machines. Understanding how the archive community uses social media will help the profession to have a better perception of their user base, and thus aid in the development of outreach programs and provide better services to the users and to the profession as a whole. The purpose of this study is to analyze how the Wisconsin archive community uses Facebook.

An archive is an institution that works for the long-term storage and retrieval of records. It is important for records to be accessible. Records can be all different types of media, such as paper, electronic, audio, and/or video. No two archives are alike. Archives differ in both the patrons they serve and collections they house. For instance, a corporate archive may have limited accessibility for the public but provide an array of access for the employees. Items in the collection may include the day-to-day documents like meeting agendas and items pertaining to the history of that entity, whereas a historical society may provide the public records that were once a part of the records center of the city, and the patrons of the historical society may include genealogists.

Archivists are the trained professionals that are in charge of maintaining, preserving, collecting, and storing of the records. Archives provide a service to patrons and part of being an archivist is being able to articulate the purpose of one's institution to the people the archive serves. The development of digital archives and libraries has opened a completely new way for archivists to permit users access to collections. Some of the software used for digitization has social media capabilities or permits the overlay of outside social media applications like Facebook and Twitter. Although archives differ dramatically, there are some similarities of their overall purpose to preserve and provide access to collections. For this reason, the rationale behind this study is the analysis of Wisconsin archives use of Facebook; while not representative of the whole archive community it does permit some basic foundational-shared characteristics among archives. This is because despite the uniqueness of archives, there are similarities, and there is a need to measure the different levels of social media use by an archive. The discovery and understanding of how archives are using social media is a way to have a better understanding of how to serve archive patrons.

In the early 2000s, the archival community, just like the rest of the world, began to integrate social media into daily practices. The increased usage and accessibility of new technology influenced cultural institutions and their user communities in many ways. It was recognized that the first time many users would "meet" the archive was through a web interface. Now, a user can "meet" an archive through any number of social media applications. To make matters more interesting, a user could stumble upon an archive through the facilitation of another user without the archive ever knowing, thus creating the online version of word of mouth advertising. The addition of social media to the archive happened organically, meaning there were no official guidelines suggested. Instead, archivists often added social media applications that many were familiar with from their personal lives. There is limited research regarding tracking of

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different social media posts made by archives. The social media statistics recorded by archivists are frequently not shared outside of a specific archive, however, social media connects individuals and institutions and it is important to study the online community as a whole.

Social media is a means of communication through the internet that enables social interaction and sharing of media. Users establishing their own social networks facilitate interaction within the applications. Social media allows users to communicate and connect, and creates a participatory community. Huvila (2008) described a participatory archive as, "notions [of] decentralized curation, radical user orientations in a both broader and deeper contextualization of records and the entire archival process" (p. 30). This proposed online community had already become mainstreamed by the late 2000s (Bishop, 2007). Archivists continue to work toward increasing online user engagement (Mason, 2014).

The user is central in social media; the organization must be sure to display information that is of interest to its user community or else no one will notice. Schrier (2011) discussed how digital librarians are at the cusp of integrating social media into digital collections and proposed general principles regarding implementing social media into a digital library setting. These suggestions included: listening, participation, transparency, policy, and strategy. Similarly, Solomon (2011) pointed out two major factors that prevent social media from being effectively used in library settings: one being the lack of followers and second the lack of social capital. Solomon equated social capital as "having credibility in a selected online community" (2011, p. 19). Establishing credibility in an online community is a matter of becoming a part of that community. The fact that the social media environment is digital does not make it any less credible than a tangible written source. Although similar, libraries and digital libraries are not archives; which is why archives need research about archives.

Few studies discuss the archives' use of social media and its impact, but the necessity of these studies is evident. There is research that discusses a discovery barrier to archive collections (Schaffner, 2009; Southwell, 2002; Krause & Yakel, 2007). However, the majority of literature focuses on social media usage in cultural institutions (libraries, digital libraries, and museums) but not archives specifically. While the focus is not directly on the archive community, there is important information from these studies as, "the social ties between contributors are vital to the success of the enterprise" (Eveleigh, 2015, p. 78,). In order to provide a thorough summary of social media technologies in archives, this research provides examples from existing social media and archives as well as from museums, digital libraries, and public libraries found in Chapter II Literature Review.

1.0 Problem, Research questions, & Hypotheses

This section lays the foundation for the research problem, questions, and hypotheses. Each one builds upon the other. This section addresses the research problem followed by the research questions, and finally, the hypotheses derived from the research questions are discussed.

1.1 Research problem

The primary research problem was the investigation of the information exchange within the Wisconsin archive Facebook community (WAFC), the roles of both Wisconsin archives and their followers within the online community, discussion content and characteristics of online activities that attribute to the sharing of information and connectivity of the social network.[1] Facebook is a multidirectional way of communication. Participants can exchange ideas and knowledge simultaneously. Once an archive makes a post to Facebook, little is known of how that information moves through the network. For this reason, the movement of information is the

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[1] The definitions of 'community' and the selection of the WAFC are described in full in chapter 3, section 3.3 Data Collection.

foundational point of the research problem. Information can be a wide array of content and media. Facebook allows users to share photographs, videos, and hyperlinks. In addition, within the media, Facebook users can 'tag', 'like', 'share', and 'comment'. The content can provide both context and characteristics of those participating in the network. Archivists need to know how information is exchanged so that better communication channel patterns can be formed and potentially more access to collections can be obtained if these channel patterns are uncovered.

Likewise, archivists need to have a better idea of what kinds of posts did well. The term 'well' is up for interpretation and is dependent on what is important to that archive. For instance a post that receives two 'likes' and a 'comment' might be considered a success; whereas, another archive might want to have X number of interactions during the week instead of looking at each post. In addition, understanding the information movement will permit the finding of who is exchanging the information. Understanding who is exchanging the information could open doors to new avenues of users. For instance, in one scenario two Wisconsin archives (Lawrence University Archive and Staubitz Archive) have Facebook pages and each creates posts regularly for their users. Each archive has its own unit of users; however, information posted by one archive might be of interest to the other user group and vice versa. Therefore, if both archives 'friend' each other on Facebook and the archives 'share' information posted by the other, each user group will see posts from both archives, thereby each archive will then open the door to potentially gain more users, and their 'reach' on Facebook could be extended.

The study investigated three different areas. The first area of investigation was the exchange of information in both the content and interactions in the Wisconsin archive Facebook community, both areas (content and context) provide a deeper understanding of the WAFC. The second area uncovered the role of the actors involved in the network. Not only is it important to know how the information is being exchanged albeit with different types of online activities on

Facebook, but it is also essential to know who is exchanging this information. It was necessary to sort out potential other cultural institutions, local businesses, and individuals that participate in the network. However, it is not enough to understand the information exchange patterns and those who are generating the information; the exchanged content is equally important.

As a result, the third area of this study was the evaluation of the content and the characteristics of the content. The material that is 'liked' by a Facebook user is a way for that user to demonstrate an aspect of their personality. The more information gathered about positive characteristics will provide suggestions to archivists for improvement of their social media use. Social media is important. Entire marketing programs are creating campaigns around it. A significant portion of society uses social media with 79% of Americans reaching for their mobile device within the first 15 minutes of waking (IDC Research Report, 2013). However, archivists, unlike large companies, do not have the quantitative evidence and marketing teams working to uncover the interworking of online community communication.

1.2   Research questions

The research questions addressed information flow, the role of the actor, content information, and the characteristics of archives, thereby illuminating the nature of the online structure of the Facebook network of Wisconsin archives. Each research question builds upon the next question, and all of the questions have relationships to one another. Each research question corresponds to a hypothesis. This section articulates each specific research question as generated from the research problem, and a general discussion of the necessity of each question is included. The following section (*1.3*) discusses the related hypotheses.

1.2.1   Research question 1 (RQ1)

RQ1:   Who are the key actors/players in the Wisconsin archival community when they exchange and share information on Facebook?

The first research question analyzed who were the major players in the WAFC, and how the players exchanged and shared information. The determination of the major players was able to be discovered through the analysis of different online activities in Facebook, i.e. 'tagging', 'sharing', 'commenting', and 'posting'. The data from these interactions provided the quantitative evidence necessary to examine the information exchange within the WAFC.

The lack of known pathways that information travels is what is often missing in archival science and social media research. Many archivists have perceptions derived from their observations of how certain information is received by their Facebook friends, and some large institutions share those statistics like the National Archive Records Administration (NARA, 2017). However, the analytics behind Facebook interactions remain largely unexplored. Facebook does provide a very general overview of their most popular posts for a group, however, there is little known of how the information travels from one Facebook friend to another within an archive social network and if a particular post attracts new Facebook friends to the archive's Facebook page.

To extract information pathways which connect different types of interactions, it was also necessary to analyze the WAFC participants. In this case, the participants are the actors of the Wisconsin archive Facebook network. The actors are the social structure of the network - the foundational pieces of the community. The community within the context of this study is defined as those who participate in the WAFC. In other words, if a Facebook user 'likes', 'shares', 'comments', or 'tags' with any of the archives defined in the study, then that Facebook user is a part of the WAFC.

Here the actors can be archive institutions, other types of institutions like businesses or libraries, or individual people. Actors propel information through the social network. The role of the actor in the context of information exchange depends on several factors like the actor's social

position in the network, centrality, relationships with other actors, and the importance of social identity. Understanding the interactions allows for the framework of the social network to be constructed. Most importantly, information exchange relationships structure the flow of information among actors (Haythornthwaite, 1996). The role of the actor is highly linked to the social structure and the interactions that dictate the relationships that the actors have with one another; however, the role of actors will vary in different environments, particularly social media applications.

Within any organization, knowledge sharing is a part of the community. For some, anonymity is a variable when linked to some social media applications, like Reddit; other social media applications, like Twitter, use a 'handle'; while others, like Facebook, use a full name. The participation values, non-confidential and confidential information, and expressive language are significant to that organization (Fan & Liau, 2014). These are the cultural pieces or social norms of the online community. The actor serving as a social structure for the network regulates the knowledge sharing that occurs. The sharing is directly related to the connectedness of the actors of a network, and the more connected some actors are, the potential for more sharing of information greatly increases.

Actors that share a significant amount of information are key pieces or central units of the social network. Borgatti (2006) identified two potential problems of identification of key network players: connectedness of the players and network cohesiveness. He added that for many interactions that take place within a network, the true measurement of centrality may be difficult to determine as a stand-alone. For this reason, additional research questions and measurements are necessary. Some research specifically aims at measuring the network in terms of information exchange. For instance, Fatalian, Nayeri, and Azadnia (2009) applied social network analysis (*SNA*) to analyze decentralized structures of organizations and developed a semantic framework

around the structure to discover that the semantic social network structure was beneficial to knowledge gain. Consequently, both the actors' role and context of the information need to be analyzed.

1.2.2   Research question 2 (RQ2)

RQ2:   What is the role of the actors within the Wisconsin archive Facebook community?

The actors are the backbone, the foundational piece of the social network. This research focused on the affiliation of the actors; in other words, actors were grouped into affiliations like 'archive' or 'university' instead of keeping the focus on individuals. Little research in archival science exists regarding the users of social networks. Understanding the actor is a key factor in determining who is significant to information exchange. For example, an archivist is most likely aware of a 'super user' amongst the archive's Facebook friends, but may not be aware that one 'like' made by the public library may have provided five additional 'likes' from outside the archive's, primary network of friends.[2] This is because the role of the actor in a social network depends on a number of variables.

Within the social structure, the actor can have many different roles. For instance, in an egocentric network, the role of the actor may be central to the flow of information throughout the entire network. In other words, is the archive perpetuating information to other archives or is there a strong user base that is creating new information? The central actors are where the information stems and flows to other actors. The non-central actors use the central actors as their main avenue to new information. For example, Archive A makes a Facebook post. A friend of Archive A, Friend 1, makes a 'comment' to that post made by Archive A. Then a third entity, a local business who is a Facebook friend of Friend 1, sees the 'comment' made by Friend 1 and as a result, also

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[2] A super user in the context of social media is referred to as someone who is incredibly active in the participation of that network.

sees the post made by Archive A. The business then 'likes' both the 'comment' made by Friend 1 and the Facebook post made by Archive A. Consequently, the local business is now a part of the community but not a central actor.

The overall structure of the network is another role variable. The structuring varies upon the actors and the information exchanged between that data set within the network. The structure can differ depending upon the environment and will influence how information travels through the social network.

1.2.3   Research question 3 (RQ3)

RQ3:   What does the content of each online activity (tagging, sharing, liking, and commenting) reveal about the Wisconsin archive Facebook community?

Due to the interactive nature of social media, there is, even more knowledge gained from understanding the content that is traversing the communication channels in the network. Information sharing on Facebook has many different online activities: 'liking', 'tagging', 'sharing', 'posting', and 'commenting.' As with any online activity, certain types of information connect to interactions that fit and subsequently enlist certain responses. For example, Archive A makes a Facebook post and 'tags' Archive B. Archive B is then notified by Facebook that Archive A has 'tagged' them in a post. Archive B then has many choices. One option is to do nothing. Other options are to 'like', 'share', or 'comment' on that post. There are then two factors to be analyzed, one being the content of the actual post and the second being the interaction mechanism through which the information was shared. Without understanding the assessment of behaviors behind the actions or the information shared in the network, the whole picture is largely unseen.

As a result, it is important to understand what is linking actors together and to develop a deeper understanding of the relationships fostered in the social network. One way to explore these relationships on a deeper level is to analyze the content of what is being shared; in other words,

what kind of information are actors identifying and interacting? The thematic analysis provided information regarding insight into the user's interests.

1.2.4   Research question 4 (RQ4)

RQ4:   How do the post characteristics (use of pictures, use of embedded hyperlinks, and use of digital collections) influence the online activities of the Wisconsin archival Facebook community?

Individuals in an online setting, such as a social network, seek to display unique aspects and to develop a network around them that displays those features or characteristics. Adding one's favorite books to a profile page, uploading a profile picture, or adding a link to one's blog provides an aspect of one's personality.

There are many measurable characteristics that have the potential to influence one's perception within a social network, like measuring whether a post that has a picture or hyperlink has more interactions (i.e. 'comments', 'likes', 'tagging', and 'sharing'), than a post with no picture. Another factor is the existence of a digital collection. The type of media associated with a post is a huge aspect of online networking. It is not just what is stated or shared in a post, but how that post is articulated. These characteristics when added to a post add information regarding the identity of the entity that created the post and subsequently make the post more interesting. The more interesting the post, the more likely users will engage and want to interact.

1.3   Hypotheses

Social networks are complex because as human behavior is involved and there are multiple levels of communication. As a result, the human behavior component yields a high connectivity level amongst social network participants. The research questions generated for this study are the result of aiming to evaluate as many aspects of Wisconsin archives and their use of Facebook. The

research questions generated six different hypotheses and three sub-hypotheses, which are used to measure and understand the necessary components of the Wisconsin archive Facebook network.

The hypotheses discussed demonstrate their relation to the other hypotheses and to the research questions themselves. Here H_{01} and H_{02} (and sub-hypotheses H_{02a}, H_{02b}, H_{02c}) are about the information flow and the role of actors. H_{03} examines the thematic analysis, and finally, H_{04}, H_{05}, H_{06} evaluate the Facebook post characteristics. The relationships between these research hypotheses build a level of knowledge with one another. The following sections restate the research questions and are followed by the hypotheses that originated from each question. This study addressed and grouped hypotheses based upon their connections and relationships.

1.3.1 Hypothesis Group 1

H_{01} *There are no significant differences among key players in the Wisconsin archive Facebook community (WAFC) in term of centralities (degree, closeness, and betweenness).*

H_{01}, derived from RQ1, focused on the information patterns, specifically how the interactions influence and facilitate movement throughout the network. This was done to uncover the major players of the WAFC. The foundational framework of a social network is the flow of information whose patterns build up the chain of information flow throughout the network. RQ1 was concerned with actors involved in the social network and the exchange of information. Therefore, the hypothesis derived from RQ1 needed to break down those components.

H_{01} focused on uncovering the major players in the WAFC by analyzing the actual interactions of the actors in the network ('share', 'tag', 'like', and 'comment'; which are combined in the *Mega Matrix*). This was done by using *SNA* and finding the top players for each centrality measurement: betweenness, closeness, and degree. More specifically, H_{01} discovered not only the major players but also the top categories. The categories refer to the association of

each player that was articulated by this study (for instance, archive, business, cultural institution, people, and university).

Understanding this information is the key to providing a framework of general principles for archivists to develop an online community that matches the behaviors of their followers. It will also provide a context for potential expectations of Facebook and the realistic reach that the tool is capable.

1.3.2 Hypothesis Group 2

H_{02} *There are no significant differences among actor affiliations in terms of interactions on the Wisconsin archive Facebook community.*

$H_{02 (a)}$ *There are no significant differences among actor affiliations in terms of degree on the Wisconsin archive Facebook community.*

$H_{02 (b)}$ *There are no significant differences among actor affiliations in terms of closeness on the Wisconsin archive Facebook community.*

$H_{02 (c)}$ *There are no significant differences among actor affiliations in terms of betweenness on the Wisconsin archive Facebook community.*

H_{02} is the manifestation of RQ2, which focused on the roles of actors. The online activities refer to the *SNA* measurements: degree, closeness, and betweenness in conjunction with Facebook interactions: 'like', 'tag', 'share', and 'comment'. H_{02} identifies which actors within the Wisconsin archive Facebook community are the most active. All actors have unique characteristics and these characteristics are apparent in online communities just as in face-to-face communities. It is extremely important to know the members of one's community.

H_{02} took the original interaction identification premise of H_{01} and added in an important aspect: the characterization of the actor, particularly, whether the actor is a cultural institution, business, university, or an individual person. While the isolation of one element of a category

does not provide a concrete decision, it does provide a starting point for archive communities to build certain assumptions about their online communities.

H_{02} analyzed whether there are unique interactions that occur among individual people. The user groups of archives are difficult to peg because all archives have unique materials but people's interests vary greatly. Consequently, public information available from profiles was gathered and then grouped into categories like university, business, cultural institution, and archive.

Overall, H_{01}-H_{02} provided a link to the major players within Wisconsin archive institutions who use Facebook. The focus of H_{02} was to gather and measure the interaction levels and the actor that was doing the interacting. The more specific the measurement of the actor and the interaction, the more information can be learned about the Wisconsin archive Facebook community. This provides archivists with the knowledge which can possibly improve interactions.

1.3.3   Hypothesis Group 3

H_{03} *The online posts made by the Wisconsin archive Facebook community revealed no significant differences among the revealed subject schemas.*

RQ3 focused on the content of each post. H_{03} was built upon H_{01}-H_{02} and the information flow patterns. The patterns revealed the actors that are involved in the information sharing interaction process; however, the content of what is being shared is equally significant. RQ3 built upon the RQ2 and RQ1 in a number of ways. For example, the purpose of RQ2 was to provide a general identity about the actor's role within the Wisconsin archive Facebook community. While RQ1 compartmentalizes the components of online activities and RQ1's relation to the actors in the network, RQ3 focused on the content of the information shared within the network.

H_{03} was the first step to breaking down the content. Here H_{03} used the schema that were developed from the thematic analysis, which aimed at the discovery of posts made within the

WAFC. This was important because it is significant for archivists to find what created the most

interactions about certain posts. The knowledge gained from having a better understanding of the

popular Facebook posts and different interactions will enable archive institutions to make a better

online space for all those involved in the network.

1.3.4   Hypothesis Group 4

H_{04} *There is no significant relationship between using a picture in a post and not using a picture in a post in terms of online activities on the Wisconsin archival Facebook community.*

H_{05} *There are no significant differences between posts with embedded hyperlinks and posts without embedded hyperlinks in terms of their online activities on the Wisconsin archival Facebook community.*

H_{06} *There is no significant difference between posts by WAFC with digital collections and posts by those without digital collections in terms of their online activities on the Wisconsin archival Facebook community.*

H$_{04}$ – H$_{06}$ were derived from RQ4, which focused on the characteristics of Wisconsin

archives. This final group of hypotheses built upon the other hypotheses which focused on the

understanding of the information patterns and actors of the archive community. H$_{04}$ – H$_{06}$ was an

important aspect of understanding the content generated in a social network, along with who is

creating the information. *H$_{01}$* - *H$_{02}$* measured the different actors of the Wisconsin Facebook

network, but there is more information needed to understand the actors. The purpose of *H$_{04}$* - *H$_{06}$*

was to measure the different characteristics of Wisconsin archive institutions.

Identity and the idea of marketing or the branding of an online image of an individual or in

this study's case, archive institution, is incredibly important in an online setting. Images say a lot

about a social media post (Kietzmann, Hermkens, McCarthy, & Silvestre, 2011). *H$_{04}$* measured

the influence of an image attached to a post, and the subsequent interactions that take place. *H$_{05}$*

measured the influence of a hyperlink attached to a post, and the subsequent interactions that take

place. H_{06} built upon H_{04} and H_{05} by factoring the existence of a digital collection at the archive. The purpose of H_{06} aimed to discover if the existence of more digital collections leads users to have more interactions in the Wisconsin archive Facebook community.

The research questions and hypotheses of this study aim to gather as much information as possible about the Wisconsin archive Facebook community. The full extent of the hypotheses is addressed in the methodology in Chapter 3. *Figure 1* is a listing of all of the hypotheses of this study. *Figure 1* also provides a visual representation of the research problem, research questions, hypotheses, and the relationships between them.
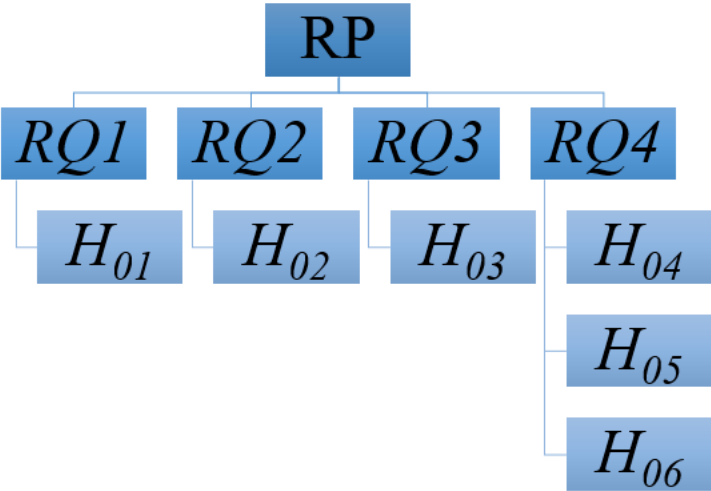
Figure 1. Structure of research questions and hypotheses

1.4   Rationale of research

Social media has become a dominant way to share information. At its essence, social media is a platform for people to exchange and share information. According to a 2016 survey from the Pew Research Center, 62% of adults in the United States use social media as a news outlet. It is just as important for an organization to use social media as it is to use a website, particularly organizations that provide services to people.

Archives provide a service to people. While the levels of service and access to information depend, to various degrees, upon whom the archive is serving; at the core, the scope of many archives is to retain and provide access to information. Archives that are open to the public are a part of the community, and oftentimes many of these archives will have community records stored in their facilities. Communicating with the public is often referred to as outreach. With the addition of social media, archives have already begun to use social media applications to connect with their communities.

The basic functionality of Facebook and social media, in general, is an exchange of information in an open space. Archives need to reach out to their community and social media provides archives with that means. Like any institution, it is important to communicate with an audience, and doing so increases awareness of one's existence. This is marketing. Consequently, there is a strong need for a greater understanding of the interworking of the archive social network, but the issue is that there are few resources and studies that have been conducted that analyze the use of Facebook and the archive community. There is a need to utilize research methods to gather information regarding the nature of archives, as well as understanding their communities' social media patterns and exchange of information. There is no research on this front that focuses on archives, *SNA*, and inferential statistics. Few significant studies employ the use of *SNA* and inferential statistics in conjunction with the subject of archival research. The rationale of this research is threefold: the importance of social media, the nature of archives, and the sophistication of the research methods used in this study.

Social media has played an important role in enhancing and improving services of institutions like archives, museums, and libraries. In one study, all 23 archivists interviewed recognized the importance of social media in achieving their professional aims (Hager, 2015). Hager asserted that "archivists should examine the reach and virality [how widely circulated an

item is online] statistics to determine their viability as a metric for "success"" (Hager, p. 35).

Asking these questions will later help answer outreach and donor questions, as well as, guidelines

and data for other social media applications. This research addressed the circulation of an item

and information with *SNA*.

Mangold and Faulds (2009) maintain that one should not underestimate the power of

today's users, "consumers' ability to communicate with one another limits the control companies

have over the content and dissemination of information" (p. 359). Taking advantage of how users

are already using social media makes the transition even swifter for an organization. Hager's

research was only qualitative in nature, "no quantitative data exist to corroborate the reports of the

respondents, each one who mentioned event promotion said that attendance has increased due at

least somewhat to social media activity" (2015, p. 28). This demonstrates the importance of the

need for more quantitative work.

More evidence is found in the Library of Congress and their involvement with the addition

of a Flickr account to showcase their digital collections in a social media environment. In 2008

just 24 hours after the launch of the Library of Congress's Flickr account, Flickr reported 1.1

million total views, a week later 3.6 million views and 1.9 million visits. By October 2008, the

Library of Congress photographs were receiving 500,000 views a month (Springer et al., 2008).

What small to medium sized archives can take away from these statistics is the realization that

there are many online user groups who love and connect with archival material for any number of

reasons.

1.5.1 Social media

Social media applications like Facebook permit the exchange of ideas as well as

information. In addition, the actors involved with Facebook can range from people to cultural

institutions like archives, libraries, museums, and even businesses. Businesses may choose to

share information on Facebook to promote their organizations, whereas, a single person may choose to share what they watched on television that night. Information is not limited to a news event; Facebook allows users to share different ideas.

The purpose of this research was to focus on one social media application, Facebook. This is due to Facebook's significant and wide use among the archive community. After 10 years, Facebook has over 1.23 billion active users and remains one of the most popular social media sites (Facebook, 2016). Among the general population, a survey conducted in 2011 at Pew Internet: An American Life Project found that two-thirds of online adults (66%) in the United States use social media platforms such as Facebook, Twitter, MySpace, or LinkedIn. Facebook remains the most popular, and the growth of the overall usage has only increased. For archive institutions, it is the most popular social media site. National Archives and Records Administration (NARA) reported in June 2016 that Facebook had a 'reach' of 4,457,470, which was by far the largest number of people on one application; the second was Twitter with 444,062 followers. One of the most recent reports of social media use in archives comes from an OCLC Research survey (2013) of archive users to learn more about their habits and preferences with a focus on social media. The survey found that e-mail and word of mouth continue to be the primary ways archival researchers share information about the resources they discover, and that features such as tags, reviews, recommendations, and user comments are viewed as useful by fewer than half of those responding (Washburn, Eckert, & Proffitt, 2013).

However, this viewpoint stems from the records center approach to interaction. The users who participated in the study were heavy archive users. There is much more to the online archive community than heavy users. Social media has allowed for any type of person, regardless of their understanding of an archive to go online, see a historic photograph, become interested and then maybe even decide to follow or become friends with an archive on that platform. Theimer (2011)

noted that Archives 2.0 is a user-centered approach. When an archive becomes a part of a familiar space, it allows all different kinds of people to interact (Sherratt, 2009). This study provides suggestions of how an archive can improve these interactions.

Facebook 'friends' have a way of influencing one another. Unlike other social settings, Facebook permits users to add information to the network through different avenues. For example, Facebook users have the option to 'tag' other users when information is shared, thus greatly expanding the potential size of a social network. Nam and Kannan (2014) noted that information contained in social 'tags' provides new opportunities for practitioners to manage and improve brand performance and can generate an expansion of associations through tagging. New ways of interacting and exchanging information within the network also open the possibility to share information from outside one's egocentric network.

Opinions of individuals are what help society form groups and networks, especially when people share opinions in various forms. Using social media, people can seamlessly share information and similar opinions in a very open format. For an archive institution, this can mean different things. For instance, an archive may be able to use social media to expand their outreach programs or an archive may want to raise awareness to the public about their existence. There have also been instances when social media has been used by an archive to help describe archival collections (Cianci & Schutt, 2014). The goal and success of archive's use of social media are dependent upon how the archive implements and creates strategies around social media.

With social media sharing tools, the effects of social power and opinion formation in social networks on sites like Facebook can dramatically shift hub nodes to more influential and central nodes (Jalili, 2013). In other words, the more connected the actors become through sharing of opinion driven posts, the more social power and central the actors become in the network. For example, Vanwynsberghe, Boundry, Vanderline, and Verdegem (2014) analyzed the distribution

of information on social media, specifically how librarians deal with social media as an organization and on an individual basis. Vanwynsberghe et al. found that librarians would often use their personal accounts to bolster or share information from the library. The inclusion of social media in society gives rise to the importance of *SNA*. The motivations behind these actions ranged from interaction and belonging to creativity and fostering relationships. The characteristics of those using social networks provide a huge insight into overall use, which makes the inclusion of social media even more important.

The statistics demonstrate the growth of social networking. However, there remains the need to evaluate those online resources, like social media, to determine connections and which sources are utilized the most by users. Social media applications have different purposes of communicating information. There are news sources like Reddit, special interest sites like Pinterest, and social networks sites like Facebook. One of the best ways to evaluate these online communities is through the analysis of the social networks. Fortunately, the framework of *SNA* provides the theory needed to conduct the research.

1.5.2   Social media & Archives

Social media makes it seem possible for an institution, no matter the size, to reach a potentially limitless number of users seemingly overnight. Archives have been working toward social media integration as another level of service offered. The evolution of analog records to digital counterparts in the archival profession has added a rapid change to how archivists can present information to patrons (Gelfand, 2013). Bearman (1989) argued that due to MARC AMC (MAchine-Readable Cataloging, Archival and Manuscripts Control Format), archivists were at the cusp of having a huge role in how archives become part of a network, and social media provides another opportunity. Research in more recent years has begun to identify how archive institutions have adjusted to the influx of new technology. Yakel (2006) noted that the role of the

archivist is changing in part due to the incorporation of the variety of technologies into the culture

and the types of information generated. With these changes, the users are changing and requiring

different types of information. An exploratory study conducted by Samouelian (2009) found that

archivists are moving in the direction of incorporating social media tools into their digital

collections and websites and those archivists who had implemented social media had done so with

little to no plan done prior to implementation. The repositories, however, did receive positive

feedback from users.

In addition, Crymble (2010) surveyed a selection from the archival community to

determine usage patterns of institutions using Facebook and Twitter among individual and

institutional users. Crymble specifically focused on archival organizations and their use of Twitter

and Facebook. The study demonstrated that archival organizations promote content they

generated and archivists promote content on Twitter that they find useful to their followers.

Within the context of Crymble's study, promotion was used simultaneously as sharing. The

survey consisted of 104 archival organizations with Facebook pages, 64 with Twitter, and 27

archivists using Twitter; all the accounts were analyzed separately. The study found that there was

no correlation between the frequency of posts and the growth of the number of fans/followers;

however, Crymble found that the greatest success in maintaining a substantial user community

was the Library of Congress, which has a huge number of fans and followers. Gosselar, Nye, and

Theisen (2015) and Werner (2016) have argued at their perspective archive and library

conferences that social media is key to reaching users in any format possible.

Many cultural institutions also recognized how their user groups were changing and began

to incorporate different types of outreach. For example, the Vancouver Public Library began

slowly integrating social media into their library services. The Vancouver Public Library

implemented Facebook, Twitter, Flickr, YouTube, and FourSquare to connect "with users in the

spaces of their choosing, rather than always expecting the library's website to be a destination in,

and of itself" (Cahill, 2011, p. 261). The library was able to understand that their user group was

changing and decided to modify the image of the library in order to meet the changing needs and

wants of their users.

In an additional related area, the California Digital Library (CDL) incorporated Twitter

into its toolkit in 2009 after discussing how Twitter would enable the library to expand its

audience (Starr, 2010). With the implementation of Twitter, the library also had a complete

website designed to meet the needs of their user community. The staff developed new links to

other social media sites as well. CDL realized that becoming involved with social media had

multiple possibilities, "social bookmarking in other words, is now an integrated part of how we

interact with the communities we serve and also the wider world of people we don't know yet"

(Starr, 2010, p. 27). The internet has a world of potential unknown users; that idea can make the

implementation of social media exciting and overwhelming all at the same time. However, the

popularity and widespread use of social media applications rest upon the user community.

Typically, the larger the user population, the more successful was the application due to the

collaborative online communities and peer production systems (Taraborelli & Roth, 2008).

Success is dependent upon the goals of an institution, however having a smaller user base does

not mean failure; it simply depends on how that institution defines 'success' for them. Likewise, a

social media plan or goals should be constantly re-evaluated, especially as the incorporation of an

interactive system development around the user encourages participation, which continuously

changes.

Archives are user-centered; therefore, it is fitting that participation becomes community

driven. This encourages the transfer of knowledge to audience engagement (Russo, Watkins, and

Groundwater-Smith, 2009). Many archivists have embraced social media to harness technology,

improve outreach and share collections with a wider audience (Theimer, 2011). Social media has the potential to do many great things for archives as, "…it [social media] empowers, offer ways to help us share our mental landscapes, our memories, and identities, our heritage and culture" (Giaccardi, 2012, p. xvi,). It is important for archives to continue to change and adopt outreach strategies, but it is important to remember to have a strategy when implementing social media. As Nogueira (2010) noted, while many social media applications are free (Facebook, Twitter, YouTube), the implementation still requires time and effort.

Typically, small- and medium-sized archives have smaller staff and less time to allocate to different activities. When time and budgetary constraints are present, it is even more pertinent to explore the full implications of what social media will do for an archive's online potential, as well as for the personnel's daily routine in the archive. A common misconception associated with social media is that one simply needs to post and post often. Social media is not just plain and simple promotion. It is a two-way street of communication practices. Griffin and Taylor (2013) analyzed special collections libraries that had incorporated social media and found that rather than an increase in interaction, "social media profiles tended to serve as one-way information conduits" (p. 266). The context of messages is important; users should want to respond to a post and organizations should respond to their users. As Russo, Watkins, and Groundwater-Smith (2009) stated, "social media are in a sense self-editing, as audiences decide who they will share experiences with and on what terms" (p. 161). This is a challenge in participatory communities to ensure the sustainability of the group (Jenkins, 2006). The movement to online communication makes the establishment of creating an online space important. It therefore becomes critical to find the strong tie amongst user groups as doing so will enable improvement of connections and communication within the group.

Boyd and Ellison (2007) note:

Some sites [social media] cater to diverse audiences, while others attract people based on common language or shared racial, sexual, religious, or nationally-based identities. Sites also vary in the extent to which they incorporate new information and communication tools, such as mobile connectivity, blogging, and photo/video sharing. (p.1)

The point of social media is to engage and facilitate connection. Few studies have measured the discrete outcomes of social media in archive environments. The lack of evaluation by archivists and the outcomes of social media make it difficult to build a strong foundational point to move forward with interaction technologies.

1.6   Definitions & Concepts

The primary focus of this study was to examine how archive institutions in Wisconsin are using Facebook. The study used *SNA* to measure the structure of the Wisconsin archive Facebook community. There are terms that need to be defined from the following areas: archives, social media, and *SNA*. The concepts described are gathered from the research problem, research questions, and hypotheses.

Actor

Actors are a part of the social network and are visually represented by nodes in *SNA*. The edge is the representation of the tie between two nodes. In *SNA*, points represent nodes and lines represent the edges. Together they are the visual representation of a social network. When describing the analysis of relationships between the nodes and edges, the terms actors and ties are used as descriptors. The nodes can be abstract or physical and are representations of individuals or institutions.

Actor affiliation

Actor affiliations identified in this study are *people*, archive, *cultural institution* (museums and libraries), *business*, and *university*. The affiliation data was gathered by identifying the actor

from profile information provided on Facebook. *SNA* can measure different perspectives of actors and their affiliations; by developing the affiliation network, relationships between affiliations and online activities will be measured and weighed. This permits classification of actors into subsets rather than ties between pairs of actors, thus providing a deeper perspective of the overall network.

Archive

An *archive* is an institution that works for the long-term storage of records. Records can be all different types of mediums: paper, electronic, audio, and video. Archive repositories are very diverse and can contain a variety of materials from different subjects. Depending upon the scope and mission of the archive, access to materials may be a part of the operation. Archives can be stand-alone entities like a historical society or can be a part of a larger parent institution, for instance, an archive that is a part of a university library. Archives can be public and may provide a service to the local community; or an archive can be private and provide a service to its organization - but some records may not be available to the public for viewing. Archives are managed by archivists; however, some archives are volunteer-run and have no official archival science training. Archives involved in this study are required to have an official archivist on staff.

Archive Facebook community

The *archive Facebook community* is the phrase used to describe those who are part of the online archive community who use Facebook. Individuals and organizations are a part of the community. To be involved, members have to interact and/or be a 'fan' of an archive page. Presumably, these members have a shared interest in archives and/or in the subject matter of the archive or a variety of archives. Members of the archive Facebook community interact online via Facebook, but members of the community may know each other or interact in face-to-face situations.

Archivist

An *archivist* is the professional in charge of maintaining and preserving the documents for long-term storage in an archive. The archivist provides physical and intellectual control over the archive collection. The archivist will select records, process the records, and arrange and describe the materials accordingly. Using archival best standards and practices, archivists will provide summaries of each collection, referred to as a finding aid. Archivists work to create outreach programs to inform the community of the purpose of the archive and provide assistance in accessing information.

Business

Business refers to businesses that are a part of the Wisconsin archive Facebook community. A Facebook user can search for different categories of potential interest by enlisting the use of searching for various fan pages. Entities on Facebook can classify themselves in different ways. There are sub-classifications in Facebook. For instance, Pepsi will appear with the sub-classification of 'Food/Beverages.' This is a classification of 'Company, Organization, and Institute.' In order to simplify the classification progress, this study will identify entities like 'Food/Beverages' or 'Company' as a 'Business.' For example, businesses can include restaurants, gyms, and stores, thus streamlining the process but still permitting classifications to be known and analyzed.

Comment

The '*commenting*' is an important feature of many social media sites. The 'comment' feature discussed in this study is concerned with the usage of 'commenting' on Facebook. The 'commenting' function in Facebook allows users to make 'comments' on a post that a Facebook friend has made or permits 'comments' to 'comments', thus allowing for a great amount of

engagement amongst users. 'Commenting' allows for an exchange of ideas that begin with an original post and can generate additional responses, thus mimicking a face-to-face conversation.

Community

Within the context of this study, *community* is a prominent term. Community is used to define the archive community, more broadly than the archive Facebook community. The community stretches to those who are archivists, archives, and those interested in archives and related events. The connection that binds the different individuals and organizations together is the archive identity.

Cultural institutions

A broad description of *cultural institutions* refers to organizations that strive to preserve and promote culture. There are different variations of cultural institutions like libraries, museums, and universities. These organizations can be nonprofit, for-profit organizations, and or public entities. Cultural institutions are referred to as LAMs (libraries, archives, and museums). According to OCLC, LAMs are, "institutions [that] have a vested interest in being able to share their holdings of unique and rare materials from their various archives, museums, and special collections in a unified way with their community of researchers and learners" (Waibel, 2011). Oftentimes LAMs have a scope that incorporates being a part of the larger community, thus enabling the organization to engage and ensure that important information is being collected and stored.

Digital collection

A *digital collection* is a digitized set of information that stems from a physical collection. The digital collections typically are of cultural significance. A digital collection may consist of manuscripts, historic maps, photographs, documents, audio, and video. The purpose of a digital collection may be to provide access to materials or provide a digital surrogate of the material. A

digital collection may also be due to preservation purposes, or a combination of these areas.

Digital collections refer to a larger body, such as a digital library or digital archive. Different

entities, like cultural institutions (libraries, archives, and museums), have digital collections.

Edge

An *edge* is a term used in *SNA* to describe the tie or link in between two actors or nodes.

An edge is the relationship of those actors. Different measurements in *SNA* analyze the

importance of that edge. Each edge can be associated with a different type of communication. For

example, on Facebook, an edge could be any of the different interaction functions, 'like', 'tag',

'comment', or 'share.' An edge acts as a bridge between all the different relations that occur

within the social network.

Facebook

Facebook is an online social networking site created in 2004. Facebook allows users to

build their own social network by creating their own profile, and then connecting with other

Facebook users, which are referred to as 'friends.' Facebook 'friends' can share status updates,

send messages, post photographs and videos, and can interact with these various items in a

number of ways. For instance, users can 'like', 'comment', 'share', and 'tag.'

Organizations can join Facebook as well and build a profile similar to the way that an

individual Facebook user creates a profile. Organizations have the same interaction capabilities as

individuals and interact with their Facebook friends. The profile of an organization is referred to

as a 'page.' The intention of the organizations may differ from individuals as organizations have a

desire to promote and bolster the entity. Organizations also have the option of paying for

advertisements on Facebook. The ads can appear in newsfeeds of any Facebook users.

A distinction of Facebook as compared to other social networking sites is that to build

one's friendship network, the other person has to reciprocate that relationship. If Friend A wants

to follow Friend B, Friend A will need to send a 'friend request' to Friend B. Then only when Friend B approves Friend A's request can Friend A interact with Friend B.

Facebook community

The *Facebook community* refers to the users of Facebook as a whole; more extensively it refers to the online community that uses Facebook. Only with online communities, as opposed to face-to-face communities, is there the potential for members of the community to interact only online. To be a part of the Facebook community, one must have a profile page. Once a profile page is created, the user is then allowed to 'add friends' with whom they can interact in different ways and built their network. Members of the Facebook community can interact as much or as little as they wish, there are no character restrictions on posts.

Facebook membership

A person or organization that uses Facebook and has a profile page, thereby allowing interaction with other Facebook members, has a *Facebook membership*. Facebook membership refers to the length of time that institution or individual has been using Facebook. Facebook was created in 2004, and since that time, any individual or organization can interact with the application. Although details regarding how organizations listed in Facebook have changed, the overall concept has remained the same, which is that the organization is permitted to have a profile and interact amongst fellow Facebook members.

Facebook newsfeed

A *Facebook newsfeed* exists for both individuals and organizations. When a Facebook user logs into Facebook, the members of their social network will appear with the latest or most popular interactions that have occurred on Facebook since the user's last login. A notification will appear if any of the user's Facebook 'friends' have conducted an interaction and 'tagged',

'commented', 'liked', or 'shared' any post and have related that post to the user. Any activity that has happened is available for the user to view.

Facebook page

There are two different types of *Facebook pages*: a community page and an official page. An official page is the organization's version of an individual's profile. An organization can develop a page that illustrates all the important information that describes that organization, much like the Facebook profile of an individual person. The difference between a profile and a page is that a Facebook user can become a 'fan' of that organization's page, thus ensuring that when that organization posts new information it will appear in that fan's newsfeed. The page setup allows organizations to pay Facebook if they want their page promoted and advertised. The other kind of page is a community page. A community page is for non-business type topics, for instance, 'Fans of Arrow the TV show' page.

Fan page

A Facebook *Fan Page* is similar to an individual's profile, but for a public entity. Organizations like businesses or public figures use a fan page on Facebook as a base to build a network. However, instead of 'friends' followers of a fan page are 'fans.' Thus, users of a fan page will build a network of 'fans' rather than 'friends.' Facebook users can become 'fans' by 'liking' the fan page. A user who has 'liked' a fan page will receive updates and notifications whenever the entity has made a new update. Unlike an individual's profile page, the administrator of the fan page can pay to guarantee updates will appear at the top of the fan's newsfeed upon login, thus ensuring that the fan will be aware as much as possible of new information.

Followers

Members of an individual's Facebook network are 'friends.' A follower is a Facebook 'friend' who subscribes to receive your updates. By default, all 'friends' become 'followers', but

the user is permitted to change the settings of their 'followers' by creating sub-groups, like 'close friends', thereby, allowing the user to allow only certain groups of their 'friends' to view certain posts. This means that those 'friends' who do not 'follow' will not receive updates about that person or organization in their newsfeed. 'Friends' who do choose to follow a 'friend' are also referred to as '*followers*.' Facebook has a setup that once an individual 'friends' a person or becomes a 'fan' of an organization's page, information that is created by those friends and organizations will appear in the user's Facebook newsfeed.

Friends

Members of an individual's Facebook network are '*friends*.' Users can create a user profile and add other users, 'friends.' Once a user has 'friended' someone, that user can exchange messages with that other user, share status updates, photos, and videos. Facebook users receive a notification when a Facebook 'friend' has made a change to their profile; these notifications appear in the user's newsfeed upon logging into Facebook. Facebook 'friends' may have face-to-face interactions, thereby extending their friendships to an online space or 'friends' may only be known online.

Interaction

The *interaction* refers to the relationship between individual nodes and the entirety of the network. The interaction can be measured by centrality measurements, including degree, closeness, and betweenness. Measuring the interactions permits the ability to extract characteristics of the connections and the entirety of the network. For instance, interactions examine the information flow and role of actors within the network.

Like

The '*like*' feature in Facebook allows users to interact at a basic level with fellow Facebook friends. 'Likes' are a part of any post made to Facebook (This includes photographs,

videos, textual posts, and 'commenting') and is another interaction feature. In addition, a 'like' can be made on any additional comments derived from the original post. 'Likes' serve as a reactive interaction tool for Facebook users, and the amount of effort it takes to 'like' an item is very minimal when compared to other interaction features.

Node

A *node* represents an actor in *SNA* and is the visual point in the social network. The use of nodes permits the capability for a wide array of data visuals. The visual representation of the social network is a huge aspect of *SNA*. Nodes visually represent different variables of different actors, which can be modified to show various colors and sizes to increase the visual appeal. Nodes can be representations of any type of actor, which may include individual people or institutions. Nodes can group together depending on the types of measurements that occur.

Online activities

Online activities are the social interactive tools provided by Facebook, i.e. 'like', 'tag', 'share', and 'comment.' The online activities that the social network engages in are different ways for Facebook users to connect to be part of a larger social network. Online activities on Facebook mimic face-to-face interactions; an example would be commenting on a photograph that was posted by a fellow Facebook 'friend.' Online activities may encourage additional interaction from fellow Facebook 'friends', for instance, an ongoing discussion on a particular post. These interactions are all ways of connecting with various members of the Facebook community. This includes both individuals and organizations, and to interact with the social community means that the user is an active participant.

Online community

An *online community* is a virtual community whose members interact with each other primarily via the internet. To be a part of an online community, the community member must

have an internet connection. People can interact in a variety of social networking applications, like Facebook. The social interactions that take place depend on the medium used and different applications will have different features that cater to the community. Certain online communities form around a subject (thus bringing the community together due to like-minded thinking) or form around an issue.

Original post

An *original post* is the first post of a thread submitted by a user. On Facebook, a user can edit or delete their post. The original post is the first in a series of posts. For instance, if Staubitz Archive makes a post of a photograph from their digital collection, Staubitz is the original poster of that information. Any subsequent post that appears after the photograph is referred to as a thread. Threads are discussions of the original post.

Outreach

The Society of American Archivist's defines *outreach* as, "the process of identifying and providing services to constituencies with needs relevant to the repository's mission, especially underserved groups, and tailoring services to meet those needs" (2016). Examples of outreach include workshops, educational programs, and exhibits. In terms of social media, outreach can also be used to promote workshops, education programs, and digital collections. Some archives have used social media to have a live version of the program available as it is happening. For instance, if an archive invites a speaker to talk on a topic, someone from the archive may stream a live video of the talk on Facebook.

People

People refer to the individual people who participate in the Wisconsin archive Facebook community. People were considered to be a part of the community if they had one or more interactions ('liking', 'sharing', 'tagging', and/or 'commenting') with posts that were extracted

for this study. The WAFC has both individuals and organizations that are active; the people who are members of the community may have stronger or weaker connections to the other members in the network. People can have different motivations than organizations to participate in a social network. This is part of the reason why it is important to separate them.

Share

The '*share*' feature is an interactive tool in Facebook. 'Sharing' allows Facebook users to take an existing post made by a Facebook friend, and 'share' it with friends on their network. Within the archival Facebook network, there are a few different examples of how this interaction can take place. For instance, an archive can 'share' a post made by anyone using Facebook, like another archive or an individual who has 'liked' their fan page, or a person or another organization can 'share' a post made by an archive. 'Sharing' is an interactive tool that has the potential to move a significant amount of information because once a post is 'shared' by a Facebook user, that information is now available to view by that person or organization's entire network. This feature has the potential for new members to become 'friends' of other friendship circles quickly.

Social media

Social media is a means of communication through the internet that enables social interaction and sharing of media. Users of social media will engage with one another through different social networking sites. Social media allows the sharing of different information and ideas through types of media, like, videos, images, and music. Social media brings together different types of online communities built on different platforms, thus allowing the opportunity for different relationships to form amongst various online groups.

Social network

  Social network is a network of social interactions that take place via a website or other application that enables users to communicate with each other with posted information, comments, messages, images, etc. The network can consist of close friends, colleagues, and many other types of personal contacts. Social networks can be built based on relationships that are known in non-online situations, can only exist online, or a mix of both. A variation of a social network is *social networking*, which is the action of developing new relationships within the network.

Social network analysis (SNA)

  SNA is a method of taking a social network and breaking it down by various variables, depending on what the researcher wants to measure, and then conceptualizing the network mathematically in a matrix. The social network can then be studied in a measurable way. This research used a specific *SNA* method that includes the centrality measurements: betweenness, closeness, and degree. The centrality measurements were used to discover interactions of the Wisconsin archive Facebook community (WAFC) in terms of social structure, information flow, and archive institution characteristics.

Subject schema

  A *subject schema* enables controlled values created to permit the analysis of a set of data. Subject schemas are keywords that are developed to represent data in a meaningful way. The classification of subject schemas will aid in the development of the data's framework. The thematic analysis will use subject schema to measure the content of the Facebook posts. Then the identity of various ideas and constructs from the text will be able to be analyzed. The schemas provide structure to the data analysis.

Tag

The '*tag*' function in Facebook gives users the ability to tag a friend in a post (which could be text, a link, video, or photograph), comment, or share. The 'tag' provides a link to that person or organization's profile or fan page. When an individual or organization has been 'tagged', they will receive a notification of the activity. That tag will also appear in that person or organization's timeline, thereby allowing a number of new opportunities for the growth of different individual's or organizations' social network.

Thread

A *thread* is a discussion that occurs after a post is made to social media applications. On Facebook, users are permitted to 'comment', 'like', and 'tag' in the thread. Facebook users can also 'share' the entire thread with their Facebook 'friends', and can start a new thread once the *original post* has been shared.

Tie

A *tie* is the visual representation of a connection between two nodes or actors in a social network. The measurement of connections is very important in *SNA*. A line represents the relationships between different nodes, a tie. Different 'strength of tie' measurements conducted in *SNA* represent different ways to display variables. The various ties between nodes can be strong or weak or somewhere in between. A general analysis of the ties in a social network will provide the details of both the primary social network and secondary social network.

Timeline

A *timeline* is a feature in Facebook that is a part of an individual or organization's profile or fan page, respectively. The timeline features all interaction activities that are a part of the user's social network from when they began using Facebook. For different Facebook members, a few days, months, or years of activity is accessible. The user and their network are permitted to

browse past activity. The timeline includes key points about the user; for instance, for an

individual a birthday, and for an organization, the date founded could be a feature.

Wisconsin archive

A *Wisconsin archive* collects and maintains records in all different types of mediums

(paper, electronic, audio, and/or video) about the history of Wisconsin, the United States, and

their individual institutions. The geographic location of Wisconsin archives is in Wisconsin. The

archive can be a part of a parent institution, like an archive being a part of a university library, but

must be an active archive with a professional archivist on staff. Each Wisconsin archive has a

different scope and mission, but the underlying commonality is the location.

Wisconsin archive Facebook community (WAFC).

The *Wisconsin archive Facebook community* consists of individuals and organizations,

which are interested and/or partake in Wisconsin archive interactions either online, face-to-face,

or a mix of both. The virtual community consists of members, some in Wisconsin, who interact

with each other via the internet or more specifically, Facebook. The entirety of the community is

much more than Wisconsin archives; it includes other organizations like businesses, cultural

institutions, and individuals, some of whom may be archivists and others may be teachers or

journalists. The underlying commonality of the Wisconsin archive community is the interest in

Wisconsin archives and the shared interactions that take place on Facebook.

1.7   Significance

The significance of this study is in three main areas: theory, practice, and methods. Social

media is a prominent means of communication and connecting. A focal point of archives is to

provide a means of outreach from the collections to patrons, and as social media now dominates

the culture, understanding how archives can better utilize this tool is critical. Consequently, there

are practical implications of this study. First, the production of solid evidence of the Wisconsin

archive Facebook communities' social network. The quantitative evidence provides guidelines and suggestions to practicing archivists and researchers, which will help to facilitate future practices and social media applications.

The research method is unique in three distinct ways: *SNA*, inferential statistics, and thematic analysis. These measures are all great tools to utilize when investigating the existing structure of a social network, particularly when it is necessary to understand the interworking of the complexities that are a part of an online community. In this study, the network was an online network, specifically Wisconsin archive Facebook community. *SNA* is rarely applied to research within archival science. Social media has been used as a communication tool in different capacities in the past decade. Few studies have measured archives' use of social media, which is troubling and puts the profession behind in making strides to incorporate a sound use of the tool. This section provides a discussion of this study's theoretical, practical, and methodological significance.

1.7.1 Theoretical significance

Social media is an important part of culture as a means of information sharing, and at the same time, it has always been an important aspect for archives to communicate with users. Consequently, it is necessary to understand how archives are using social media. The lack of research regarding archives' use does not mean that the archive community has not been using social media. The theoretical significance lies in the uncovering of emerging patterns and information exchange among WAFC. Understanding the makeup of the social network permits the discovery of major players of the WAFC and of the exchange of information. In addition, understanding the placement of archives within the entirety of the community is also highly significant. For example, if archives have a better understanding of their network placement, this

would provide them with key insight into how to increase the number of Facebook friends, which in turn could help to increase awareness of the archive.

The discovery of the major players within Wisconsin archive Facebook community provides a framework for growth. Knowing the major players in the Wisconsin archive Facebook community is a key aspect to understanding how archives can foster relationships within the community. Currently, archivists may not be aware of key allies within the community by which information is shared and exchanged. Understanding key allies and various levels of connectivity and types of interactions can create pathways to additional networks outside of an archive's main social network. This study is the beginning of making these observations into a framework that can be used to work toward the expansion of relationships within archival communities and learn how information travels through different connections.

1.7.2 Methodological significance

The secondary layer of significance lies in the research design of this study. The theoretical layer is the groundwork for the development of the key problem: understanding the information exchange of the Wisconsin archive Facebook network and the players of that network. In order to gather and analyze this important data, this study employs a mixed research method with the use of *SNA*, thematic analysis, and inferential statistics; all of which aim at solving the lack of awareness of archive social media use. The contribution of this study is the combination of these strong methods to gain access to a whole area of information not fully known by the archival community. None of these methods have been previously combined in this manner to unlock the necessary social network structuring within archival science.

This study's sample is unique. The identification of a subset of archives in a confined geographic area that uses Facebook and has unique characteristics is a group that is seldom explored but needs to be better understood. This sample, Wisconsin archive institutions that use

Facebook, permits the ability to investigate thoroughly the many different intricacies that are unique to social networks. In addition, both thematic analysis and inferential statistics are used in conjunction with *SNA*. This permits the measurability of different elements within the network and unique identifiers of archival institutions. Social networks are complicated; the combinations of human behavior set in an online setting create a matrix of overlapping and sometimes unknown relationship patterns. Inferential statistics is a way to analyze relationships of information patterns, exchanges, players, and the content of the online activity.

In order to begin to understand and measure the information behind it, *SNA* provides a method to take the existing network and then compartmentalizes and measures the distinct social structures - done through the basic measures of density and centrality. To measure the social structure, a matrix was built. A matrix creates an algebraic expression of the social pieces of the network. Using a soundly established interaction tool, like Facebook, permitted the ability to break down all the information exchange pathways of the network, thus, being able to provide a thorough insight into the interworking of the connectivity. In addition, the application of a thematic analysis of the posts made on Facebook identified the themes of the information exchanges. Case studies exist on how social media implementations have been conducted, but no quantitative research exists that examines the entirety of an online network.

The framework laid out by *SNA* permits the ability to learn and gather important information regarding the connections made by individuals and institutions within online communities. One of the major reasons behind the push for implementation of social media is due to the number of opportunities that suddenly seem possible. That level of integration seems impossible to ignore, especially when the purpose of an institution is to establish connections with patrons. Archive institutions need the insight into the interworking of the mechanics behind social

networks. Consequently, this study focused on a specific geographic area, Wisconsin, to thoroughly evaluate archive institutions using Facebook.

1.7.3 Practical significance

The strategies employed in this study provide contributions that will enhance the archive profession's use of social media. For instance, this study measured the effects of implementation of social media in different areas of archives to begin to identify and evaluate social media for future use by the archive community. The study also analyzed the numbers to provide quantitative evidence of what is going on "behind the scenes," and the correlation to the content of the post and the number of responses. One of the results being the identification of factors that affect the information exchange and sharing of archive information on Facebook, additionally, the findings can enhance an effective information exchange on Facebook. The more information provided to archivists about archive network connectivity, the better the profession will be able to market and create outreach programs via social media. Connectivity information provides archivists with the insight of user interests and knowledge of which archives, businesses, universities, or people might be advantageous to connect on Facebook.

Historically, archives have not provided a selection of research that analyzes or assesses social media. Until assessment begins to occur, it is difficult to provide suggestions for moving the field further. There are social media guidelines that exist for libraries, but no such guidelines exist that cater specifically to archives. Archivists have provided case studies about how they have implemented social media at their archive, which are all great ways to begin a social media program. However, there is little data to demonstrate what happens one or two years after implementation. Archivists who do want to evaluate their social media use do not all have the tools or resources to do an effective test of their network outreach. However, if archivists can

grasp a better understanding of overall user behavior and social media integration, the profession will be able to promote archival collections in a completely new way.

Archives are not as easy as public libraries for people to relate. Most of the general population have been to a public library and understand a library's basic function, but not nearly as many people have been to an archive. Showcasing archival collections in a space, like Facebook, permits archives the ability to reach out to potential users. The purpose does not have to necessarily be for that user to one day enter the archive, but if the user 'likes' a photograph and then begins to 'comment' and 'share', even 'tag' friends on Facebook about the photograph, this creates a way for archive institutions to begin to make the archives more 'user friendly' and less intimidating, thus permitting the archives the ability to grow awareness.

The use of quantitative measurements and the selection of a social media application, Facebook, result in a real-world appreciation for the results. The benefit of using a mixed research method is that applicable data will provide much-needed insight into archives' social media use. In addition, the research design can be replicated for other social media applications. This means as technology continues to change, the tools utilized in this study are adaptable with social media applications, thus ensuring that archivists and researchers can evaluate social networks moving forward; there are no other studies that employ the same methods in archival science. In addition, archives that have not yet implemented social media will have a better understanding and practical guidelines to aid in the process of beginning a social media program.

Currently, within the archival profession, many aspects of social media are considered ephemeral. No guidelines, acquisition, or arrangement and description frameworks are going to be able to be suggested for the profession until more is learned about what goes on in the archives social networks. It is already happening that community groups, local artists, and businesses use social media as a main way to communicate. Conversations need to be occurring that discuss how

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social media is handled in the archive. The first place to start is with archives and their own use of social media. By better understanding one network, it opens the door for more information and knowledge that is shared by the entire profession, thus continuing the archivist's duty to ensure documentation of culture.

1.8 Research design

The purpose of this research was to explore how archives are using Facebook. The sample includes archive institutions located in Wisconsin. Each archive institution is required to have a Facebook page that is representative of that institution, meaning that the archive institution must have a lone social media page or account outside of the parent institution. If an archive is a part of a larger institution or a historical society that has many different departments, such as, a museum or library, but has its own Facebook page, that archive is included in the study. This study analyzed Facebook data from different archive institutions in Wisconsin. In the context of this study, an archive institution is defined as having a professional archivist on staff. In other words, 'archives' that are community or volunteer run are not included. The data extracted from the institutions includes six months of Facebook use. In order to use the data, the archive institution must have used Facebook by the time the study took place (beginning in January 2014 to June 2014). In addition, the archive institution must have been using Facebook for at least 6 months. The design included three major areas for analysis: *SNA*, inferential statistics, and thematic analysis. This section will discuss all three of these areas.

1.8.1 Social network analysis

In the large context, networks are a made up of relationships and connections. The purpose of analyzing a social network is to determine, "constraints and opportunities, that he or she will encounter, and therefore identifying that position is important for predicting actor outcomes such as performance, behavior or beliefs" (Borgatti, Everett, & Johnson, 2013, p. 1). *SNA* is a method

of taking a social network and breaking it down by various variables, depending on what the researcher wants to measure, and then conceptualizing the network mathematically. Using *SNA*, a structure will be constructed to build the social network nodes and ties which will be used to identify the relationships and create the measurements for the various weights which will connect different ties. Countless studies have been conducted that analyze various networks using *SNA* (Guo, 2012; Hambrick, 2012; Hoppe & Reinelt, 2010; Salah, Manovich, Salah & Chow, 2013; Zhao et al., 2012).

SNA defines nodes as the actors (people, institutions, or objects) and the relationships that join them together as the ties. The measurements in between those ties illustrate how strong or weak the relationship is within the social network. The removal of social media data from its original environment increases the likelihood that the interactions or ties amongst the users (nodes) will be compromised. However, due to the ability of *SNA* to evaluate social networks, data from social media can be analyzed by *SNA*'s ability to break down and then reconstruct the network to enable analysis while keeping the measurements of the variables intact. UCINET software is used to conduct *SNA*. In this study, in order to figure out how to gather the 'likes', 'shares', 'tagging', and 'commenting' made on Facebook, a series of different matrices was created.

1.8.2 Thematic analysis

A thematic analysis of the content shared amongst archive users of social media provided a rich description of what is going on in the network. As few archival social media studies have utilized features of thematic analysis on social media posts; open coding will serve as the means of analysis of the social media functions (Strauss & Corbin, 1990). Theme development is an important approach when analyzing the construction of content (Aronson, 1994; Benner, 1985;

Boyatzis, 1998; Vaismoradi, Jones, Turunen, & Snelgrove, 2016). In addition, on a network level, the thematic analysis will characterize the various ideas diffused and terminology used.

The main purpose of the thematic analysis was to provide a broad overview of the interaction contents. It is for this reason that an additional level of analysis took place in this study. The first level of analysis took place on an original Facebook post. For example, think of an interaction when you meet a new person. The communication could go, "Hello, my name is Jennifer. I like cats." This same concept applies online. In the case of an archive institution, the interaction that specifically involves social identity may go, "Today at the Lawrence University Archive, a class of visiting 4th graders learned about archives." A portion of the main purpose of this interaction is to show a facet of the archive's identity. The name of the archive was involved, and an activity (education about history to students) was added to demonstrate a part of the archive's purpose, their identity.

The entirety of the post needs to be analyzed for the context as delivered to the Facebook users. Without the context of the post, the purpose of that post cannot be interpreted. To provide a rich analysis of the Facebook posts, the words used in the Facebook posts were also be analyzed to understand the context. The purpose of the additional layer of analysis on the words used within the posts was to have a deeper understanding of the archive's perception and overall identity online. The analysis of the words used within the posts revealed patterns and added context to the entire post that was coded previously, thus providing archivists and researchers with a better understanding of the use of the social network from the context of what is being discussed via Facebook.

1.8.3 Inferential statistics

In addition, inferential statistics was used to provide more insight into the Wisconsin archive Facebook community. Inferential statistics allow the examination of differences and

similarities between different groups and subgroups. These statistics are the key to analyzing a social network, especially an online network. Social media is so important in our lives that businesses have whole groups devoted to social media marketing campaigns. Archives do not have this capability but are reliant on social media as an outreach and communication tool. The use of statistical analysis for the Wisconsin archive Facebook community characteristics was foundational to understanding the network. Inferential statistics have been used to aid in the understanding of the complexities of social media use (Sharma & Kaur, 2016; Riffe, Lacy & Fico, 2014; Vaughn & Gao, 2016).

Consequently, the captured data was analyzed using a series of T-test and ANOVA tests on the previously stated hypotheses. The following factors were evaluated and compared: online interactions, actor types, actor affiliations, subject schema, and various characteristics of archive institutions, for instance, use of a digital collection, easy access to Facebook, and size of the overall friend group.

1.9   Summary

Many archivists have already integrated social media into their daily routine in the archive, changing the way that outreach was traditionally conducted. Archival outreach and advocacy have always shifted with the influx of new technology - for example, electronic findings aids. Social media is the next step in technology integration. Archivists are conscious of their users and the issues involved with social media.

Outreach is a key part of archives. Through outreach, archives can spread the mission of the archives, provide a service to their user community, and build relationships from records gathered for the archives. A new branch of outreach and communicating with the public is social media which has established a stronghold in society; however, how archives and cultural institutions can foster these applications has yet to be decided.

More research is needed to learn about the hard evidence behind how archive institutions have implemented Facebook. Information learned from enlisting *SNA* techniques, inferential statistics, and thematic analysis can provide the parameters necessary to discover the connectedness within the Wisconsin archive Facebook community.

CHAPTER II
LITERATURE REVIEW

Social media has extended into many facets of society and has quickly become a huge part of how people communicate. Through different social media platforms, people interact by open opinion sharing, the exchange of photographs, and videos on both professional and personal levels. However, the development of an online network is not as easy as it seems; social networks are only as strong as their network size and network quality (Sacks & 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 in order for information to bridge across different networks, the bridging of information will only extend as far as the strong ties between the individuals. Therefore, it is necessary for a constant evaluation of the medium to meet the community's ever-changing needs.

A common misperception associated with social media is that one simply needs to post and post often. However, social media is not just plain and simple promotion and interaction. It is a two-way street of communication practices. From the perspective of an organization, the context of the message is important, users should want to respond to one's post, and the communication should be reciprocated. The point of social media is to engage and facilitate connection. However, it is not known how that information and interaction exchange among archivists and archive institutions takes place.

The purpose of this study was to evaluate a known social media network (Facebook) and its use by the Wisconsin archive community. The Wisconsin archive Facebook network was evaluated using social network analysis, thematic analysis, and inferential statistics. Consequently, this chapter reviews the relationship that archives and other cultural institutions have had with social media applications, drawing particularly from library and information

science which includes suggestions for social media integration in a library. Suggestions from related fields are discussed as archival science has few sources created from the field and often draws on library science for suggestions. In addition, the discussion of related areas in relation to archival science provides a larger scope of the field. Social media is also discussed in both the context of archives and in related fields like library and information science. Social network analysis, thematic analysis, and inferential statistics and the strength of each method are reviewed and include a comparison of how the methods will aid the archival science community in learning and evaluating its online network interactions. In order to see the importance of content analysis and information flow, research that has used a combination of *SNA* work and qualitative work will be discussed, and the findings from research of content analysis studies will be analyzed.

2.1   Archives

Archivists have recognized the depth to which social media has been entrenched into society, and have started to make the leap to incorporate several social media tools into their institutions. There are a few obstacles that archivists must overcome to successfully integrate social media into the archive. These obstacles are unique from other cultural institutions. For instance, archives are unique in each of their collections; by comparison, social media recommendations made to public libraries are easier to integrate because public libraries have many shared characteristics (Al-Kharousi, Jabur, Bouazza, & Al-Harrasi, 2016; Gaha & Hall, 2015). Archives differ greatly in not only their collections but also their patron base. In the past, the adoption of new procedures and technology has been more gradual. However, the rapid acceptance of social media has given archivists little time to prepare for the inclusion of online participation. The issue is twofold: social media is being used as a medium for recording of events, and archives themselves need to participate in social media.

This study focused exclusively on the analysis of social media use. The analysis of use will lend itself to the issue of preservation of social media. Before an archive can store information, the first step is to figure out how the tool is being used. The lack of integration strategies can result in an absence of planning. Liew, King, and Oliver (2015) found that many archives lack long-term strategic planning to sustain social media programs. Likewise, Duff, Johnson, and Cherry (2013) found in a preliminary study of Canadian archives' use of social media that few archives were only interacting minimally in online communities. Thomson and Kilbride (2015) noted social media data is rich with information, however, for research to occur, the data must be accessible. More information is needed regarding social media use in archives for evaluations to occur.

Social media research is needed for the archive community and conducted by archivists. Evans (2014) noted many challenges that archives face in the digital world, including the few specifically designed digital archive systems that facilitate participatory descriptive networks. Evans made a point that the archival community tends to assume that outsiders will provide a structure and archivists will make that structure fit as best as they can. While Evans' focus was on design and data structure of archival systems, the same is true for user and social media studies as few studies focus on the archive community's use of social media.

The archive community uses social media and both the wide array of users reached and additional access to collections have been discussed as key reasons for social media implementation. There have been a multitude of case studies regarding archives and social media implementation, and an important characteristic of those within the archival profession is the constant advancement of services provided. This was a focal point of many of the case studies (Chute, 2002; Dearstyne, 1997; Hager, 2013; Mason, 2014; Njobvu, Hamooya, & Mwila, 2012).

Likewise, discussions of enhanced access to archive collections through social media have been introduced. One way to provide additional sound access to collections and necessary resources is to go where the users are, which is now not just online but on social media. "For archives, Web 2.0 connects communities with collections or, maybe even more conceptually, communities with their history and identity" (Yakel, 2011, p. 258). Theimer (2011) identified this shift in archival practice as 'Archives 2.0', which she argued is not the practice of implementation of Web 2.0 tools, rather Archives 2.0 should discuss the methods and innovations behind user-centered theories. Both of which should be analyzed. Integrating quantitative research methods with archival science and social media fits these criteria, as it is the working background of social media which needs to be understood on a deeper level.

2.1.1 Digital Archival Outreach & Engagement

The transition into a new type of technology for outreach is not new to the archive. Prior to social media, archivists used several different tools to represent the archive. The first being the finding aid, which in the context of archival science is a document containing detailed information about a specific collection of papers or records within an archive that is used by researchers to help determine whether a collection is useful to them.

Finding aids were the beginning of information discovery in archive institutions. Findings aids are guides that provide a summary of the archive collection; this permits access to the collection and provides the user and archivist with a range of information, for instance, collection scope, types of materials, and inventory. The incorporation of finding aids as access points were the beginning of how the archivist would administer outreach through technology. Like many different new professional changes, the development of finding aids was not liked by all. For example, Pugh (1956) discussed his displeasure with the notion of findings aids by arguing that there was no need to provide the public access to materials, thus dismissing all ideas of promoting

an archive. However, findings aids were readily adapted by the archive profession. There have

also been attempts to make archives more accessible by the addition of finding aids to archive

websites (Williamson, Vieira, & Williamson, 2015).

Incorporating finding aids into the archive brought forth a few different descriptive

standards that would be used to regulate the archive's holdings. From MARC (MAchine Readable

Cataloging) to MARC AMC (MAchine Readable Cataloging Archive Manuscript Control), and

then later with the incorporation of the internet, EAD (Encoded Archival Description) have been

used at times to create a better means of access to patrons. Prom (2004) studied the usefulness of

online finding aids and suggested instead that the archivist is the main mediator between

collections and users in an online reference setting.

Access and interaction with users are at the forefront of questions continuously being

asked by the archival community. Archivists have been gradually trying out different means in

which access to collections and interactions with users can be achieved. This study's purpose is

not to argue the proper way to distribute aids to users; rather the purpose is to provide a practical

output of how archivists can better understand the culture using social media, particularly as it

pertains to archives, which then, in turn, permits an additional way for archivists to reach their

users. Not in the same way that finding aids provide a means of access to materials, adding the

use of social media to the archive strengthens an access point or outreach that the archive is

currently doing. For example, Hager (2015) interviewed 23 archivists who used Facebook and 19

found the tool to be beneficial. The term 'beneficial' could mean different things to different

archives. In any case, using social media was not determined by Hager (2015) to be harmful to

archival practice.

There are arguments of the true purpose of social media, and questioning of the

helpfulness, much in the same way that the electronic finding aid was just the start of opening the

archives to more users. On archival representation, Cox (2007) noted, ". . . we [archivists] also represent what has not been saved, the individual archivist's own interest in preserving something of the past, the objectives of the original creators of documents, and society's own sense and value of history" (p.28). Social media data is being created now, and archivists need to have a better sense of how users are interacting and perhaps might even want to access collections. On the future of archives, Cox (2016) noted "[an] archivist's focus should be on sharing their expertise with others, even empowering others to function competently as archivists. This takes into account the influence of the computer in building more complex documentary systems requiring collaborative solutions and approaches" (p. 13). Having more on an understanding of how archive institutions use social media is one way to build a more collaborative space.

Social media development research has been conducted from the qualitative viewpoint; for instance, Chern Li, Wellington, Oliver, and Perkins (2015) conducted a survey of libraries and archives and found that reasons for implementation of social media included the want of "access to a larger audience," "reaching new audiences," "rapid form of communication," "similar organizations were using social media," "low cost," and "stakeholder engagement" (p. 387). From a user perspective, Duff and Johnson (2002) identified four non-linear ways that historians orientate themselves in an archive: use of finding aids, seeking known material, building contextual knowledge, and identifying relevant material. These different perspectives when combined can in part be fulfilled by social media, particularly communication and seeking known material.

It is critical to remain objective when developing the idea of adding social media tools to the archive. For example, Freeman (1985) spoke of the importance of archivists knowing their users and how they use the archive's holdings. In order for the archive to 'know' its users, more research needs to be conducted. While archivists have an idea of whom their users are, it remains

critical for research of online behaviors to be conducted to ensure that observation biases are not taking the place of sound data findings.

In addition, "customer input" is necessary for obtaining information from the community about "our institution's level of service and usefulness, and provides us with ammunition for local support" (Freeman, 1985, p. 93). Freeman argued that with that information, the archivist can begin to build archival outreach programs. Thirty-one years later that statement can be used to describe the need to learn about the effectiveness of social media as an outreach tool. In accordance with Abraham Maslow's law of the instrument, "I suppose it is tempting, if the only tool you have is a hammer, to treat everything as if it were a nail" (p.15). The shift to incorporating social media into the archive seems to be the next step in service. For instance, Chinery and Clemens (2016) proposed that improving access to collections through social media was particularly important to reach marginalized and underrepresented groups. It is the level of helpfulness that is contemplated. Stevenson (2013) found that archivists measured 'helpfulness' in terms of their own archive and their own users. For instance, a small to medium-sized Wisconsin institution found that social media was helpful by allowing them to reach more users. One archivist noted, "If I get 10 likes on a post that I made, I consider that a job was well done. After all, maybe I had two people physically enter the archive that day. The fact that at least some additional people think about the archive for a few minutes is a plus to me" (Stevenson, 2013, slide 10). Likewise, Kriesberg (2014) analyzed archives' use of Twitter by conducting a qualitative study and found that many archivists are using Twitter, but stated that a significant amount of research was needed to dig deeper into the subject matter.

Social media is complex; it encompasses human behavior and interaction. The complexity of human interaction results in the need for a deeper understanding of the foundational source, in this case, social media. Archivists help define mass communication (Bratslavsky, 2015). Gordon

(1992) urged historical records professionals to learn more about how their users use archival material and found that many users prefer informal information, as opposed to the more formal finding aid. Social media is not only an informal way to distribute information but a media that millions of people use. Allison-Burnell, Yakel, and Hauck (2011) noted that many digital collections were created prior to the thorough understanding of user behavior, and thus, user studies are more critical than ever to online success. Consequently, if archivists can grasp a better understanding of user behavior and how to integrate social media into the archive, the profession will be able to promote archival collections more effectively.

2.2   Social media

The strength of online communities has grown since the rise of social media sites and the shift to a participatory culture in the early 2000s. Social media has replaced the former descriptive term of Web 2.0 technologies. Initially, Web 2.0 identified, "participation of mass groups of users rather than centrally controlled content providers, aggregate and remix content from multiple sources and intensely network users and content together" (Ahn, 2011, p. 1435). Advertising, marketing, and education are all affected by social media applications, "they [social media applications] have become a major factor in influencing various aspects of consumer behavior including awareness, information acquisition, opinions, attitudes, purchase behavior, and post-purchase communication and evaluation" (Magngold & Faulds, 2009, p. 358). The behavior and interactions that occur within a social network provide a framework of how information travels. This section will provide a detailed discussion of social media, particularly Facebook, and how social media is being used in archives and library and information science. In addition, resulting consequences of the adoption of social media like the development of online identity will also be discussed.

According to web traffic analytic site, Alexa.com (2016), out of the top ten most visited websites in the United States five of the top 10 were social media websites, including Facebook (no. 1), Twitter (no. 2), Pinterest (no. 4), Flickr (no. 7), and OkCupid (no. 10). These social media applications provide different interaction capabilities to the users. The types of social media dictate different uses. For instance, a microblog like Twitter provides 140 characters for users to share information. The users are identified by a 'handle' or username. Users can choose to follow other users who tweet information that they find interesting (Twitter, 2017). In contrast, a social news site like Reddit serves as a holding ground for users to share all different types of information posted to subject defined 'subreddits', which is a sub-form that permits users to view certain topics like science, health, and current events. Reddit users have a handle to identify themselves and rank other users by a point system (Reddit, 2017). Xie and Stevenson (2014) developed a comprehensive summary describing the different kinds of social media that are in use (see *Table 1*).

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. Creates 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
Microblogs	Allows 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, Ramasco, Moro, Pujol and Eguiluz, 2012; Starr, 2010; Kroski, 2008
Photosharing	Online image and video hosting site that allows users to share, comment, and connect through posted images.	Facebook; Flickr; Pinterest; Twitter	Buigues-Garcia and Gimenez-Chornet 2012; Taraborelli, Roth and Baldassarri, 2008; 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, Watkins, Groundwater-Smith, 2009; Samouelian, 2009; Kroski, 2008
RSS feeds	Rich Site Summary or Really Simple Syndication is frequently updated web feed that indicates news, events, blog entries that a user can subscribe to and follow. RSS takes current headlines from different websites, 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 for users to communicate and connect via interests, backgrounds, and activities that are part of a large social network.	Facebook, Twitter; Reddit	Ahn, 2011; Knuttila, 2011; O'Reilley, 2007; Yang and Ng, 2011; Kroski, 2008; Boyd and Ellison, 2007; Dwyer, Hiltz, Widmeyer, 2007; Millen, Yang, Whittaker, and Feinberg, 2007
Video	Content distribution of videos, typically available for free to the public.	YouTube	Buigues-Garcia & Gimenez-Chornet, 2012; Cho, 2013; Kroski, 2008
Wikis	Allow users to create and edit Web page 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

Table 1. Descriptions of social media as described by Xie and Stevenson, 2014, p. 204

2.2.1 Facebook

This study focused on Facebook, which uses a few terms that need to be defined which are unique to that medium. This subsection provides a breakdown of the functionality of Facebook. Few pieces of literature are discussed in this section; however, it is important to provide the context of how Facebook functions, within the framework of social media applications.

Facebook has many tools that users can use to interact; these features are 'like, 'comment', 'share', or 'tag.' These tools permit users the ability to connect with friends, potential friends, and institutions that have Facebook pages. In addition, "users may join common-interest user groups, organized by workplace, school or college, or other characteristics, and categorize their friends into lists such as, 'People From Work' or 'Close Friends'" (Facebook, 2017). Each one of the interaction tools is described in the following sections.

2.2.1.1 Like

The easiest interaction tool to use on Facebook is the 'like' feature. The 'like' tool is a quick and easy way for Facebook users to communicate an opinion. For instance, if Archive A posts a photograph to Facebook, Friend A can 'like' that photograph post, thus illustrating to Archive A and their other Facebook friends that they found this post interesting. *Figure 2* is a visual of the 'like' interaction on Facebook.
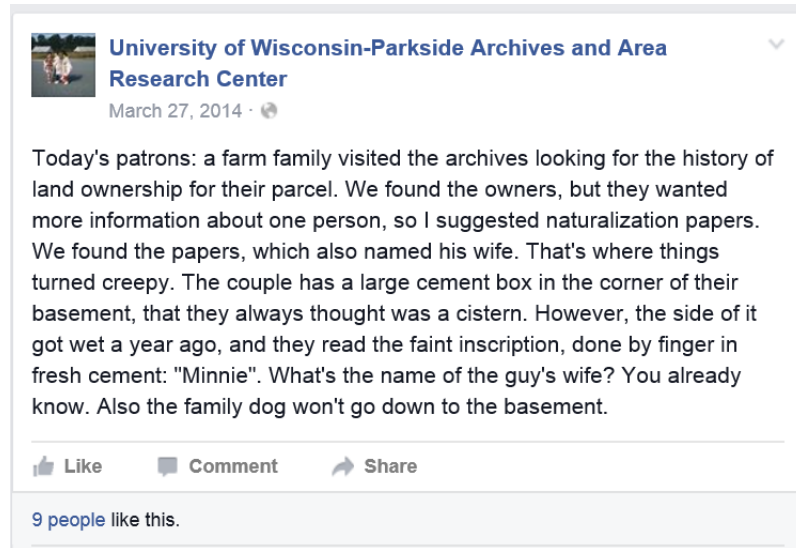
Figure 2. Like interaction found on the University of Wisconsin-Parkside Archive and Area Research Center Facebook page

2.2.1.2 Share

Another interaction tool in Facebook is 'share.' There are two different ways that the 'share' function can be used. The first example is Archive A makes a Facebook post and Friend A decides to 'share' this post made by Archive A; 'sharing' a post in this way enables it to be seen by all on the person's own newsfeed, which permits 'friends' to view recent activities of that user. The second example is if Archive A decided to share a post made by Friend A, which would then open the possibility for other friends of Archive A to see and share the post that was originally made by Friend A. These two examples exhibit how quickly communities can become shared, and friends can overlap through the distributing of information. *Figure 3* is a representation of those two different interactions. *Figure 3* represents only two potential networks that could be involved using the 'share' feature, but many more networks have the potential to be involved.
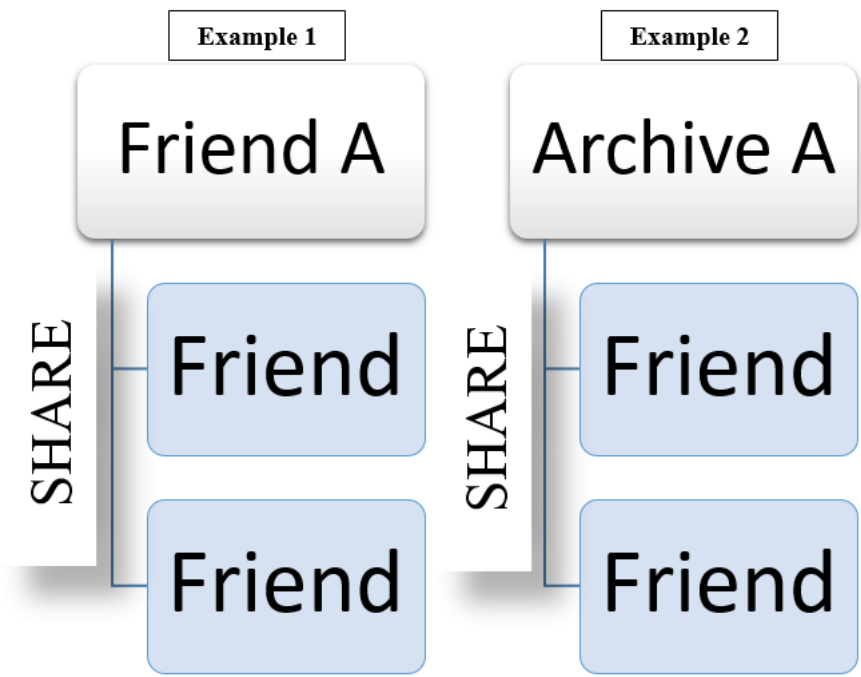
Figure 3. Sharing interaction on Facebook.

Figure 4 is a screenshot from Staubitz Archive that represents how the share feature is represented by a Facebook friend of Staubitz Archive.
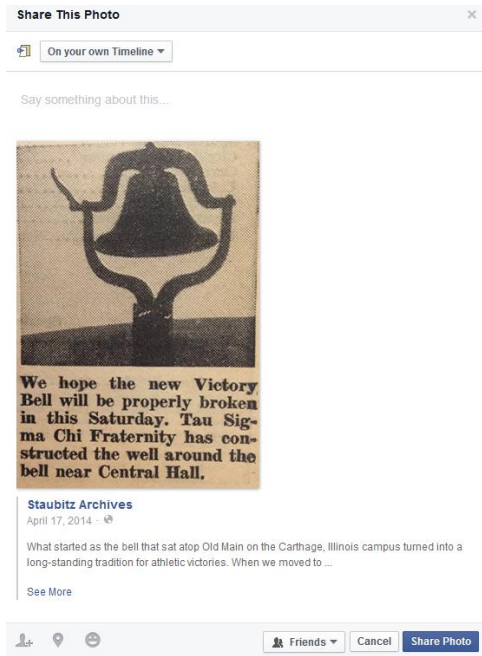
Figure 4. Sharing example on Facebook.

2.2.1.3 Comment

Another feature in Facebook is 'comment.' 'Commenting' is more interactive than the 'like' feature as it enables the user to explain a thought, feeling, or interaction, thus permitting the capability for a variety of different people to become involved in a discussion. For example, if Archive A makes a post and Friend A 'comments' on that post, then Friend B may make a 'comment' on the original post or on Friend A's 'comment.' *Figure 5* is an illustration of that potential interaction.
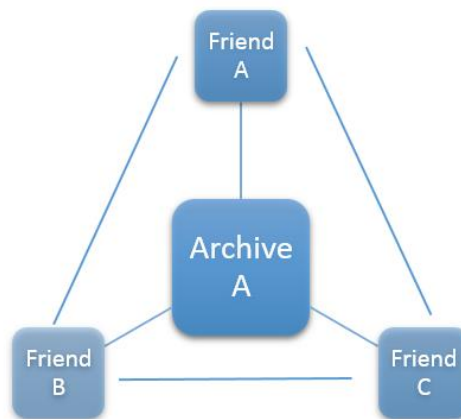
Figure 5. Illustration of the commenting interaction on Facebook.

Figure 6 is a screenshot of the commenting interaction that took place in the gathered dataset. In order to protect the identity of the individuals who commented, the names and profile pictures have been redacted from the screenshot.

Figure 6. Lawrence University Archive commenting example.

2.2.1.4 Tag

The final interaction tool on Facebook is 'tag.' People and institutions can be 'tagged' on

Facebook. When a person is 'tagged' in Facebook all the friends of that entity are able to see the

post. This allows for the potential of more people or institutions to decide to friend and then

follow the original poster. *Figure 7* is a visual of the interaction where Friend A is the 'tagged'

entity and Friends AB, BB, BC, and CD are all friends of A that could see the post due to the 'tag'

of Friend A.
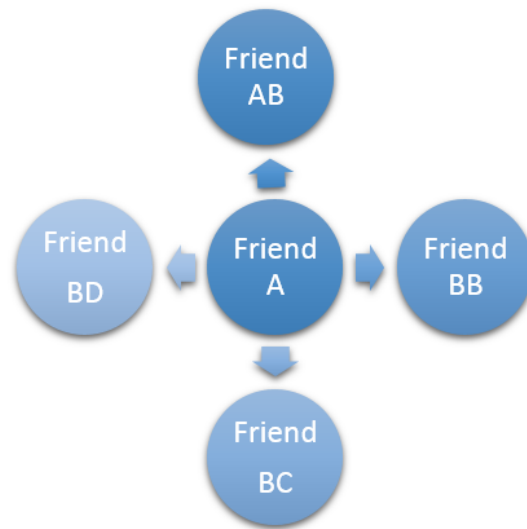
Figure 7. Representation of growth of the 'tag' function on Facebook.

'Tag' can enhance a 'comment' by directly citing a particular person or institution, which then upon that person's next Facebook login, will receive a notification of a 'tag.' For example, *Figure 8* is an example of the Ward Irish Music Archive using the 'tag' feature. In *Figure 8*, it is evidenced they won an award, however, instead of simply stating they had won the award, the Ward Irish Music Archive made the decision to 'tag' the awarding institution on Facebook. Thereby permitting their 'friends' on Facebook with the opportunity to click on the award to find out more information; in doing so, the archive provided their Facebook friends with more context (see *Figure 8*).

Figure 8. Ward Irish Music Archive tag example.

2.2.2 Social media & Library & Information science

In order provide context for the need of social media integration within archival science; it is necessary to analyze related fields like library and information science (LIS). The field of library and information science is a very diverse research field with research areas varying greatly within the realm of social media. Various research methods, tools, and outcomes have been identified by research within LIS to use in conjunction with social media.

A plethora of research methods has been conducted in LIS and social media research. For example, Anwyll and Chawner (2013) analyzed the use of social media use in libraries by interviewing 15 librarians. The main reasons found to integrate social media into the library were staff interest, conference attendance, and monitoring trends. In addition, Anwyll and Chawner found that many librarians were conscious of language use within a social media climate, and

most librarians used social media as a platform to discuss books and library materials, for example, new books. Similarly, Mulatiningsih, Partridge, and Davis (2013) used a qualitative approach to discover LIS professionals' experience using Twitter. The study found that being connected, building networks, and staying informed were all foundational elements regarding LIS professionals and their use of Twitter. The findings from these two areas provide the context of the overall perceptions of social media. These perceptions coincide with changing opinions and methods as new mediums of social media have emerged. For example, Torres-Salinas, Cabezas-Clavijo, Ruiz-Perez, and Lopez-Cozar (2011) found a 52% decrease in blog usage within LIS from 2006 to 2009 and identified the emergence of Facebook and Twitter as potential causes of the decrease.

Research that illustrates and marks changes surrounding social media is significant as social media adapts quickly. Without consistent studies documenting the changes in the field, it becomes difficult to predict and offer suggestions for implementation and continued success of social media. Qualitative and quantitative data is often integrated together for social media analysis. The inclusion of both types of research methods allows researchers to thoroughly analyze the use of social media in a variety of ways. For example, Ross, Terras, Warwick, and Welsh (2011) analyzed 4,574 tweets using content analysis, text analysis, and a survey of a selection of Twitter users; the study indicated with a high amount of certainty that Twitter is important for academic communities due to the high level of integration by the community for information sharing. Likewise, Gilbert and Karahalios (2009) used interviews to complement the quantitative findings of strong and weak tie relationships in social media, the reasoning that, "relationships make social media social. Yet, different relationships play different roles" (p.211).

The results from Gilbert and Karahalios' research were able to predict strong and weak tie relationships over 85% of the time with a dataset of over 2,000 Facebook posts. Charitonos,

Blake, Scanlon, and Jones (2012) used a mixed methods approach to determine if social and mobile technology would increase the visitor experience in school field trips. The study used descriptive numerical analysis, created a network map of tweets (microblogging) produced by students, and participant interviews; and concluded that "engagement with the microblogging platform improved students' impressions, participation and enthusiasm during the trip itself" (p.817). Ross et al. (2011), Gilbert and Karahalios (2009), and Charitonos et al. (2012) were able to demonstrate the full extent of social media use by utilizing both quantitative and qualitative methods, thus ensuring that the research was sound.

Research tools like NVivo, R, and Python make the integration of quantitative and qualitative research easier in many respects. Although NVivo (2017) is a qualitative research tool, it has the capability to capture the nature of social media (i.e. time stamps), and tracks communication channels while at the same time allowing researchers to conduct a content analysis of the material captured from the social media applications. For instance, one can review and classify broad data points, but still very easily dive into a subset of data points for qualitative data relative to the quantitative, thus ensuring that a large amount of data can be analyzed and that the data is not skewed. R (2017) is a programming language specifically used for statistical analysis and can be catered to capture social media data points. Python (2017) is another programming language that can help manage large social media datasets.

These tools have been used by various researchers in LIS to conduct social media research. Depending on the size of the data set, different tools aid in the interpretation of the data. Compare Pettit (2013) who analyzed millions of social media posts across thousands of different websites, to the content analysis research of Colburn and Haines (2012),who were only able to review 100 results and narrow down to four categorical areas. Colburn and Haines (2012) got specific and in-depth results, but the numbers are much lower than Pettit (2013). Content analysis

works extremely well for research as conducted by Colburn and Haines (2012) because there were a specific library and a focus of the research, but Pettit (2013) had a much broader focus making it necessary to expand the numbers to the thousands and millions to obtain information necessary for the research question at hand. The richness of social media is only going to become more complex as features within the applications become sleeker and users begin to utilize new methods of communication.

2.2.3 Advancing archives with social media

Archival science has the opportunity to learn about how social media is being used by archive institutions, archivists, and users. The observations from the potential research will aid in the advancement of archives. Analyzing the work from related fields like library and information science, museums, and even small businesses are all key areas to place the general context of how users utilize social media services. In order to advance archives with social media, four major areas will be discussed in this section: tapping into online user groups, developing an identity, niche marketing, and embracing Archives 2.0.

2.2.3.1 Online communities

Large user groups perpetuate flourishing online communities. Businesses markets are able to use social media to develop their consumer market. Social media is being harnessed and effectively used by large institutions in part due to the large online communities that use their services. User-generated content, such as reviews of a product, are often held in high regard within online communities. The Library of Congress is an excellent example of a cultural institution with a large user group. Solomon (2011) points out two major factors that prevent social media from effectively being used in library settings; one being the lack of followers and second the lack of social capital. Solomon equates social capital as having credibility in a selected online community. Establishing credibility in an online community is a matter of becoming a part

of that community. However, as Crymble (2010) demonstrated, the Library of Congress has a substantially large user group especially compared to other archive institutions. Crymble concluded that the main reason was there were more users that frequented the Library of Congress's site in general. The Library of Congress had over 15,000 followers on Twitter in August 2009. The next most popular archive had just over 2,200. Nothing about the Library of Congress's posting patterns, frequency, or content suggests it is a significantly better Twitter user; therefore, it stands to reason that its reputation has attracted a significant number of followers.

More evidence is found in the Library of Congress and their involvement with the addition of a Flickr account to showcase their digital collections in a social media environment. In 2008, just 24 hours after the launch of the Library of Congress's Flickr account, Flickr reported 1.1 million total views. A week later they reported 3.6 million views and 1.9 million visits. By October 2008, the Library of Congress photographs were receiving 500,000 views a month. What small- to medium-sized archives can take away from these statistics is the realization that there are many online user groups who love and connect with archival material for any number of reasons. Allied fields can hold a key to untapped users. Followers of the Library of Congress's Flickr account were either part of a related subject group in Flickr, for instance, fans of World War I material, or they were generated after certain digital collection were added. To further explain, Flickr has established online communities that a user can join that were created by other users. In joining an already established group, there lies a participatory group ready to explore more information that is related to the user's interests.

It is important to know what social media service users are using. Social media applications can cater to diverse audiences, some of which are based on common language or shared racial, sexual, religious, or nationally-based identities. Sites also vary in the extent to which they incorporate new information and communication tools, such as mobile connectivity,

blogging, and photo/video sharing. The significance for other archives is to find and follow users who have uploaded photographs that are like the images one's institution may intend to post. In summary, it is important to attract users who share an institution's interests and to also follow users who share the same interests as the institution.

2.2.3.2 Growth of niche communities

Niche communities have harnessed social media tools to strengthen their connections. There are several examples from which archives can draw: Ravelry, 4-chan, and the Brooklyn Museum. The information shared in these networks is unique; typically, the information is subject specific like Ravelry being an online knitting group. The contributions are created by many and shared by even more. The theory of markets and the social phenomena that occur within the "wisdom of crowds" and collaborative authoring is a piece that is unique to the emergence of social media, and there is much that can be obtained from analyzing the semantic and information networks of different communities (Easley & Kleinberg, 2010).

Ravelry (2017) is a prime example of strong ties in an online niche market community. Ravelry is a community site, an organizational tool, and a yarn & pattern database for knitters and crocheters. There are currently over 7,000,000 registered users in Ravelry as of April 2017. The site was first created in 2007 by Jess and Casey Forbes to keep track of projects and to allow others to easily find patterns and yarn. The site started with one hundred of their closest friends and jumped to 15,000 in the first weekend. The rapid development of Ravelry was not done via traditional marketing; instead, it was the users themselves who promoted the site through word of mouth communication. Ravelry users blogged their way through their own established networks. "There was no need to build a community for the site as there was already strong, existing well connected, a network of knitters passing information among themselves on the internet" (Humphreys, 2009, p.3). Unknowingly Jess and Casey Forbes simply created a meeting place for

knitting enthusiasts to meet and connect. The ability to latch onto an existing online community is one way to generate the rapid expansion of a new site. The success behind Ravelry was in part due to the existing audience of knitting enthusiasts that already existed. Despite the lack of user studies, archives have a built-in set of users like Ravelry.

4-chan (2017) is another example of the rapid development of a niche group. 4-chan was created in 2003 by Christopher Poole and has a highly dedicated group of users behind it. The site is an image-based message board that allows users to post images and comments either anonymously or with a handle (username, although no username registration is required to post). Like Jess and Casey Forbes, Poole initially created the site for his close friends to use to communicate and connect. As of 2017, the site has had over 500,000,000 posts made to the website in various boards, although the site is considered controversial due to the lack of mediation by the administration. At the same time, that is the reason behind why the site is widely popular; the users are the mediators.

The Brooklyn Museum has created a strong online user community. Users connect with the museum through several and various social media applications: Facebook, Twitter, and FourSquare. The Brooklyn Museum has several Flickr groups. Seb Chan (2012), director of digital & emerging media at the Smithsonian, weighed in on his blog in regards to the Brooklyn Museum's online success:

> I'd suggest their success is a result of their existing strong ties with the local community, of which the Flickr groups and image upload participation, is a logical extension of their mission. What Flickr offers the museum is many-fold. Firstly, there is new traffic – leveraging the existing Flickr audience.

The Brooklyn Museum (2012) has recognized the importance of online communities and makes access to social media venues easy for its users by integrating a Community link on its homepage. The community page is welcoming and the museum offers this statement to users:

The Brooklyn Museum believes in community and in the importance of the visitor experience. In this area, you'll find a number of ways to connect with us: blogs, photo and video submissions, podcasts, and more. We look forward to hearing from you (Brooklyn Museum).

The practice of open engagement allows the user groups to connect in a number of ways. The above statement validates that the museum finds not only its users but also its users' opinions and comments to be important. Grabowicz, Ramasco, Moro, Pujol, and Eguiluz (2012) found that the more mentions were exchanged between users, the stronger the tie between them. The Brooklyn Museum is successful in creating online communities because it offers many different avenues for potential users to exchange ideas.

Typically, in a social media environment this means that once users become involved in a network circle, it becomes easier for users to find like interests with other users, and can then find different areas of interest. In a case study regarding Harvard's open collection's program, Madsen (2009) noted, "When scholarly communities move onto the Web, it is still the function of an academic library to support them. Libraries are no places for simple information retrieval. They are dynamic spaces for discovery, learning, knowing, and creation" (p. 7). What the niche communities, like Brooklyn Museum and Harvard University, have been able to accomplish is the construction of an online identity that resonates with users.

2.2.3.3 Developing identity

Social networks allow individuals to connect with individuals, groups, and even companies with whom they share common interests either personally or professionally. These networks are no different for an archive. One implementation for social media in libraries noted that "even though a library is an organizational entity, once it enters the social realm it is perceived as a person and will need to act and speak accordingly" (Solomon, 2011, p.3). There is

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no 'one size fits all' when it comes to social media and cultural institutions. Social media was created for the user to communicate and connect. The user is central in social media. As an organization, if one is not displaying information that is of interest to your user community, no one will notice.

When an archive is developing an online image, it is essential to "develop relationships with important social media personalities within a knowledge community" (Schrier, 2011, p. 5). Niche markets have recognized this fact and market their products accordingly (Roberts & Roach, 2009). When a user 'likes' a product on Facebook, the user's network sees that action. The user has decided to use this product to demonstrate a facet of their identity.

One of the reasons for the success of niche markets like Ravelry, 4-chan, and the Brooklyn Museum is how users are able to not only to connect with a community but also how that community becomes a part of the user's own personality. Business schools emphasize the concept of identity and social media to their students by asserting the importance of communication both formally and informally through open channels. Even more important is the idea of marketing or branding an online image of oneself or institution. Christopher Poole discussed the idea of a multi-faceted identity at the Web 2.0 Summit in 2011. He described how "identity is more complex than the world's largest social networks would like you to believe. … We all have multiple identities" (Poole, 2011, 1:10). 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.

A strength of social media is its flexibility to wrap itself around many different domains. Social media applications have different purposes to communicate information. There are news sources such as Reddit, social networks sites such as Facebook, and micro-blogging sites such as Twitter. Just as in social settings, people behave differently when with different groups. For

example, Hermida, Fletcher, Korrell, and Logan (2012) found that when it comes to news broadcasts, users are experiencing sharing as "becoming central to the way people experience news" (p. 821). Another focus is on social identity. Lee and Leizerovici (2011) reasoned that many consumers feel the need to seek uniqueness in a social network. The focus of Lee and Leizerovici (2011) was within a business context; the basic ideas could also be applied to the archive community, as archives certainly have an identity. Theimer (2011) noted that archives need to represent themselves in several different online spaces: Wikipedia, Facebook, Flickr. Oftentimes, what is missing for many small- to mid-level archive institutions is a pre-built larger user community to draw from to build their online community.

When an archive is developing an online image, a different image may be necessary to attract users. Poole (2011) also noted that there is no "one size fits all" when it comes to developing an online identity. This idea holds true for an archive organization as well. From a user perspective, it is essential to "develop relationships with important social media personalities within a particular knowledge community" (Schrier, 2011, online).

Niche markets have recognized the importance of social identity and market their products accordingly. When a user 'likes' a product on Facebook, the user's network sees that action. The user has decided to use this product to demonstrate a facet of his or her identity. When a Flickr user connects and then follows a Library of Congress digital image, for example, the user has decided the image means something to them about his or her own identity and wants to share that piece of information within their network.

This connection creates a chain reaction among the user's network. The more activity from the user, the more the user will appear on their follower's networks. As an institution, if a user 'likes' a post made by the Library of Congress in a social media application, that user's network and the Library of Congress's network will be privy to that information, thus beginning a

digital version of word of mouth communication that has been popular for many years in the

promotion of markets. In a study regarding participatory communication and social media, Russo,

Watkins, and Groundwater-Smith (2009) found that when users partnered with museums through

the facility of social media, the user felt that it emphasized the importance of the museum to them.

It is also significant to discuss the 90-9-1 rule, which in most online communities means 90% of

users are lurkers who never contribute, 9% of users contribute a little, and 1% of users account for

almost all the action (Nielsen, 2006). Being able to build a deeper connection with users and make

them feel as though they are a part of one's institution is a paramount result that may occur from

the correct facilitation of social media. Likewise, gaining knowledge from the analytics behind

social media use will help identify the 90-9-1 rule.

2.2.3.4 Embracing Archives 2.0

Traditionally, archives have been a physical place that foster idea exchanges between

patrons; the movement to online communication makes the establishment of creating an online

space for library patrons a natural transition. Kennedy (2009) noted, "Archives 2.0 must work

alongside, but surely never replace, more traditional strands of research. In working alongside

these traditional strands, it will augment them as a synergy" (p. 9). It is important for archivists to

combine both traditional research methods with new tools provided by social media to meet the

needs of users.

Chern Li, Wellington, Oliver, and Perkins (2015) found that social media is failing in

archives and libraries but can be transformative. The fact that the environment is digital does not

make it any less credible than a tangible written source. Taraborelli, Roth, and Baldassarri (2008)

contend that the unique aspects of social media lie in the structure itself:

> Users are not only able to create new social links but also to share content
> whether in the form of collaborative content productions (such as in wikis or
> open source communities), content sharing (such as sharing in photo, music or

video sharing services), content annotation (such as in social bookmarking websites) or content-driven discussion (as in discussion forums or review-based services) (p.1).

It is important to remember that social media is a means of internet communication that enables social interaction and sharing of media. Interaction within the applications is facilitated by users establishing their own social networks. When implemented well, the results are tenfold. For instance, Cianci and Schutt (2014) discussed an archive project that used social media to harness community outreach after rescuing 10,000 records from a sign painting company. Cianci and Schutt (2014) noted that if it were not for the incorporation of social media into the project, most the collection would have remained incomplete.

It is important to recognize that online environments are continuously changing as new technology becomes available. In order to decide if a social media tool is going to be useful to the user community, different testing should be employed. Thematic analysis, inferential statistics, and social network analysis are various ways to work toward a greater understanding of archival networking.

2.2.3.5 Summary

There are four major aspects to archives and social media: social identity, connection, collection, and Archives 2.0. Overlap exists between all of the aspects. However, as discussed in the literature, there are unique points to each that archives should be aware. To begin with, social identity is much more than just creating a profile. Every action made online adds to one's social identity; for instance, 'Facebook friends', the action of 'commenting' or 'sharing' or another post.

In addition, responding to comments or questions made on Facebook also adds to social identity. These actions provided insight for another Facebook user to understand someone. For an archive, this might be 'sharing' a post made by another archive (an archive that might be in a completely different subject area). However, choosing to 'share' that post demonstrates a few

different things: The first being that the archive is trying to connect and be a part of the broader spectrum of the online world; the second is that it demonstrates to the other archive that there is an interest in their material. This is part of embracing Archives 2.0.

By embracing Archives 2.0, archives will be able to connect and by connecting, archives can share users. While it is true that archives have unique collections, interests overlap in wanting to connect with users and share their story. Instead of archives focusing on their own material, it would be worthwhile to reach out and 'share', 'comment', 'tag' other entities. Each time that one of those Facebook interactions takes place, it opens the possibility for different people to know about the archive and know that that archive exists.

2.3   Thematic analysis

Thematic and content analysis are often used interchangeably in research. At their foundation, both analyses are a core form of evaluating variations of qualitative research. However, where content analysis follows a structure of systematic coding across textual information, thematic analysis emphasizes the recording of patterns as they emerge (Mayring, 2000; Gbrich, 2007; Braun & Clarke, 2006). Thematic analysis involves the search for and identification of common threads that in the case of social media would extend across an entire post (De Santis & Ugarriza, 2000). In addition, thematic analysis often refers "to the visual presentation of themes, codes, and their relationships, involving a detailed account and description of each theme, their criteria, exemplars and counter examples, and other similar details" (Vaismoradi, Turunen, & Bondas, 2013, p. 403).

Content analysis is a method heavily used in qualitative research of social media. Content analysis can also be a quantitative method, however, qualitative research is often used in regards social media. Qualitative is used to better understand the context of the actions of social media users. For example, even in the field of medicine, Twitter is used to discuss news events and to

make connections. Sullivan et al. (2011) investigated the use of Twitter and the discussion of medical injuries, such as concussions. Through the content analysis of 1,000 randomly selected Tweets, Sullivan et al. found that news (33%), sharing personal information/situations (27%), and inferred management (13%) were the frequently used themes. In a related study, Mishori, Singh, Levy, and Newport (2014) mapped the flow of tweets of four medical networks on Twitter and found the collective community to be large and growing with a significant percentage of individuals who follow more than one group. Mishori et al. suggested that medical groups develop a more cohesive community of shared users to help users share content.

Politics is a subject that has received a lot of social media research. Himelboim, McCreery, and Smith (2013) analyzed cross-ideological political views on Twitter using cluster analysis and found that certain subgroups of highly connected users emerged from buried content on non-traditional media sites like blogs and social media. In a related study, Naaman, Becker, and Gravano (2011) analyzed different trends on Twitter; their findings indicate that exogenous trends were present. Exogenous trends were described by Naaman et al. (2011) to be trends that had characteristics centered on a certain event, for example, a holiday, a physical event like the Superbowl or a marathon, and global news events. Many of the approaches to qualitative research in social media are similar. In the end, the research is aimed at ascertaining more information regarding a group of people to gauge behavior and interactions that take place in an online setting.

In addition, Adams and McCorkindale (2013) studied Twitter pages from the 2012 presidential candidates and found that the economy, events, and specific primaries were the main content shared. Overall, the candidates failed to connect and engage in meaningful conversations amongst users as many of the Tweets were transparent in nature. Adams and McCorkindale point out an important aspect: social media was created to foster connections and communication amongst users with similar interests. As such, it is incredibly important to know your user group.

Holmberg, Bowman, Haustein, and Peters (2014) found that astrophysicists who use Twitter communicate with a variety of different types of groups in the same platform. Using sentiment analysis, Holmberg et al. identified information sharing activities between opinion expression and conversions amongst colleagues all within their ego network.

This study used thematic analysis to evaluate social media. However, given the closely related nature of content and thematic analysis, content analysis research was also analyzed in both library and information science and archival science contexts to provide a greater sense of awareness of the method.

2.3.1 Thematic analysis & Library & Information science

LIS is a large field that covers several different research areas. Within LIS there has been research conducted regarding the library' use of social media. In addition, the content exchanged in a social network can depend on the medium used to transmit information. Social media as an information exchange medium will also depend on the application used to make connections.

Content from Facebook, Twitter, and YouTube have all been analyzed in various ways. For example, Xie and Stevenson (2014) conducted an analysis of the use of social media applications, Facebook and Twitter, to discover its usage in digital library environments. Xie and Stevenson (2014) found a lack of standards and consistencies in terms of how digital librarians are posting information via social media applications, and that information posted is loosely oriented with the purpose of promoting the digital library or making connections. Aharony (2010) evaluated the differences of tweets produced by 30 academic and 30 public libraries, including the wording and content of tweets and the number of tweets produced by each. Aharony found that academic libraries used only formal language while public libraries used a mix of both and that the content analysis was broken down into information about library events, book recommendations, the library collection, library services, references, and the library in general.

Colburn and Haines (2012) categorized and analyzed YouTube comments to understand if the outreach projects carried out by a library were successful. Waters and Lo (2012) analyzed non-profit organizations' use of Facebook to find that the communication patterns, including information sharing, were the main type of engagement that took place. Despite the different social media applications used, communication and making connections are key points of online communities.

The LIS research had practical outcomes for libraries using social media. The various findings all provided insight into how the librarians were using social media and the information exchanged, thus providing librarians with more background to improve their social media exposure. Social media needs to be researched within the context that it was created, meaning that the highly interactive spaces of online communities need to have multi-step approaches to get the full picture.

2.4   Social network analysis

Social network analysis is a framework that measures structural relations between members of a network. The ultimate purpose of social network analysis (*SNA*) is to explain the behind the scenes development and interactions in a network. John Barnes first theorized the concept of *SNA* in 1954. Since its conception, the theory has grown to encapsulate many different fields and research areas, including anthropology, sociology, and computer science. *SNA* focuses on the asymmetric ties, hierarchical structures, and unique characteristics of different communities (Wellman, 1983). For example, *SNA* has original findings from Coleman's 1986 research on theories of social action. Coleman suggested that the system of behavior extends from small individual actions to large actions that consume the whole community. The direction of social theory focused on the building of the direction of the individual and behavioral characteristics; it

is the measurement of these individual behaviors within the large network, thus, analyzing

structural relationships and pattern ties of a network.

The strength of *SNA* comes from its visualization potential and measurement of an

immense framework. Nodes represent actors that are a part of the social network. The edge is the

representation of the tie between two nodes. Nodes are represented by points, and the edges are

represented by lines. Together they are the visual representation of a social network. When

describing the analysis of relationships between the nodes and edges, the terms actors and ties are

used as descriptors. The nodes can be abstract or physical and are representations of individuals or

institutions. For example, an abstract group would be subject words in a library database. A

physical example would a group of people in a friendship network; these people are the actors,

represented by nodes; their relationships illustrated by edges, ties. The path of the node illustrates

the connectedness that exists amongst the nodes. Therefore, the length of the path is also quite

revealing as it provides more insight into the interactivity in the network. The connections

between the nodes can be directional or non-directional. The lack of ties amongst the nodes

illustrates the network's variables. Additionally, *SNA* has the ability to explain variation amongst

the different nodes at different points within the network. Scott (2000) described the relations

between nodes as the social positions or relations within the social network; this provides the

framework for the social network.

These *SNA* concepts explore a multitude of different types of research, particularly with the

cultural inclusion of the use of social media use. Within a larger scope, a social network can

consist of a community of a number of different environments. For example, *SNA* research from

the 1960s was prominent within the sociology research community. Today, due to the rapid

development of technology and widespread use of internet, the evaluation of online social

network communities is a common part of *SNA*. Within the online world, Guo (2012) used *SNA* as

a framework to evaluate media use and public agenda, to provide a better understanding of news

coverage. The relationships that can emerge from *SNA* can be very revealing. The integration of

social media into culture requires a better understanding of the use to provide better services to

the public. The quantitative data gathered from *SNA* enables the identification and evaluation of

how information moves in a social network. Through the understanding of the information

exchange, researchers and practitioners can ensure accurate sources.

This section will explore different capacities of *SNA*, including information sharing,

representation, roles of actors with the network, social structure, and participating roles. *SNA* will

also be discussed within parameters of subjects like social media, LIS, and archival science; and

how these areas can be enhanced by *SNA*.

2.4.1   SNA & Information sharing

The purpose of a social network is to share information. How that information shared is

central to understanding the social network. *SNA* provides measurements using the nodes and

edges that aim at uncovering as much detail about the information sharing as possible. Depending

upon the purpose of the research, several different measurements are conducted by *SNA*. There

are many significant factors regarding the importance of nodes and edges in information sharing,

all of which are grouped in three categories: representation, movement of information, and

relationship patterns.

2.4.1.1 Representation

The nodes and edges represent the social structure of a network. A social network is a

communication group, and the nodes are tied to one another based on their relationships. The

edges or ties describe the relationships between the nodes, meaning that the strength of the tie will

vary upon several characteristics. When implementing *SNA* to learn more about a community,

depending upon the issues, the measurements are defined several different ways. For instance,

Hage and Harary (1995) noted the importance in their work of being able to weigh different variables to allow different points to be evaluated over others. The edges illustrate the communication pattern, which are the paths of information sharing. However, depending upon the social structure, the information can be shared differently. The interesting part of each network is that the nodes have different connections with one another. As in the friendship network, people are multifaceted, meaning there will be different edges depending upon those who connect with members of their work network versus a family member. The linkages and connections (the ties) represent the flow of information within the network.

The size of the social structure illustrates the characteristics of the network. The lack of representation provides information regarding the popularity and potentially the type of connections that occur. Networks are only as strong as the network size and quality. For example, McAuley and Leskovec (2012) collected Facebook data and analyzed different friend circles, and identified over 4,039 nodes and 88, 234 edges. Included in this data is what Knoke and Yang (2008) refer to as both circuit ties where an edge begins and ends at the same node, and directed ties where communication is not reciprocal.

2.4.1.2 Roles of actors and structure of a social network

In order to thoroughly understand a social network, it is necessary to examine the roles of the actors. The actors are the backbone, the foundational piece of the social network. There are many variables that create the structure. Actors propel information through the social network. The role of the actor in the context of information exchange depends on several factors like the actor's social position in the network, centrality, relationships with other actors, and the importance of social identity.

Within the structure of a social network, the actor can have different roles. For instance, in an ego-centric network, the role of the actor may be central to the flow of information throughout

the entire network. The central actors are where the information stems and flows to other actors. The non-central actors use the central actors as their main avenue to new information. Key players of a network can be identified in different ways. Depending upon the type of information being shared, node centrality, group centrality, or peripheral centrality may be employed. The algorithms applied to the network, which quantifies the actors of a network, simply depends on the perspective wished to be used. The structuring will also vary upon the actors and the information that is being exchanged between that data set within the network. The structure can differ depending upon the environment and will influence how information travels through the social network. It is not only how the information is exchanged but also the type of information that is a crucial variable. For example, Magni, Angst, and Agarwal (2012) investigated behaviors of team network structure and technology use behaviors and found that advice-seeking ties were strongly linked to increased technology usage in the financial services sector. This means that the roles of actors both rely on and are fostered by the type of network environment.

Knowledge sharing and management is an integral part of any organization and social structure. However, knowledge sharing is a difficult task for many organizations to do successfully. Understanding the social structure surrounding the organization is key to gaining information about social groups. The social context dictates the kind of information that is shared in the network. Cruz, Bothorel, and Poulet (2014) aimed at uncovering community detection on a social media application like Twitter to gain knowledge of the online community and social networking methods. Cruz et al. (2014) discovered that members of a community that had interests that were similar but not the same with those from other communities were more likely to bridge the gap between the two communities.

The roles of actors in social networks can influence other actors. Brown, Dennis, Burley, and Arling (2013) analyzed the role of the actor, specifically those involved in a Canadian

working Canadian's workman's compensation board, to find that the size of the individual's social network influenced the value of person-to-person knowledge sharing. As their social network grew, individuals were more likely to bypass the knowledge management system and seek out information from their own social network. The reasons behind why different communities exchange information, paths outstretching one community to another, requires analysis of a multitude of different types of data. Analyzing the participating roles of actors in a social network is one way to understand the exchange.

2.4.1.3 Participating roles

The interactions that occur on a social network begin and end with the actors. A number of different types of interactions can take place between the actors, depending upon the network environment. Borgatti, Everett, and Johnson (2013) noted that information that is exchanged could extend to intangible ideas like beliefs, attitudes, and norms. The relational cognition that is structured into social networks is part of the ties that bind or remove connections that actors have and feel toward one another. For example, on Facebook, actors can 'share', 'comment', 'tag', 'post', and 'like.' The high rate of potential interaction greatly increases the type of participation, "the most typical form of participation consists of posting ideas. However, community users can also refine, improve or criticize a previously posted idea by posting comments associated with this idea" (Martínez-Torres, 2014, p. 437).

These different ways of participation provide an insight into the everyday interactions and values of the actors. Other studies have analyzed the importance of *SNA* to real world scenarios. For example, Batool and Niazi (2014) sought to discover the information flow of a social friendship network of people involved with a karate club. Batool and Niazi (2014) identified key nodes and analyzed patterns on different centrality patterns and determined that high closeness

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centrality nodes and high degree centrality were highly responsible for the information flow of a social friendship network.

The interaction among actors can be different in an online community. There are many definitions of what constitutes an online community. Chau (2010) stated that a participatory culture is defined by five distinct characteristics:

1. Relatively low barriers to artistic expression and civic engagement

2. Strong support for creating and sharing one's projects

3. Informal mentorship

4. A belief that contributions matter

5. A sense of social connection

Together these traits foster an environment that has become an essential part of society and social networks. The values that are central to the actors are also a key point to understanding how the social network connects. A certain amount of trust is also needed for the user to communicate freely online. Trust is often attributed in the same manner as being considered a credible source, as networks are only as strong as the network size and quality.

2.4.2   Social network analysis & Social media

SNA is paramount to the understanding of the actions and reactions of network members. Tichy, Tushman, and Fombrun (1979) recommended that organizations begin to utilize the theoretical framework to help identify patterns and conceptualizations within the organization. In order to aid in the identification of framework patterns, *SNA* was adopted as a process. The importance of *SNA* is of great significance in today's research due to the influx of technology and social media use. With *SNA*, researchers have the capability to learn more about online communities. The structure of the web lends itself to a strong connectivity framework. The capabilities of individuals to connect through sequences of undirected paths have a significant

influence on the reachability of information. Gruzd and Wellman (2014) argued that "social influence has become networked influence…by occurring on social networks and by propagating through online communication networks" (p. 1251). *SNA* was developed to analyze face to face groups; however, it lends itself well to the online world. It is the data gathering process that is the most different; consequently, special care should be taken to learn the roles of the actors within these networks to better understand potential variables.

2.4.2.1 Role of actors in social media

The type of actor has a huge impact on the type of information that is being exchanged. Freeman (1979) discussed the structural centrality of social networks (absolute, relative, and the entirety of the social network) and these established concepts paved the way for the prospect of social media and information continuation. For instance, Facebook and Twitter permit the exchange of ideas as well as information. In addition, the actors involved on Facebook can range from people to institutions, like archives, libraries, museums, and businesses. As a result, institutions may choose to share information on Facebook for promotion and marketing, whereas, a single person may choose to share what they watched on television that night. Information is not limited to a news event; social media allows actors to share a number of different ideas. Haythornthwaite (1996) noted that the information relationships tell what kind of information is being exchanged; the patterns that are created between the actors reveal what kind of information is being exposed to which actors.

The information distribution among actors is a concern of various aspects of *SNA* research. Bechmann and Lomborg (2013) demonstrated that in terms of information found on social media, oftentimes, it is very user-centric and invested heavily in value creation. Given that the values of the actor drive the purpose of social media, the role of the actor is related directly to production and usage of information exchanged in social media environments. The flow of information in a

social network depends on different variables. The actors and the relationships between different actors are one aspect. However, social media adds additional factors that add weight to the actors' influence. Unlike other social settings, social media permits users to add information to the network through different avenues. For example, on Facebook users are also allowed to 'tag' other users when information is shared.

In order to gain more knowledge about what shapes societal relationships, it is necessary to examine the context of what is being shared in the network, rather than just analyzing the relationships and connections.

2.4.3   SNA & LIS

The development of the International Network for Social Network Analysis in 1978 opened the door for different fields like LIS to expand research boundaries in *SNA* (INSNA, 2016). In an analysis of information scientists' use of *SNA*, Otte and Rosseau (2002) found that as early as 1972, pattern analysis was being conducted in relation to information transfers. LIS has since expanded the use of *SNA* as a method and now encompasses different capacities: user studies involving behavior and connections, system development, and visualization. These research areas are also intertwined with an array of subjects that are covered by LIS researchers ranging from sports and health to psychology. The practical side of LIS research is that it is a field that has many practitioners in addition to researchers. The practicality of LIS calls for a need of *SNA* to aid in the understanding of social media.

Behavior and connections have been analyzed in conjunction with social media. Measurements proposed by *SNA* provide a toolset that enables the researcher to explain the variation between the nodes and edges in knowledge and information sharing. The level of analysis that takes place is completely dependent upon the research. Terblanche (2014) gathered data from a sports team and used *SNA* to identify coaching communication patterns to aid in the

selection of good coaching candidates. Other types of information sharing can take place online; this prospect is of importance due to the increase of mutual communication and maintained relationships found in social networking sites like Facebook (Easley & Kleinberg, 2010). Likewise, in the larger scheme of things, information sharing embedded within *SNA,* provides a communication network that describes the cognitive social structure of different networks. Kumbasar, Romney, and Batchelder (1994) found that individuals who see themselves more central within their own personal networks; these networks are often referred to as ego networks.

LIS is concerned with the behavior of information and usability of that information (Borko, 1968). LIS combined with *SNA* elicits research concerning connections amongst the foundation of *SNA*: the nodes and edges. When researched, it is these connections that can yield interesting results, particularly as relationships among nodes may show areas of isolation or dense areas of activity. For example, Hambrick (2012) used *SNA* to explore sport social networks and found that the integration of *SNA* for those involved in the sports industry promote products through Twitter. Hambrick (2012) illuminated the interworking of athletes, teams, and entire leagues through their use of Twitter, and found that users with numerous relationships can serve as information hubs, thus increasing the lasting life of a message posted. Knoke and Yang (2008) also noted that there are significant differences between a "friendship network among office employees . . . and their advice-seeking network" (p.8). These relationship patterns are the social structure of the network. The measurement of the nodes and edges unveils the characteristics of the network.

In addition, in *SNA*, the nodes and edges are how information is posted to a network, which is another critical area of LIS research -the flow of information. Nodes and edges are significant to the understanding of how information is shared on the social network. The information shared throughout the network is based upon the edges that are pre-established.

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However, due to the nature of interactivity within social media applications, more nodes have the possibility to see more information in their network depending upon who shares what information. This prospect is very different compared to the bulletin board concept, where a person would only see information if they happened to pass by that board. Social media applications open the door to more and more people and institutions (nodes) to view new information based upon their network connections or the edges. Communication patterns were much more simplified. Rolland and Parmentier (2013) took the concept of bulletin boards as a concept of communication and applied it to modern day social media, compared both concepts within a *SNA* framework, and explored another avenue of *SNA*. Interestingly, Rolland and Parmentier (2013) discovered that the power found in social media applications was key due to the continuum of communication and additional networks nodes that were established over time.

However, to understand the social network, it is not enough to investigate the nodes and edges; a deeper level of analysis is needed. As nodes and edges are representations of the actors and ties of the social network, it is necessary to discuss the potential roles in the constructs of the information exchange. For instance, Ingwersen (1996) found that to provide the best possible access to information, a multitude of behaviors have to be accounted for within a system. These behaviors can be analyzed using sentiment and regression analysis. Stieglitz and Dang-Xuan (2013) analyzed behavior on Twitter and found that users post emotionally charged tweets, and many of those tweets were often re-tweeted more than less emotionally charged tweets. Thus, emotions and the information diffusion in social media environments deserve more analysis as re-tweeting is a powerful tool for information sharing. In addition, Singh (2013) found that a group of undergraduate students used Facebook groups without hesitation to communicate and share information. The information shared brought in sources from outside social media applications, for instance, links, videos, and blogs. Together this information sheds light on users' behavior on

different social mediums and provides researchers and practitioners with a better understanding of users' needs.

Finally, whole knowledge systems can also be analyzed using *SNA* and the relationships and connections that can emerge can be quite revealing. It is imperative that systems continue to change with users' needs to keep up with demand. Zhang, Zhai, Stevenson and Xia (2016) made recommendations for an improved U.S. Agriculture Department of Economic Research Service portal after measuring the related connection optimization of the system. It was discovered using *SNA* that a large knowledge system, like the World Health Organization (WHO), integrated connections between the semantic and link navigation guidance protocol that needed improvement (Zhang, Zhai, Lui, & Stevenson, 2016). Likewise, Akdag Salah, Manovich, Salah and Chow (2013) analyzed user-generated content that applied to different mediums, i.e. videos, games, images. The concept that Akdag Salah et al. (2013) merged was media visualization as framed with social network analysis. The relationships revealed through social network analysis can shed light on areas that are very subject specific.

LIS and *SNA* research uses a plethora of various methods and explores a variety of different areas. Together, this research provides a foundational point to continue to expand *SNA* research in several different capacities. *SNA* has the potential to unlock a large amount of information; related subject areas like archival science can use this research to begin their own *SNA* work.

2.4.4   SNA & Archives

Archives have a great deal to gain from the incorporation of *SNA*. Palmer (2009) discussed that Archives 2.0 is much more than the adoption of a participatory community, and echoed many others by adding that it was time for an epistemological shift in archival practice. *SNA* is a powerful tool that permits the discovery of the intricacies of social networks, a tool that like in the

field of LIS, aids in the interpretation of online communities. The inclusion of *SNA* would provide more insight into the usage patterns of social media. One distinct feature that social media has fostered is how users choose and identify various groups, subjects, and products online. Information learned from enlisting social network analysis techniques can provide the parameters necessary to discover the connectedness between archival institutions.

There is already a participation in various online communities. In 2015, at the Archival Education Research Institute (AERI), Dr. Ferriter from the Smithsonian Transcription Center discussed the incorporation of social media to push an experimental transcription project, which was met with overwhelmingly positive feedback and results. The Smithsonian project called for users to transcribe materials from the archive. The project was promoted through various social media applications, including Facebook, Twitter, and blogging. Prior to social media, archives communicated like many other professions through Web 1.0 methods and word of mouth networks (WOM). Archival communities are typically smaller in the core group of participants, especially when compared to librarian communities and the attendance differences between the Society of American Archivists (SAA) annual meeting and the American Library Association (ALA) annual meeting, wherein 2014 and 2013 ALA had 14,282 and 26,362 attendees; SAA had 2,579 and 1,668 respectively.

However, like other niche communities, the size of the network does not mean that it should not be studied. The importance of nodes within a network can illustrate so many different characteristics. For instance, Sparrowe, Liden, and Kraimer (2001) wanted to learn more about how individual's network positions within a work group may influence their job performance. The study determined that those individuals who had a central role in working groups had much higher levels of positive job performance. Conversely, if archives can identify what their network position is within their social group through more information regarding connections, they can

increase the number of Facebook friends which can be crucial for increasing the performance of the archive within social media. The identification of interaction patterns within relationships is one way to measure the effectiveness of what the archives are doing on a social network. For instance, effectiveness could mean that archive institutions are interacting online and sharing a user base which then provides the ability to grow one's user base. The effectiveness also helps the researcher identify key players on a social network.

Archivists have implemented social media. What is needed now is more information, meaning statistics and network behavior of archives on Facebook regarding the use and the post-implementation process. The more information that is gained from learning about archivist's daily social media routines, the more quickly the profession can grow and adapt guidelines or principles to aid the process.

2.4.5   SNA studies that combine qualitative work

SNA is considered a quantitative method; however, given the interactivity especially when working with social media, integrating qualitative methods strengthens the research. For example, Zupan and Kaše (2007) examined the social system configurations that were part of a human resources social network and the identified actors that constituted the knowledge network. Combing both quantitative and qualitative methods, Zupan and Kaše measured relationships within the social network that were found to be a part of the knowledge creation. The qualitative aspect of the network is necessary to better understand motivations and behaviors behind actions.

Both qualitative and quantitative methods can identify not only the structural position of the actors but understand better the communication channels of the actors. Wood et al. (2014) employed the use of *SNA* to analyze a farmer knowledge exchange in a farming network. Using both qualitative interviews and the quantitative side of *SNA* measurements, Wood et al. investigated on a deep level the communication practices of farmers. This type of information is

not easily extracted from the *SNA* measurements. *SNA* permits the measurement of the network, and the flow of information can be seen; then once patterns are identified, members of that network can be interviewed. In a related study, Greuling and Kilian (2014) used a mixed-method approach to analyzing the use of blogs and discovered bloggers' need to interact with other bloggers. They were then able to cluster the content analysis findings to calculate the degree of interaction of the bloggers.

Creating a mixed-method approach with *SNA* and social media is a sound way to extract important details about the network. In these details, a significant amount of practical information can be extracted. In order to take the analysis to the next level, content analysis of those interactions should be conducted.

2.4.5.1 Content analysis of information flow in a network

There is a myriad of information gained through the measurements supported by *SNA*, such as, interaction patterns and which actors have the most influence in a network. However, due to the interactive nature of social media, there is even more knowledge gained by understanding the content that is traversing the communication channels in the network. The information shared in a social network can be exchanged in different ways. Without understanding the assessment of behaviors behind the actions or the information shared in the network, the entire picture is left largely unseen. For example, the relationships in *SNA* are the central aspect. As a result, it is important to understand what is linking actors together and to develop a deeper understanding of the relationships fostered in the social network.

One way to explore these relationships on a deeper level is to analyze the content of what is being shared; in other words, what kind of information are actors identifying and interacting. Myneni, Kayo, Cobb, and Cohen (2015) analyzed an online community that worked toward smoking cessation. In addition to the network analysis, Myneni et al. (2015) were particularly

interested in the driving force that kept the group together. This information could only be extracted through the examination of the content of the posts. Similarly, research conducted surrounding learning and interactive environments combined content analysis with *SNA* to discover the learning process among student groups (Shea et al., 2013).

Understanding the flow of information is an important aspect to understanding online communities. *SNA* provides the basic structure of how that information is moving. It is the content analysis, however, that provides information regarding insight into the user's interests or, on a larger scale, the group's interests. Once knowledge is gained about the group's interests, improvements and suggestions can be provided to encourage participation and activity within the group. These two aspects would be highly beneficial for the archival science community.

2.5   Summary

SNA, inferential statistics, and thematic analysis all are crucial for archives to better understand social media. Social media is as important as having a website or phone, as it offers many new ways to communicate and connect in an online setting. Consequently, more study is needed to learn about the hard evidence behind how archives have implemented social media and the cost-benefit analysis of what the free applications have accomplished.

Archives 2.0, online engagement and outreach are all in progress. LIS and marketing research provide some basis for archivists to move forward, but it is crucial for research to be conducted for archivists by archivists. Social media has established a stronghold in society. How archives can foster these applications has yet to be decided. Online communities form around niche areas, and these communities have an identity that is central to their purpose. Archives can embrace their identity to help harness the new generation of archival users. In order to accomplish this goal, *SNA*, inferential statistics, and thematic analysis can be used to analyze archive's use of social media.

Likewise, social media can be studied from a number of different points of view. Quantitative and qualitative research methods provide researchers with a multitude of different avenues to approach analysis. However, researchers need to be cautious when working with social media data, as it can easily be removed from its interactive context, thus losing important aspects of the online community. It is important to have a basic understanding of social media and the behaviors behind it when working with data. The movement of information and information flow of a network illustrate many characteristic behaviors of that community.

The integration of *SNA* is an immensely important factor in moving archival science and social media research forward. Collaboration in an online setting is just as critical, if not more so, as in a traditional sense. One of the best ways to learn how online collaboration is taking place is through the analysis of social networks. Outreach is a critical part of an archive; archivists are already using social media as a tool. The more information gathered regarding use, the more capable the profession will be in the harnessing of social media and moving forward.

CHAPTER III
METHODOLOGY

This chapter provides the detailed methodology of the study. The methods direct the research goals. In the first chapter, the research questions, problems, hypotheses outlined the basic principles of the study. The foundational and significant methods of this study are *SNA*, inferential statistics, and thematic analysis. In addition, the uniqueness of the sample, archives, is a lesser-studied area when quantitative methods are applied. The movement of information within a social network is complicated. Human behavior can be difficult to measure, particularly in an online setting. The ways that people communicate continuously evolve, as technology becomes more sophisticated. People want to share information. Social media is now a significant medium for the sharing of that information. Archives have always been about being able to share information with users and archivists have been using social media for some time, however, the statistics and how information moves through the network remains highly unreported. Consequently, it is necessary to analyze how archives use social media. This chapter discusses the specifications for analyzing one specific group — Wisconsin archives and their use of Facebook. The analysis conducted included *SNA*, inferential statistics and thematic analysis. The application of inferential statistics analyzed the intricacies of the various interactions, thus providing archivists with real numbers. The thematic analysis provided an output of the content that was being discussed — a huge advancement for archivists in knowing what their users are most interested.

3.1   Social network analysis

Social systems consist of networks. Broadly speaking, networks are made of relationships among entities; these entities can be people, archives, businesses, and cultural institutions. Basic network theory states, "an actor's position in a network determines in part the constraints and opportunities that he or she will encounter, and therefore identifying that position is important"

(Borgatti, Everett, & Johnson, 2013, pg. 1). The structural relations and their relation to one another are the central aspects of *SNA*. Understanding an archive's position within the archive Facebook community is critical to learning how interactions between archives and users can be improved and how content is suited to the needs of the community, thus providing archives with the necessary tools for continuing to be a service to the community.

This section addresses the foundational framework of *SNA*, including the definitions and overall structure. The section also discusses measurements conducted in *SNA* to study network characteristics. The measurements used in this study are discussed in detail.

Nodes & Edges

SNA has a focus on social networks; the terms used for the acting bodies within the network are *nodes/actors*. Actors are the entities in the network; nodes are their visual and mathematical representations. For example, a node may be a university archive. The relationship between two or more nodes is a *tie*. There are different types of ties. An archive node may have a collegiate tie with another node that is representative of a university archive. For instance, there are two nodes, Lawrence University Archive (node *A*) and Staubitz Archive (node *B*), which are represented in *Figure 9*. The first line displays the nodes, with the name associated; the second line displays the nodes as represented by a single letter, which is common practice in *SNA*. As both archives are part of a university library, the nodes are represented by the color blue. The size of each node is the same as there are no measurable characteristics in the figure.

One archive institution can have a Facebook account; the people at that archive institution can also have personal accounts. For instance, Carthage College can have a Facebook account, and archivists working at Carthage College can have their own personal accounts. Wisconsin archive institutions and archivists with valid Facebook accounts are actors in the network. All of

the actors are treated as nodes within the network, "nodes can be all kinds of entities – monkeys, firms, countries and so on" (Borgatti, Everett, & Johnson, 2013, p. 30).

Lawrence University Archive   **Staubitz Archive**

A   **B**

Figure 9. Nodes in the Wisconsin Archive Facebook network.

In Facebook, if Lawrence University Archive 'comments' on a post made by Staubitz Archive, there are two nodes, Lawrence University Archive and Staubitz Archive. The 'comment' made serves as the tie that links these two nodes together.

However, that tie must also be represented mathematically in *SNA*. The mathematical and visual representative of a tie, referred to as an *edge*, connects vertices in a graph. An edge between two nodes illustrates a relationship. The edge between Lawrence University Archive (node *A*) and Staubitz Archive (node *B*) is represented in *Figure 10.* Various edges can have different implications for the nodes in the social relation. The illustration of the node and edge representations is conducted in graphs.

A   **B**
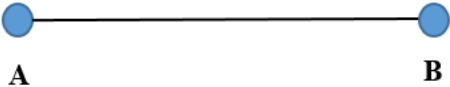
Figure 10. Edges in the Wisconsin Archive Facebook network.

Directed graph

SNA uses graph theory to conceptualize a network, graph meaning, that 'graph' refers to a mathematical object and not any kind of diagram (Harary, 1969). Graphs can be directed or non-directed. Directed graphs indicate different aspects of the relationships within the network. Here

in *Figure 11*, the representation is node *A* and node *B* and the interaction that took place on

Facebook between Lawrence University and Staubitz Archive. As Lawrence University (node *A*)

made a 'comment' to a post made by Staubitz (node *B*), the arrow represents that 'comment' on

Facebook.
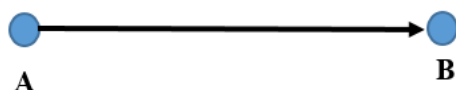
Figure 11. Directed graph for nodes A and B in the Wisconsin Archive Facebook network.

In the directed graph, nodes *A* and *B* are connecting vertices, because the edges between

the nodes are connected by an interaction or some kind of tie. *Figure 11* is a small network, but a

network nevertheless, and the larger the network, the larger the graph. The expression remains the

same. In *Figure 12*, Lawrence University (node *B*) makes a post to Facebook. Staubitz Archive

(node *A*) 'commented' on the post. Also in that post, UW-Madison Archive (node *D*) is 'tagged'.

UW-Madison Archive 'shared' that post with their 'friends', which permits UW-Green Bay

Archive (node C) to see the post. Then UW-Green Bay Archive 'likes' the post made by

Lawrence University (node *B*). The vertices, *V*, for the directed graph in *Figure 12* are {A, B, C,

D} and ordered pairs, edges or *E*, {(A, B), (B, D), (D, C)}.
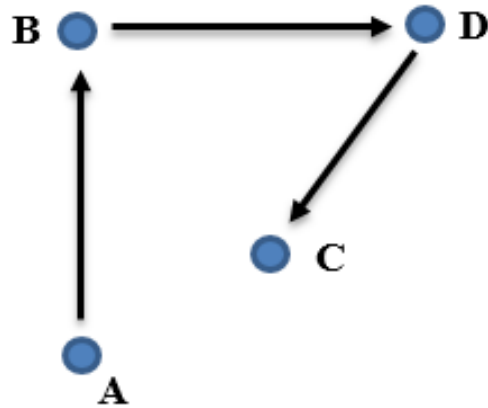
Figure 12. Directed graph of Wisconsin Archive Facebook network.

For each graph, a matrix mathematically represents the graph. The mathematical

representation of *Figure 12* is shown in *Table 2*. Here in the 4x4 adjacency matrix, the interaction

that occurred in the network is labeled with '1'. No interactions are indicated with '0'. *Table 2* is

an adjacency matrix as it represents *who* is adjacent to *whom*. The matrix is also asymmetric as it

represents directed ties, ties that go from a source to a receiver.

	A	B	C	D
A	-	1	0	0
B	0	-	0	1
C	0	0	-	0
D	0	0	1	-

Table 2. Matrix of a directed graph of Wisconsin Archive Facebook network.

Undirected graphs

Figure 13 is an example of an undirected network. Here information is not directed

through any particular order through any node, {A, B, C, D}. The nodes in *Figure 12* are the same

as in *Figure 13*; however, the interpretation is different. Instead of node *A* indicating the start of

the information exchange, *Figure 13* shows that nodes {A, B, C, D} are connected, the path that

the direction information was exchanged is unknown. The undirected graph matrix is represented

in *Table 3*.
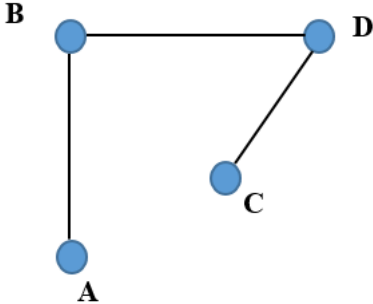
Figure 13. Undirected graph of Wisconsin Archive Facebook network.

	A	B	C	D
A	-	1	0	0
B	1	-	0	1
C	0	0	-	1
D	0	1	1	-

Table 3. Matrix of undirected graph of Wisconsin Archive Facebook network.

In *Table 3*, the matrix is 4x4 and represents the un-direct Wisconsin archive Facebook

network. The recipient and sender are unknown in *Table 3*.

Measurements & Degree centrality

The main aspect of graph theory is the ability to discover the prominent actors in the social

network. There are three main centrality measures *degree centrality*, *closeness*, and *betweenness*

(Freeman, 1979). All three of these measures are used in this study. Networks can be analyzed in

a number of ways, both visually and mathematically. Using a matrix, the social network data can

measure centrality: degree, betweenness, and closeness.

Centrality measures the vertices (nodes) in a graph, it is "a property of a node's position in a network" (Borgatti, Everett, & Johnson, 2013, p. 164). Using centrality measurements, the most influential nodes in the network can be identified. The distance between two nodes is the length of a *path*. The more central a node is the more influence that node has on the network. A central node can influence others in the network through the sharing of information.

In social media, information and relations are made and directed in different ways, and these pathways can be and measured in order to learn more about the studied network. Centrality uncovers the overall flow of information through the network; the most central actors are able to be observed. Statistical methods like ANOVA tests are commonly used to measure the centrality between different variables in the network. For instance, using an ANOVA test to calculate the centrality in the Wisconsin archive Facebook network uncovers which group of actors (people, businesses, cultural institutions, archives) are the most central in the network.

Degree centrality

Figure 14 is an example of the multidirectional pathways that information can travel in social media.
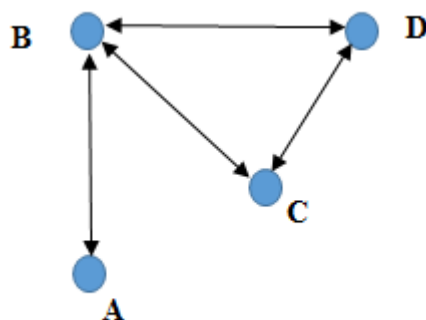
Figure 14. New directed graph of Wisconsin Archive Facebook network.

Each node has a degree, which is the number of other nodes it shares with an edge in the network. The *degree centrality* is the total number of connected ties. There is an in_degree

measure and an out_degree measure; in_degree is the number of ties directed to the node and

out_degree is the number of ties directed to other nodes. Degree centrality is also dependent on

the size of the network, meaning that the "larger the network, the higher the maximum possible

degree centrality value…either an actor is well connected within a small network, or that it is only

connected to just a few others within a large network" (Knoke & Yang, 2008 p. 63). For example,

in *Figure 14*, Staubitz Archive (node *B*) has an *out_degree* measure of 3 and an *in_degree*

measure of 3, the other nodes in_ and out_ degrees are illustrated in *Table 4*. Note that the

measurements in *Table 4* have the same in_ and out_degree measurements; this is because the

example is of reciprocated ties. The *in_ and out_degree* measures do provide a general sense of

how information is moving through the network.

	A	B	C	D
In_degree	1	3	2	2
Out_degree	1	3	2	2

Table 4. In_Out_ degree centrality measurements for the archive network

Closeness centrality

    Closeness centrality measures how near nodes are to one another. Closeness and distance

illustrate how actors in a network interact, specifically, "how quickly an actor can interact with

others" (Knoke & Yang, 2008, p. 65). Closeness determines the communication channels if there

is an intermediary between the two actors. Scott (1991) defined closeness as:

> A matrix of distances between two points in an undirected path is calculated,
> the sum distance of a point is its column or row sum in this matrix (the two values
> are the same). A point with a low sum distance is 'close' to a large number of other points,
> and so closeness can be seen as the reciprocal of the sum distance (Scott, 1991, p. 86).

    Closeness cannot measure isolated nodes; all nodes must be connected as the measurement

is derived from the paths between the nodes. In *Figure 14*, to calculate the closeness centrality for

node *A,* the sum distance of *A* is calculated by adding the following path lengths (AB), (AD),

(AC) = 1 + 2 + 2 = 5. Therefore, its closeness, the reciprocal of the sum distance, is equal to 1/5 or

0.2. The calculations for the rest of the network are illustrated in *Table 5*.

	Distance sum	**Calculated path sum**	**Closeness**
A	AB + AD + AC	1 + 2 + 2 = 5	0.2
B	BA + BD + BC	1 + 1 + 1 = 3	0.33
C	CA + CB + CD	2 + 1 + 1 = 4	0.25
D	DA + DB + DC	2 + 1 + 1 = 4	0.25

Table 5. Closeness degree measurements

Table 5 illustrates that node *B* has the highest closeness value in the network, meaning that

node B has the least amount of effort to interact with other nodes. Node *B* can quickly interact

with many nodes in the network, whereas node *A* (the closeness value is equal to 0.2, which is the

smallest) is the least connected to other nodes as it must go through node *B* to reach *D* or *C*.

Betweenness

In order to learn more about these nodes and the potential of their relationships, the

betweenness measure is important. Betweenness measures the "extent to which other actors lie on

the geodesic path (shortest distance) between pairs of actors in the network. Betweenness

centrality is an important indicator of control over information exchange or resource flows within

the network" (Knoke & Yang, 2008, p. 67). Therefore, betweenness is an indicator of who is in

control of the information flow within a network. Understanding the flow of information is

extremely important; once this knowledge is known, one then has the potential to change the

relationship within the network and maybe become more influential.

Then referring to *Figure 14*, actor *A* has to go through actor *B* to communicate with actor

C or actor *D*. As a result, actor *B* has the responsibility and control of the transmitting of messages

between actors *A*, and *C* (*D*), making actor *B* a pivotal point in the network. The actor that lies on the geodesic path between numerous pairs increases that actor's chance of controlling network interaction (Knoke & Yang, 2008). Betweenness of node X is defined as the sum of the ratios of the number of paths between the other two nodes that contain node X to the number of all the paths between the two other nodes in the network.

In order to determine the betweenness for *Figure 14,* the following calculations occur. Betweenness for *B* is measured by including the following paths: (A, C), (A, D), and (D, C). These paths (A, C) and (A, D) contain node *B,* meaning the number of each of these paths containing node B is 1. The path (C, D) does not contain node *B,* meaning the number of this path containing node B is 0. Then they are divided by the number of all the paths that connect them respectively, which is 1. Finally, the betweenness of B is equal to $\frac{1}{1} + \frac{1}{1} + \frac{0}{1} = 2$. The rest of the betweenness measures for the network illustrated in *Figure 14* are in *Table 6*. In Table 6, the betweenness value of B is the largest. It implies that it is the most influential in terms of betweenness.

	Paths containing measured node	Fraction	Betweenness Measure
A	(B, C), (B, D), (C, D)	$\frac{0}{1} + \frac{0}{1} + \frac{0}{1} = 0/1$	0
B	(A, C), (A, D), (D, C)	$\frac{1}{1} + \frac{1}{1} + \frac{0}{1} = 2/1$	2
C	(A, B), (B, D), (A, D)	$\frac{0}{1} + \frac{0}{1} + \frac{0}{1} = 0/1$	0
D	(A, B), (A, C), (C, B)	$\frac{0}{1} + \frac{0}{1} + \frac{0}{1} = 0/1$	0

Table 6. Betweenness measurement of network displayed in Figure 14.

Measurement summary

In Facebook actor interactions are different. Degree centrality and closeness centrality are measured by the strength of connections of a node within the network. Whereas, betweenness

centrality, indicates the ability of one node's linking ability to other nodes within the network. In order to assess this information in the Wisconsin archive Facebook network, the interactions used in the application (i.e. 'like', 'comment', 'tag, and 'share') are used to provide value to these interactions.

3.2   Facebook & Networks

Facebook is a social media application that permits individuals and institutions to connect, interact and share information. Relationships can be created, fostered and maintained on Facebook using many different interaction tools — 'like,' 'comment,' 'share' and 'tag' — thus creating an environment where communication can take place.

As an online social network, Facebook has mechanisms by which interaction can occur and consequently be measured. Unlike face-to-face communities, online networks leave observable data traces of interactions, meaning that these relationships can be identified and measured using quantitative measures known as social media analytics.

Facebook permits connecting and communicating among entities. An unknown "magic number" discussed in social media is a point when a post in social media can be seen by a significant number of people. This is the 'reach' of the post, meaning how many people were able to see one's post. When institutions and individuals reach this 'magic number' a completely new door of interaction opportunities open. In businesses, marketing departments devote whole teams of researchers to analyze posts to better understand the 'reach' of the company on social media. Statistically, once the number is achieved, the greater the likelihood that posts to social media will be considered 'successful', successful being interpreted in several different ways depending on the institution or person. The closer that the archive community can come to finding this number, the greater reach they can have for outreach program development, and better overall service for

their community. The measurement of centrality ensures the discovery of how information is moving through the network as it measures each actor's position in the network.

Archives have little resources to allocate staff time and resources to social media analytics. In addition, few archivists conduct quantitative research. If measures are not taken now to begin the process of learning how archive social networks function, as social media continues to be used, it presents an even larger problem for the archive field. *SNA* is the most logical theory to apply when analyzing social networks, as it takes the existing social network, breaks it down, and mathematically rebuilds it into a matrix for analysis.

3.3   Thematic analysis & Archives

There are opportunities made available to archivists when there is an initiative to incorporate mass communication materials into the archive's holdings because archivists need to actively preserve materials for future and present patrons. Thematic analysis is an efficient method to use when the research is exploratory. For instance, Klein, Eisenstein, and Sun (2015) used thematic analysis to understand the process of sense-making when using digital archive collections, specifically how humanities research occurred. Using an exploratory tool like thematic analysis, both design and process suggestions were uncovered. Rendón and Nicolas (2012) used thematic analysis to learn how media shaped attitudes and behaviors toward Haitian women; coding photographs in the photo archive allowed attitude-shaping behaviors to be uncovered.

Archival content is unique and by analyzing its use on social media, a plethora of information can be extracted. Social media comes with its own opportunities for people to connect given the content's archival nature; the context of these social media posts when analyzed offers an important window into the usage for practitioners and researchers. For instance, Humphreys, Gill, Krishnmurthy, and Newbury (2013) created a content analysis schema based on historical

literature in 18th and 19th-century diaries to understand the most popular commenting and narratives types on Twitter. The content analysis provided a rich understanding of the social communicative practices that occur on Twitter. Another example is from Humphreys, Gill, and Krishnmurthyhu (2014), who conducted a content analysis to understand the use of Twitter as a communication method. Humphreys et al (2013). drew on the historical aspect of diary use to compare Twitter, and asserted that the traditional use of diaries within our culture was to share snippets of one's life; however, the medium of the diary is not typically shared.

The introduction of technology into society has dramatically changed the way people track their daily lives and the increased sharing of personal details of one's life given a certain medium. The communication channels are vibrantly different from 20 years ago. Information is shared at a much more rapid pace. Social media has the toolset to share all kinds of information, oftentimes personal information.

The thematic analysis provides a sound way to evaluate the context of social media. Together these studies demonstrate the importance of adding a qualitative component to social media research. However, there is the undeniable importance of the quantitative element of social media research. Thus, a combination of *SNA* and thematic analysis provides two pieces of a multilayered and complex area of social media for researchers to analyze.

3.4   Data sampling

The investigative scope of this study is to evaluate Facebook archive communities in the state of Wisconsin. The first criterion for selection was that the archive had to be located in Wisconsin. The second criterion was that the archive had to have a professional archivist on staff. The third criterion was that the archive had to have an active Facebook account for at least six months, from January 2014 to June 2014; this is indicated in the profile of each archive's Facebook page. The final criterion was that the archive needed to have its own Facebook page,

meaning that if the archive is part of a parent institution the archive would not share a page with the parent institution. For instance, the Golda Meir Archive is part of the larger entity of the Gold Meir Library at the University of Wisconsin-Milwaukee. In order for the Golda Meir Archive to qualify for the study, the archive needed to have a devoted Facebook page and not share posts via the Golda Meir Library Facebook page. Archives that met these criteria were the foundation of the Wisconsin archive Facebook community (WAFC). These archives were University of Wisconsin – Green Bay Archive and Area Research Center, Lawrence University Archive, University of Wisconsin – Parkside Archive and Area Research Center, University of Wisconsin – River Falls Archive and Area Research Center, University of Wisconsin – Stout Archive and Area Research Center, Staubitz Archive, and the Ward Irish Music Archive.

Networks may be classified as homogeneous and heterogeneous networks. For the heterogeneous networks, they are treated differently based on the nature of nodes and relations of the networks (Cai, Shao, He, Yan, & Han, 2005; Yan, Ding, & Sugimoto, 2011). The main relation of the WAFC is the interest and interaction with and about Wisconsin archives. This study recognized that the actors have some characteristics that make them unique. For instance, in the WAFC actors can be archive institutions, businesses, and individual people. Knoke and Yang (2008) state that "actors maybe individual natural persons or collectivities such as informal groups and formal organizations" (p. 6). The people can have a variety of identifiers, such as archivist, librarian, retired, student, teacher, etc. This study identified these characteristics for all actors in the WAFC; Knoke and Yang (2008) addressed that, "sometimes network actors encompass mixed types, such as an organizational field comprising of the suppliers, producers, customers, and governmental regulators of health care" (p. 7).

The justification for using the Wisconsin archives that use Facebook is threefold. First, no research has previously been conducted that involves both SNA and archives. It is critical that the

sample included a diverse type of nodes. For instance, archives are part of a larger network. Consequently, businesses, cultural institutions, and universities are also part of the larger network and were extracted as nodes for the network analysis. Secondly, isolating the population of the study to a geographic area like Wisconsin ensured that all qualified archives could be extracted for study. Finally, there is no official list of archives that use social media. Therefore, extracting qualified and diverse archives is time consuming; by isolating archives to a single state, it ensured that time and effort could be taken to account for a sound sample. This study acts as a foundational point for further network studies to be conducted within and for archival science.

3.4   Data collection

Membership of the WAFC included actors who participated with a Wisconsin archive through one of Facebook's online interactions i.e. 'like', 'comment', 'tag', and/or 'share'. The WAFC is not an official community group. Facebook allows users to form special interest groups. For archivists, there is no central or universal group. There are entities like the Society of American Archivists and the United States National Archive that has a high number of followers, however, the inclusion and analysis of archives at the national level was outside the scope of this study.

The searching process was intensive to locate as many archive institutions as possible in Wisconsin. The process included the identification of local archive institutions through local groups identified by the Society of American Archivists, local archive groups like the Southeast Wisconsin Archives Group (SWAG), museum and historical society local chapters (who have a dedicated archive with a professional archivist on staff were also to be included), and the harvesting/searching for archive institutions on Facebook. This process was the foundation for establishing and defining the WAFC.

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The process was done in three rounds to ensure that the sampled WAFC was complete. The identification of seed nodes began with Wisconsin archive institutions that meet the four criteria: having an active account, having a professional archivist on staff, having a self-managed account, and being a Wisconsin archive. The Wisconsin archive institutions are the base of the community; consequently, identifying archives that met the criteria were the seed nodes for *Round 1*. The criteria are the defining factors of the Wisconsin archives, which are the foundation of the community development. Data was captured using NVivo's web extension tool, NCapture (NVivo, 2017). From that point, the Wisconsin archives' posts served as the bridge to its Facebook community. The posts created by the Wisconsin archives were examined in order to determine potential actors in the Facebook community.

Then *Round 2* consisted of examining those interactions gathered from *Round 1*, and ensuring the integrity of data set development. From the Facebook posts, actors who interacted with the archive institutions either in the form of 'liking,' 'commenting,' 'tagging', or 'sharing' information were extracted from the original posts made by Wisconsin archives, and other posts made by participants in the community.

For example, a local business was 'tagged' in a post made by a Wisconsin archive. The business that was 'tagged' may or may not be a member of the WAFC, despite being 'tagged.' However, if that business interacts with the archive by 'liking' or 'sharing' that post in which they were 'tagged', then the business becomes a part of the WAFC. Each time that an interaction ('like', 'comment', 'tag', or 'share') occurred, the interaction was examined in order to validate the person or institution as a member of the WAFC. *Figure 15* is an illustration of the development of seed nodes, which includes the expansion and coverage of the three rounds.

Due to the complexities involved with social media interaction, a third round was necessary to ensure the integrity of the data collection process. Similar to *Round 2*, *Round 3*

continued adding and verifying individuals to the WAFC. *Round 3* was another opportunity for including more valid actors or players in the community. After the third round, more qualified nodes were included.
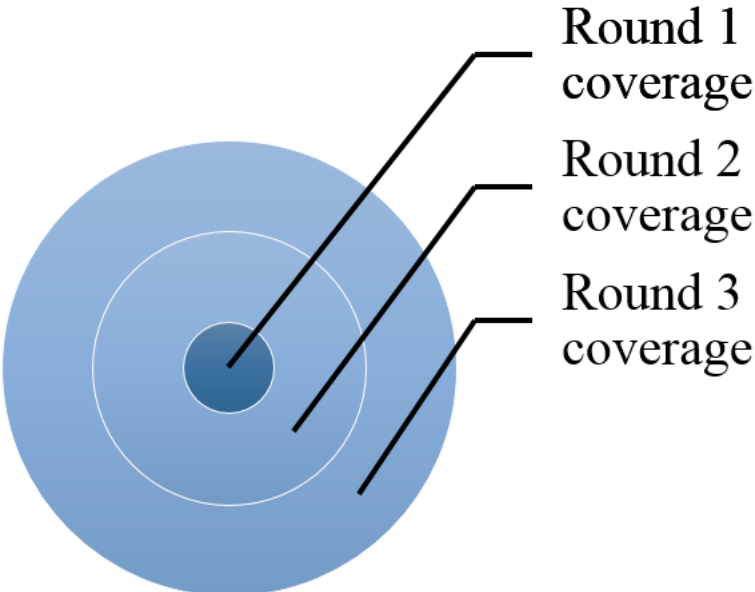
Figure 15. Visual display of the WAFC final population.

In each round, new potential nodes were added; these nodes were institutions such as archives, museums, historical societies, and businesses. There was also a wide variety of individuals, such as archivists, museum curators, librarians, teachers, business owners, and journalists.

Following the addition of new actors, a validation process occurred. This is because not every one of the actors identified is a valid actor of the WAFC. Only actors that are true participants of the WAFC were included. Occasionally, there were fringe actors that participated in the WAFC but are not true members of the community. For instance, a valid member of the WAFC makes a post on Facebook about the Staubitz Archive and 'tags' a family member. That family member may participate in that one singular post but did not become a full-fledged member of the WAFC. Therefore, that participant may be included in a round, and then was

excluded once the verification process occurred. This was a way to ensure the validity of the WAFC in each round.

3.3.1 Internal and External Validity

In order to ensure internal validity, several rounds of filtering were conducted. This ensured the completeness and data integrity as errors from *SNA* can occur from the omission of nodes and edges often lost in the data collection and inclusion of false nodes or ties. Nodes and ties are the building blocks of *SNA* research. For example, the matrices' development took place in three separate rounds. Each round included the identification of meaningful actors through gathering all the Facebook interactions ('likes', 'tags', 'shares', and 'comments') and placed the interactions in matrices that were tables created in Microsoft Excel. Each round also included the verifying and matching of the columns and rows in each table. The matrices were alphabetized; each row and column was checked to ensure that at least one institution or person was noted. The three separate rounds of matrix development reduced the likelihood that there was missing data, and that no nodes or ties were falsely added to the network. The specification of the interactions involved allowed parameters to be established and thus reduced misrepresentation of the data.

The external validity of the archival community's use of Facebook can be applied to many different types of social media. For example, Twitter is also a popular social media application amongst archivists. However, instead of using 'likes,' 'shares,' 'comments,' and 'tagging,' a study focusing on the use of Twitter would use 'tweets,' 'retweets,' 'mentions,' 'tagging,' and 'hashtags.' It is not just the archival community that the methods of this research can be applied. Any other type of community could use the matrix development here to gather and evaluate the interactions on social media applications to learn more about their group.

The procedures described provide a foundational point for other cultural institutions to build proper social media analysis. The study also offers practitioners an insight into how archival

users of social media applications are interacting, thus enabling archivists and other information professionals a way to re-evaluate social media tools.

3.4   Matrix definitions

The clear definition of the WAFC permitted the next step, which was defining relationships among the community members. These relationships have five levels: 'like,' 'tag,' 'comment,' 'share,' and integrated relationships. The relationships were addressed separately and defined in multiple adjacent matrices to permit *SNA*. When all data in the defined domain was collected, the data was processed and multiple matrices were generated. These relationships are vital for *SNA*. The relationships also lay the foundation for inferential statistics.

3.4.1. Tag matrix

The 'tag' function in Facebook permits users the ability to 'tag' a friend in a 'comment,' 'share,' or post, which could be text, hyperlink, video, or photograph. *Table 7* displays the matrix representation of 'tag' usage in the WAFC. This matrix is an expression of how the archives tagged themselves and one another in Facebook. *Table 7* is the tag matrix. In *Table 7*, TA_i is an actor who 'tags' fellow community members. The 'tag' function permits users with the ability to 'tag' themselves.

	TA_1	TA_2		TA_i		TA_n
TA_1	TAC_{11}					
TA_2		TAC_{22}				
			...			
TA_j				TAC_{ji}		
TA_n						TAC_{nn}

Table 7. Tag Matrix

The archives (actors) in the rows are all the initiators and senders of the 'tags.' The archives (actors) in the columns are the same as the rows. Thus, the entry $TAC_{ji} = 1$ indicates that actor i 'tagged' actor j one time, whereas $TAC_{ji} = 0$ means there is no relation or 'tagging.' Here n is the number of all nodes/actors who use a 'tag' on WAFC, and TAC_{ji} is a cell in the matrix and refers to the number of 'tags' that actor i creates and 'tags' actor j or $1 \leq i, j \leq n$. In other words, the matrix records not only who 'tags' whom but also the frequency of the 'tags.' The frequency indicates the connection strength between actor i and actor j.

Table 8 is an example of WAFC. There are seven actors in the community: UW-Green Bay Archive, Lawrence University Archive, UW-Madison Archive, UW-Parkside Archive, UW-River Falls Archive, Staubitz Archive, and Ward Irish Music Archive. In Table 8's example, UW-Green Bay Archive 'tagged' Lawrence University Archive six times in different Facebook posts. However, Lawrence University Archive 'tagged' UW-Green Bay Archive only two times. Because the relationships are not always reciprocal, the matrix is asymmetric. Here each value in a cell measures the relationship between two archives. Table 8 illustrates the 'tagging' relationship on WAFC.

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	UW-Green Bay Archive	Lawrence University Archive	UW-Madison Archive	UW-Parkside Archive	UW-River Falls Archive	Staubitz Archive	Ward Irish Music Archive
UW-Green Bay Archive	1	6	1	0	0	0	0
Lawrence University Archive	2	0	0	4	0	0	1
UW-Madison Archive	1	0	1	2	1	2	3
UW-Parkside Archive	0	3	2	0	0	4	5
UW-River Falls Archive	7	0	1	0	3	1	2
Staubitz Archive	1	0	2	4	1	3	8
Ward Irish Music Archive	0	1	3	5	2	8	4

Table 8. WAFC Tag Matrix Example

3.4.2 Share matrix

The 'share' function in Facebook permits users the ability to 'share' a friend in a 'comment,' 'share,' or post, which could be text, hyperlink, video, or photograph. *Table 9* displays the matrix representation of 'share' usage on WAFC. The example and setup are the same formats as 'share.' This matrix is an expression of how the archives share information with one another on Facebook. The 'share' function also permits users the ability to 'share' a post that they have themselves posted. In *Table 9*, SA_i is an actor who 'shares' information with fellow community members. The 'share' function permits users with the ability to 'share' a post that was originally posted by them.

	SA_1	SA_2		SA_i		SA_n
SA_1	SAC_{11}					
SA_2		SAC_{22}				
SA_j				SAC_{ji}		
SA_n						SAC_{nn}

Table 9. Share Matrix

The archives (actors) in the rows are all the initiators and senders of the 'shares.' The archives (actors) in the columns are the same as the rows. Thus, the entry $SAC_{ji} = 1$ indicates that actor i 'shared' an item from actor j one time, whereas $SAC_{ji} = 0$ means no relation or 'sharing' occurred. Here n is the number of all nodes/actors who use 'share' on WAFC and SAC_{ji} is a cell in the matrix that refers to the number of 'shares' that actor i 'shares' with or about actor j or $1 \leq i, j \leq n$. In other words, the matrix records not only who 'shares' with whom, but also the frequency of the 'shares.' The frequency indicates the connection strength between actor i and actor j.

Table 10 is an example of WAFC 'sharing.' The actors used in the example are the same as in the 'tag' table. In *Table 10*'s example, UW-Green Bay Archive 'shared' a post from the Lawrence University Archive five times. However, Lawrence University Archive 'shared' UW-Green Bay Archive only once. Because the relationships are not always reciprocal, the matrix is asymmetric. Here each value in a cell measures the relationship between two archives. *Table 10* illustrates the 'sharing' relationship on WAFC.

	UW-Green Bay Archive	Lawrence University Archive	UW-Madison Archive	UW-Parkside Archive	UW-River Falls Archive	Staubitz Archive	Ward Irish Music Archive
UW-Green Bay Archive	0	5	2	2	1	3	0
Lawrence University Archive	1	0	1	4	0	0	2
UW-Madison Archive	2	1	0	2	2	2	4
UW-Parkside Archive	0	2	1	0	0	4	1
UW-River Falls Archive	3	0	0	0	0	1	3
Staubitz Archive	1	0	1	4	0	0	7
Ward Irish Music Archive	0	0	4	5	2	8	0

Table 10. WAFC Share Matrix

3.4.3 Comment matrix

The 'comment' function in Facebook permits users the ability to 'comment' on a 'comment,' 'share,' or post, which could be text, hyperlink, video, or photograph. *Table 11* displays the matrix representation of 'comment' usage in the Wisconsin archive Facebook community. The example and setup are the same formats as 'comment.' This matrix is an expression of how the archives 'comment' on Facebook. Similar to the 'tag' and 'share' function, the 'comment' function permits users the ability to 'comment' on a post or another 'comment' that they have themselves posted or previously 'commented.' In *Table 11*, CA_i is an actor who

'comments' on a post. The 'comment' function permits users with the ability to 'comment' on a post that was originally posted by them.

	CA_1	CA_2		CA_i		CA_n
CA_1	CAC_{11}					
CA_2		CAC_{22}				
			...			
CA_j				CAC_{ji}		
CA_n						CAC_{nn}

Table 11. Comment Matrix

The archives (actors) in the rows are all the initiators and senders of the 'comments.' The archives (actors) in the columns are the same as the rows. Thus, the entry $CAC_{ji} = 1$ indicates that actor i 'commented' to actor j one time, whereas $CAC_{ji} = 0$ means there is no relation or 'commenting' occurred. Here n is the number of all nodes/actors who use 'commenting' on WAFC, and CAC_{ji} is a cell in the matrix and it refers to the number of 'comments' that actor i made to actor j or $1 \leq i, j \leq n$. In other words, the matrix records not only who 'comments' to whom but also the frequency of the 'comments.' The frequency indicates the connection strength between actor i and actor j.

Table 12 is an example of WAFC 'commenting.' The actors used in the example are the same as in the 'tag' and 'share' tables. In *Table 12*'s example, UW-Green Bay Archive 'commented' on a post or 'comment' from the Lawrence University Archive seven times. Lawrence University Archive 'commented' to UW-Green Bay Archive ten times. Because the relationships are not always reciprocal, the matrix is asymmetric. Here each value in a cell measures the relationship between two archives. *Table 12* illustrates the 'commenting' relationship on WAFC.

	UW-Green Bay Archive	Lawrence University Archive	UW-Madison Archive	UW-Parkside Archive	UW-River Falls Archive	Staubitz Archive	Ward Irish Music Archive
UW-Green Bay Archive	1	7	2	3	1	4	1
Lawrence University Archive	10	3	1	5	0	0	2
UW-Madison Archive	2	1	0	10	0	1	4
UW-Parkside Archive	0	2	1	1	0	4	1
UW-River Falls Archive	3	13	0	0	6	1	9
Staubitz Archive	1	0	1	4	0	2	6
Ward Irish Music Archive	1	1	0	3	2	7	0

Table 12. WAFC Comment Matrix Example

3.4.4   Like matrix

The 'like' function in Facebook permits users the ability to 'like' a 'comment,' 'share,' or post, which could be text, hyperlink, video, or photograph. *Table 13* displays the matrix representation of 'like' usage in the Wisconsin archive Facebook community. The example and setup are the same formats as 'like.' This matrix is an expression of how the archives 'liked' themselves and one another in Facebook. Like the 'tag,' 'share,' and 'comment' function, the 'like' function permits users the ability to 'like' a post or 'comment' that they have themselves posted. In *Table 13*, LA_i is an actor who 'liked' a 'comment' or a post. The 'like' function permits users with the ability to 'like' a post that was originally posted by them.

	LA_1	LA_2		LA_i		LA_n
LA_1	LAC_{11}					
LA_2		LAC_{22}				
			...			
LA_j				LAC_{ji}		
LA_n						LAC_{nn}

Table 13. Like Matrix

The archives (actors) in the rows are all the initiators and senders of the 'likes.' The archives (actors) in the columns are the same as the rows. Thus, the entry $LAC_{ji} = 1$ indicates that actor i 'liked' actor j one time, whereas $LAC_{ji} = 0$ means there is no relation or 'liking' that occurred. Here n is the number of all nodes/actors who use 'like' on WAFC and LAC_{ji} is a cell in the matrix and refers to the number of 'likes' that actor i made to actor j or $1 \leq i, j \leq n$. In other words, the matrix records not only who 'likes' whom but also the frequency of the 'likes.' The frequency indicates the connection strength between actor i and actor j.

Table 14 is an example of WAFC 'liking.' The actors used in the example are the same as in the 'tag,' 'share,' and 'comment' tables. In Table 14's example, UW-Green Bay Archive 'likes' a post or 'comment' from the Lawrence University Archive seventeen times. Lawrence University Archive 'liked' UW-Green Bay Archive twenty times. Because the relationships are not always reciprocal, the matrix is asymmetric. Here each value in a cell measures the relationship between two archives. Table 14 illustrates the 'like' relationship on WAFC.

	UW-Green Bay Archive	Lawrence University Archive	UW-Madison Archive	UW-Parkside Archive	UW-River Falls Archive	Staubitz Archive	Ward Irish Music Archive
UW-Green Bay Archive	11	17	2	13	1	15	9
Lawrence University Archive	20	3	1	4	2	2	12
UW-Madison Archive	25	1	0	30	4	1	14
UW-Parkside Archive	7	12	16	1	2	4	25
UW-River Falls Archive	3	13	10	3	6	1	5
Staubitz Archive	1	0	1	46	9	2	6
Ward Irish Music Archive	6	1	2	13	2	7	1

Table 14. WAFC Like Matrix

3.4.5   Mega Matrix

The *Mega Matrix* was inclusive of all the actors and all interactions in the four matrices. The *Mega Matrix* is asymmetric. Each of the four original matrices — 'like,' 'comment,' 'tag,' and 'share' — corresponds to a set of actors and their interactions which are described in the *Mega Matrix*, therefore the *Mega Matrix* format is inclusive of all actors and interactions.

To understand the interactions, weighting was used. Yan, Ding, and Sugimoto (2010) demonstrated how relationships were weighted based on their prestige in a journal network. In

this study, instead of weighting being connected to a prestige relation, it is used to measure the

interactions ('like', 'tag', 'share', 'comment'). It is important to weight the interactions in this

study as the medium is Facebook.

In order to assess this information in the Wisconsin archive Facebook network, the

interactions used in the application, i.e., 'like,' 'comment,' 'tag,' and 'share' are used to provide

values to these interactions. Weights were assigned to each interaction to maintain the value of the

social implication. The weights assigned ranged from 1 to 3; the higher the weight, the more

interactive the means of communication. For instance, 'commenting' is a major way for

community members to interact on Facebook, 'commenting' also requires the most effort; as a

result, the weight assigned is 3. Then 'sharing' and 'tagging,' both of which provide community

members with a way to communicate, require some effort. But neither interaction is as interactive

as 'commenting,' consequently, the weight assigned is 2. Finally, while 'like' is the least

interactive way to communicate on Facebook, it also requires the least amount of effort. As a

result, the weight assigned is 1. *Equation 1* demonstrates the integrated weight formula for the

Mega Matrix.

Assigning weights to these interactions and overlaying this information to the matrix

provides a sound way to assess the strong and weak ties in the network, providing a framework to

the workflow of the information. By providing a weight to a cell of the matrix, the relationships

between the players were also analyzed. The matrix development based on the accumulation of

information, was done to capture the interactions that took place on Facebook.

$$MMAC_{ji} = 3 \times CAC_{ji} + 2 \times TAC_{ji} + 2 \times SAC_{ji} + 1 \times LAC_{ji}$$

Equation 1. Integrated weight formula for the Mega Matrix

The archives (actors) in the rows are all the initiators and senders of all of the interactions,

'like,' 'comment,' 'share,' and 'tag.' The archives (actors) in the columns are the same as the

rows. Thus, the entry $MMAC_{ji} > 0$ indicates that actor i 'liked,' 'commented,' 'shared,' and/or 'tagged' actor j more than one time, whereas $MMAC_{ji} = 0$ means there is no relation or any interaction that occurred. Here n is the number of all nodes/actors who use 'liking,' 'commenting,' 'sharing,' and/or 'tagging' interactions on WAFC. In *Table 15*, $MMAC_{ji}$ is a cell in the matrix and it refers to the strengths of 'likes,' 'comments,' 'shares,' and/or 'tags' that actor i made to actor j or $1 \leq i, j \leq n$. The $MMAC_{ji}$ indicates the connection strength between actor i and actor j.

	MMA_1	MMA_2		MMA_i		MMA_m
MMA_1	$MMAC_{11}$					
MMA_2		$MMAC_{22}$				
			...			
MMA_j				$MMAC_{ji}$		
MMA_n						$MMAC_{nn}$

Table 15. Mega Matrix

Table 16 is an example of the WAFC *Mega Matrix*. The actors used in the example are the same as in the 'tag,' 'share,' 'comment,' and 'like' tables. Because the relationships are not always reciprocal, the matrix is asymmetric, meaning that each cell value comes from the combination of the interactions ('tag,' 'share,' 'comment,' and 'like').

Table 16 illustrates the combinations of interactions of the WAFC. The values for cell UW-Green Bay Archive and Lawrence University Archive for 'tag' is 6, 'share' is 5, 'comment' is 7, and 'like' is 17. Then each one of those values is multiplied by the corresponding weight, 'tag' then equals 2 times 6 for 12; 'share' equals 2 times 5 for 10; 'comment' then equals 7 times 3 for 21; and 'like' then equals17 times 1 for 17, for a total of 60. *Equation 2* illustrates the value of the cell. The *Mega Matrix* took the values from each the combination of the interactions ('tag',

'share', 'comment', and 'like') and then assigned a weight. The weight calculations for other cells are similar.

$$MMAC_{12} = 3 \times 7 + 2 \times 6 + 2 \times 5 + 1 \times 17 = \quad 60$$

Equation 2. Illustration of cell value in Mega Matrix

	UW-Green Bay Archive	Lawrence University Archive	UW-Madison Archive	UW-Parkside Archive	UW-River Falls Archive	Staubitz Archive	Ward Irish Music Archive
UW-Green Bay Archive	16	60	14	26	6	33	12
Lawrence University Archive	56	12	6	35	2	2	24
UW-Madison Archive	37	6	2	68	10	12	40
UW-Parkside Archive	7	28	25	4	2	32	40
UW-River Falls Archive	32	52	12	3	30	8	42
Staubitz Archive	8	0	10	74	11	14	54
Ward Irish Music Archive	9	6	16	42	16	60	9

Table 16. WAFC Mega Matrix

3.5 Thematic analysis

The thematic analysis served one main purpose, which is the revelation of hidden themes from Facebook posts. It was necessary to uncover the content of the information as more can be

learned from the information flow in the network. The thematic analysis provided information regarding insight into the WAFC subject interests. The thematic analysis revealed subject themes from Facebook posts while *SNA* illustrated information flow patterns and player patterns, the findings of each are discussed in depth in *Chapters 4 and 5*.

There is a plethora of information that is gained through the measurements supported by S*NA. H*owever, due to the interactive nature of social media, there is, even more, knowledge to be gained by understanding the content that is traversing the communication channels in the network. The information that is shared in a social network can be exchanged in many different ways. Without understanding the assessment of behaviors behind the actions or the information being shared in the network, the entire picture is left largely unseen.

The relationships in *SNA* are the central aspect. As a result, it is important to understand what is linking actors together and to develop a deeper understanding of the relationships that have been fostered in the social network. One way to explore these relationships on a deeper level is to analyze the content of what is being shared; in other words, what kind of information is WAFC identifying and interacting.

Facebook posts were analyzed on each archive institution's Facebook profile page. These posts were generated by the archive institution and by the archive's Facebook friends. Then, the coding of the Facebook posts served to provide a grand overview of the Facebook posts made by WAFC. A codebook was developed to define the specific Facebook posts.

The entirety of the post needed to be analyzed in order to maintain the context with which it was delivered to the Facebook users. Without the context of the post, the purpose of that post cannot be interpreted. In addition, in order to provide a rich analysis of the Facebook posts, the words used in the Facebook posts were also analyzed. The purpose of the additional layer of analysis on the words used within the posts was to have a deeper understanding of the archive's

perception and overall identity online. The analysis of the words used within the posts also added more contexts to the entire post. The reason for this was the revealing of data patterns, thus providing archivists and researchers with a better understanding of the use of the social network from the context of what was being discussed via Facebook.

3.5.1 Thematic analysis data collection

Publicly available posts were captured via NVivo's NCapture add-in expansion. Facebook data was collected from January 2014 to June 2014 ($n = 461$) from the WAFC. All posts that appeared on the archive's profile pages during the January 2014 to June 2014-time span were collected; this included posts made by an archive or from a Facebook user. Then a subject schema was produced. The subject schema included four subject categories: *archive story*, *communication*, *information*, and *outreach*. *Table 17* provides the coding schema, definitions, and examples. In order to evaluate the reliability assessment of the coding, a Kappa agreement analysis was conducted to ensure that there was substantial agreement between the two evaluators according to the criteria (Viera & Garrett, 2005). NVivo was used to analyze the thematic analysis. NVivo used comparison measures between the different posts and words defined in a study. The development of a word list that included similar words and phrases was also developed. These themes are discussed in depth in *Section 4.4 Findings for research questions 3 and H$_{03}$*.

Theme	Definition	Example
Archive story	Creates awareness about the archive, and is associated with the archive's identity. The promotion and marketing of the archive might be embedded in the post. There is also information regarding general archiving techniques, such as, processing and collections.	Melissa found a folder of old guidelines for finding things in the archives. There are many gems, but among the best is this: "The White File Cabinets: We have the white file cabinets in the back room with all of the information in it for what forms to use also located in the further drawer are the files on how to locate material in the Univ. Room. This is important to know also."
Communication	Provide relatability for the archive. Announcements like new staff members, retirements, and Throwback Thursday posts all create avenues for the archive to interact with the public. Communication can also include incentive posts to entice interaction.	Carthage students and alumni, we want to hear from you! If you have a great story, old photographs, or papers from your college days, please consider sharing with us!
Information	Include information regarding the hours of the archive, weather, and job postings.	The UWRF Archives will be CLOSED May 24-25-26 for the Memorial Day holiday. We will reopen on Tuesday May 27 at 10:00 a.m.
Outreach	Includes different services that the archive provides, such as, events, workshops, educational programs. Some posts are 'mini' educational pieces, providing information about how to go about researching genealogical information.	Curious about the history of the Lawrence Conservatory? Check out the display in the library by Dakota Williams '14, up through next week. Dakota's also doing a brief talk about this history at 5pm today in the library.

Table 17. List of themes, definitions, and examples of posts from WAFC

The thematic analysis aimed to created subject categories of the posts generated by the WAFC. These categories were analyzed using the same procedure as the interactions, i.e. 'like,' 'comment,' 'tag,' and 'share.' *Table 18* defines the node-category table (NCT). In the table, the columns are categories generated from the subject thematic analysis, and the rows are actors in the network. $NCASC_{ji}$ indicates the frequency of subject category (*SC*) *i* and node category actor (*NCA*) *j*. Thus, the entry $NCASC_{ji} = 1$ indicates that subject category *i* was used by node category actor *j* one time, whereas $NCASC_{ji} = 0$ means there is no relation or usage of that subject category. Here *n* is the number of all nodes/actors who have posted on WAFC with the identified subject categories, *m* is the number of all subject categories, and $NCASC_{ji}$ is a cell in the matrix and refers to the number of times that subject category *i* was used by actor *j* or $1 \leq i \leq m$, $1 \leq j \leq n$. In other words, the matrix records not only who uses the various subject categories but also use

frequencies of the subject categories. The frequency indicates the connection strength between subject category i and actor j.

	SC_1	SC_2		SC_i		SC_m
NCA_1	$NCASC_{11}$					
NCA_2		$NCASC_{22}$				
			...			
NCA_j				$NCASC_{ji}$		
NCA_n						$NCASC_{nm}$

Table 18. Node Category Table (NCT)

3.5.2 Keywords

Stop words (as, but, for, if, or, when) were removed and plural words like "digital collections" were changed to "digital collection." The unique words collected and analyzed resulted in $n = 415$. In each one of the Facebook posts, terms reoccurred 17% of the time within the sample.

Overall, there were few exact keywords that were shared; more *themes* were shared amongst WAFC than keywords. Often keywords themselves were unique to that single archive. For instance, each archive referred to a name, like Lawrence University or University of Wisconsin-Green Bay. WAFC members used their own name in a Facebook post 11% of the time. As a result of the keyword categories consisting of keywords that were not unique by themselves, terms were categorized together with other like terms to yield sound results. For instance, 'archive material' consisted of terms used to describe material unique to an archive, i.e. scrapbook, processing, letters, diaries. For a keyword to be considered 'reoccurring', it had to appear in at least two archives. *Table 19* provides a listing of all keywords that were categorized together into the same keyword category. Appendix D lists the raw keyword data.

Categorical Term	Keywords Included
Year	1795 1800 1851 1863 1864 1872 1873 1881 1883 1898 1903 1905 1906 1907 1910 1912 1915 1917 1918 1919 1920 1921 1923 1926 1929 1929 1930 1931 1932 1933 1935 1936 1937 1938 1939 1940 1941 1941 1942 1942 1943 1944 1948 1949 1950 1952 1953 1954 1955 1956 1957 1958 1959 1960 1960 1961 1964 1965 1969 1970 1971 1972 1974 1976 1978 1979 1980 1983 1991 1997 1998 1998 2004 2011 2012 2013 2014
Archive name	Lawrence University Archive; University of Wisconsin River Falls Archive & Area Research Center; University of Wisconsin-Green Bay Archive Area & Research Center; University of Wisconsin-Stout Area & Research Center; Staubitz Archive
Archive material	diaries, letters, photographs, collection, postcard, correspondence, processing, record, scrapbook
Cultural places	Carthage College, University of Wisconsin -Milwaukee, Wisconsin Historical Society, Lawrence Conservatory, Mudd Gallery, Anthology of American Folk Music, American Association for State and Local History, Irish Traditional Music Archive, Shamrock Club of Wisconsin
Holiday	April Fool's; Earth Day; Father's Day; Founder's Day; Groundhog Day; Mother's Day; Martin Luther King Day; Valentine's Day

Table 19. Terms that were categorized and their associated keywords

The top five keywords 'year' (55% reoccurrence), 'archive name' (10% reoccurrence),

'archive material' (5% reoccurrence), 'cultural institutions' (4% reoccurrence), and 'holiday' (3%

reoccurrence) are keyword categories that were grouped together. While some keywords could be

categorized, like the top five (year, archive name, archive material, cultural institution, and

holiday), many others occurred only once. *Table 20* shows the distributions of unique keywords

and the percent that these terms reoccurred.

Archive	Unique keyword	Percent of reoccurring terms
Staubitz Archive	59	17%
Lawrence University Archive	45	6%
University of Wisconsin Stout Archive & Area Research Center	20	20%
University of Wisconsin Parkside Archive & Research Center	40	24%
University of Wisconsin Green Bay Archive & Area Research Center	54	14%
University of Wisconsin River Falls Archive & Area Research Center	122	21%
Irish Music Archive	75	10%

Table 20. Keywords and percentages of reoccurring terms in WAFC

3.6   Hypotheses and Hypotheses Testing

In this section, each of the statistical methods that correspond to a hypothesis is discussed in detail. For each of the hypotheses, the independent and dependent variables and other important factors are stated, and a discussion of how the data was organized is included. *Table 21* specifies each research question, associated hypothesis, independent and dependent variable, method used to test, and the software used.

Research Question	Hypothesis	IV	DV	Software	Test
Who are the key actors/players in the Wisconsin archival community when they exchange and share information on Facebook?	H01: There are no significant differences among key players in the Wisconsin archive Facebook community (WAFC) in term of centralities (degree, closeness, and betweenness).	Centrality (degree, closeness, betweenness)	Ranking data of centrality	SPSS	Friedman
What is the role of the actors within the Wisconsin archive Facebook community?	H02 There are no significant differences among actor affiliations in terms of interactions on the Wisconsin archive Facebook community. H02 (a) There are no significant differences among actor affiliations in terms of degree on the Wisconsin archive Facebook community. H02 (b) There are no significant differences among actor affiliations in terms of closeness on the Wisconsin archive Facebook community. H02 (c) There are no significant differences among actor affiliations in terms of betweenness on the Wisconsin archive Facebook community.	Actor affliations (archive, business, cultural institution, university)	Centrality (degree, closeness, betweenness)	UCINET	ANOVA
What does the content of each online activity (tagging, sharing, liking, and commenting) reveal about the Wisconsin archive Facebook community?	H03 The online posts made by the Wisconsin archive Facebook community revealed no significant differences among the revealed subject schemas.	Subject schemas (archive story, commuication, outreach)	Use of subject schema (frequencies)	SPSS	Chi-Square
How do the post characteristics (use of pictures, use of embedded hyperlinks, and use of digital collections) influence the online activities on the Wisconsin archival Facebook community?	H04 There is no significant relationship between using a picture in a post and not using a picture in a post in terms of online activities on the Wisconsin archival Facebook community.	Use of pictures in FB posts	Online activities	UCINET	T-test
	H05 There are no significant differences between posts with embedded hyperlinks and posts without embedded hyperlinks in terms of their online activities on the Wisconsin archival Facebook community.	Use of hyperlinks in FB posts	Online activities	UCINET	T-test
	H06 There is no significant difference between posts by WAFC with digital collections and posts by those without digital collections in terms of their online activities on the Wisconsin archival Facebook community.	Presence of digital collections	Online activities	UCINET	T-test

Table 21. Distribution of research question, associated hypothesis, independent and dependent variable, software used, and method tested

H_{01} *There are no significant differences among key players in the Wisconsin archive Facebook community (WAFC) in term of centralities (degree, closeness, and betweenness).*

The independent variables for this hypothesis were WAFC actors. The dependent variable is centrality. The centrality can be broken down into 3 aspects of centrality: *degree*, *closeness*, and *betweenness*. A Friedman Test was then conducted with results from the Mega Matrix centrality testing. SPSS was used to test the hypothesis; a Friedman test was used because it handles rank data of degree, closeness, and betweenness.

H_{02} *There are no significant differences among actor affiliations in terms of interactions on the Wisconsin archive Facebook community.*

The independent variable for this hypothesis is actor affiliations. The valid values or levels of this independent variable are *archive*, *business*, *cultural institution*, and *university*. The *people*

affiliation was not analyzed as the number of variables that separate people are too high to gather concrete findings.

The dependent variable is interactions, which is measured by centrality. The centrality can be broken down into 3 aspects: *degree*, *closeness*, and *betweenness*. In other words, the proposed hypothesis can be divided into 3 sub-hypotheses:

$H_{02\ (a)}$ *There are no significant differences among actor affiliations in terms of degree on the Wisconsin archive Facebook community.*

$H_{02\ (b)}$ *There are no significant differences among actor affiliations in terms of closeness on the Wisconsin archive Facebook community.*

$H_{02\ (c)}$ *There are no significant differences among actor affiliations in terms of betweenness on the Wisconsin archive Facebook community.*

Since the number of the independent variable levels (4) is larger than 2 and subjects in different groups receive different treatments ('*archive*', '*business*', '*cultural institution*', and '*university*') an ANOVA statistical method was used for these hypotheses using UCINET instead of SPSS as UCINET addresses the interdependency of the *SNA* matrices whereas, SPSS does not.

H_{03} *The online posts made by the Wisconsin archive Facebook community revealed no significant differences among the revealed subject schemas.*

The independent variables are subject schemas. The valid values or levels of this independent variable are the different subject schema: *archive story*, *communication*, *information*, and *outreach*.

The dependent variables are the use of subject schema, which was measured by the frequencies of subject schema identified from the thematic analysis.

Since the number of the independent variable levels is larger than 2, and each revealed subject schema received different treatments (the different subject schema), a Chi-Square statistical method was used for the testing of this hypothesis.

H₀₄   ***There is no significant relationship between using a picture in a post and not using a picture in a post in terms of online activities on the Wisconsin archival Facebook community.***

The independent variable for this hypothesis was using pictures in Facebook posts. There are two valid values or levels, which are the Facebook posts with pictures and posts without pictures. The dependent variable was online activities.

There are two levels of the independent variables. UCINET was used to test the hypothesis; an independent T-test was conducted.

H₀₅   ***There are no significant differences between posts with embedded hyperlinks and posts without embedded hyperlinks in terms of their online activities on the Wisconsin archival Facebook community.***

The independent variable for this hypothesis was using hyperlinks in Facebook posts. There are two valid values or levels, which are the Facebook posts with hyperlinks and posts without hyperlinks. The dependent variable was online activities.

There are two levels of the independent variables. UCINET was used to test the hypothesis; an independent T-test was conducted.

H₀₆   ***There is no significant difference between posts by WAFC with digital collections and posts by those without digital collections in terms of their online activities on the Wisconsin archival Facebook community.***

The independent variable is the presence of a digital collection in an institution. There are two valid values or levels, which are the institutions with digital collections and institutions without digital collections. The dependent variable was online activities which were measured by their frequencies.

There are two levels of the independent variables. UCINET was used to test the hypothesis; an independent T-test was conducted.

3.6.1 Summary

All of the statistical testings provided a well-rounded summary of the WAFC. The significance level (α) for these tests was 0.05. If, $p > α$ then the hypothesis was accepted. If $p \leq α$ then the hypothesis was rejected.

3.7 Software

The foundation point of data collection was done using data captured through NVivo's extension, NCapture. NCapture is a web browser extension tool that gathers social media data and permits the researcher to gather and save social media datasets such as web pages and online PDFs, Facebook posts, shares, tagged individuals or institutions, and comments, LinkedIn group discussions, and Twitter content (NVivo, 2017). Using NVivo, the NCapture data was exported to Microsoft Excel for analysis.

While a significant portion of the data extraction was conducted using NCapture, the rest of the data collection was extracted manually. The manual extraction of data was necessary as NCapture gathers the number of 'likes' but does not list all actors that 'liked' an interaction on Facebook. In addition, 'shares' are noted in NCapture with the total number of 'shares' per post, but do not indicate who in the network 'shared.' The development of the matrices was done in Microsoft Excel. Tables in Microsoft Excel are able to be imported into UCINET, which is a *SNA* tool.

UCINET and NetDraw software packages for social network analysis and cultural domain analysis were developed by Lin Freeman, Martin Everett and Steve Borgatti (UCINET, 2016). Both UCINET and NetDraw are used for the *SNA*. UCINET is the most popular and widely used software package due to the ability to apply an extensive number of data manipulation tools (Knoke & Yang, 2008). UCINET mathematically measures the social network in a number of different ways as dictated by the researcher. Due to UCINET's unique capabilities with *SNA*, it

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was used for all ANOVA tests instead of SPSS. NetDraw is the visualization component and illustrates the measurements through visual representations of the dataset.

SPSS was used primarily for measuring the statistical analysis of the data. SPSS is predictive analytics software developed by IBM (IBM, 2016). It is widely used in the social sciences for statistical analysis. SPSS is used for this study for the statistical measurements of the hypotheses. The software includes tools used for descriptive and inferential statistics. Data is entered into SPSS in a manner similar to spreadsheets and Microsoft Excel spreadsheets can be imported.

UCINET was primarily used in this study for testing the hypotheses. UCINET provides unique exponential random graph models for inferential statistical analysis (Borgatti, Everett, & Johnson, 2013). The models address the issues that observations must be statistically independent and the observations must follow a normal distribution. The software includes tools used for descriptive and inferential statistics. Data was entered into UCINET in a manner similar to spreadsheets, and Microsoft Excel spreadsheets can be imported.

3.8 Ethics

It should also be acknowledged that the author of this proposal is a practicing archivist that participates on Facebook. The researcher's position to the social network should always be considered. Although one's tie and participation within the community might be reflected in the data, as an archivist, the involvement was not viewed any differently from other archivists as the researcher's participation relates to her fieldwork. However, as a researcher, this research is highly influenced by her work as an archivist and knowledge of the lacking quantitative research and potential practical advice it may yield to the profession. In order to use the NVivo's NCapture feature, the researcher must be logged into the social media application. This means that the researcher must have an account.

For the purpose of this study, the researcher used her existing Facebook account to log in. The researcher is identified as an archivist in her personal life, there was no conflict or need to hide her profile. The purpose of this study was not to interact or participate in an interview-type situation with any of the individuals involved, only observations of the data were conducted. Kadushin (2005) noted that a potential dilemma for social network research is unlike other research methods, "social network data have one troublesome and distinctive attribute: the collection of names of either individuals or social units is not incidental to the research but its very point" (p. 140).

The visualization representation of *SNA* is also a matter of discussion. As it is not necessarily the individual nodes, but the entirety of the network that needs to be evaluated; meaning that the research does not pick out single individuals to name and discuss, but rather it is the patterns that are of major concern to the researcher. For the purpose of this study, node labels were omitted at the individual levels for the visualizations and during the thematic analysis. In addition, to protect the identity of those individuals involved in the study, all actors' names are anonymized. Numeric codes were used in lieu of actors' real names. However, in order to learn as much as possible about the archive's Facebook community, individuals are anonymized and grouped into subject areas using the information that was available on their public Facebook profiles.

Early on in *SNA* research, the development of computer networks was acknowledged along with the idea that the study of computer networks was easy, however, it was the sociology and ethics of the research that is the most difficult (Wellman, 1996). Brass, Butterfield, & Skaggs (1998) noted that the harvesting of personal characteristics of individuals with SNA to be the most unethical while also discussing that it is the significant ties in individual relationships that should be studied. The omission of those important details would result in the misrepresentation of a

network. Ngai, Tao, and Moon (2015) analyzed 46 different articles about social media and found that "social media is a double-edged sword that can help and harm" (p. 42). It is important to be mindful of the data and the group of individuals that is being used to study.

The widespread use of social media results in behavior analysts needing to evaluate the interactions; however certain principles should be applied (O'Leary, Miller, Olive, & Kelly, 2015). Moreno, Goniu, Moreno, and Diekema (2013) suggested that in regards to observational research, Institutional Review Boards (IRBs) should pay attention to risk factors. For instance, observational research that involves how many times a certain post was 'liked' has focused on the number rather than the individual who 'liked' the post, particularly if the individuals were not part of a high-risk group or one that involves illegal data (such as drug use). IRBs strive to be as ethical as possible, but there are considerable gaps between practice and written policy. Zimmer (2015) presented a topic on research ethics in the 2.0 era, noting the conceptual gap between anonymity and identifiability.

This study acknowledged the potential ethical issues with the harvesting of publicly available profile information. Data mining of people's habits and behaviors online has been a growing topic of discussion as social media has become more integrated into the daily lives of people, and marketing programs have been developed to reach those individuals more efficiently. According to the IRB at the University of Wisconsin-Milwaukee on the subject of social media, the suggestion is that security measures must be taken for anonymity and that the original data set of collected data not to be released to the public.

3.9   Summary

The WAFC data was gathered using NCapture, which is an NVivo tool. The data was structured using Microsoft Excel. Subsequent analyses were run using *SNA* tool, UCINET. *SNA*, inferential statistics, and thematic analysis are the three methods that were used to analyze

WAFC. There are six main hypotheses and six sub-hypotheses that were tested against the data collected from WAFC. Together, these methods provide a more thorough understanding of WAFC and their use of social media, which can be translated into different archive communities to expand their overall understanding of social media use.

CHAPTER IV
RESULTS & ANALYSIS

This chapter reports the findings including sample development, general statistics, previously stated hypotheses, social network analysis, and thematic analysis.

4.1   Description of the collected data

The process began with the identification of known archive areas: academic, historical societies, and corporate. To qualify for the study, the archive needed a professional archivist on staff; volunteer organizations did not qualify. There is no standing list of all archives that use Facebook, nor is there a standing list of all archives in the United States, let alone the state of Wisconsin. As a result, it was necessary to create an outline to extract as many Wisconsin archives that use Facebook as possible. For example, the process for academic archives included the identification of all the four-year University of Wisconsin institutions (13 university campuses) all of which have archives.[3] Each UW archive was investigated to determine if it qualified for the study. Four UW archives were found to have an independent Facebook page. Private universities were also analyzed for potential study; consequently, one private Wisconsin university archive also qualified. The process for historical societies, religious archives, and corporate archives included the investigation of archive institutions from the Southeast Wisconsin Archival Group (SWAG), which has 69 members. As the study's focus was on social media application use, the next criterion was that each institution had to have at least one social media application installed before the study began; this criterion reduced the list to 32 members.

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[3]All 72 counties in Wisconsin have a historical society; however, these societies are not maintained by professional archivists. As a result, in 1992, the University of Wisconsin developed a series of Area and Research Centers (ARC) to be housed at four-year university campuses. These ARC's serve the public to provide access as official State records repositories under 16.61(13) of the Wisconsin Statutes and is governed by Faculty Legislation II-400 (University of Wisconsin Archives History, 2017).

The last criterion is that each archive institution had to have its own social media application outside of its parent institution, meaning that if an archive was within an academic library, the archive must have its own Facebook page separate from the library. This brought the final tally to three institutions from the initial 69 members of SWAG. In the end, there were seven archival institutions in the state of Wisconsin that had their own Facebook page and these were extracted for this study. The initial sample of the archives is small. However, due to the small sample size, several other meaningful actors were identified; the finalized actor categories are illustrated in *Figure 16*. *Figure 17* illustrates the breakdown of the largest category *People* in the WAFC.[4]
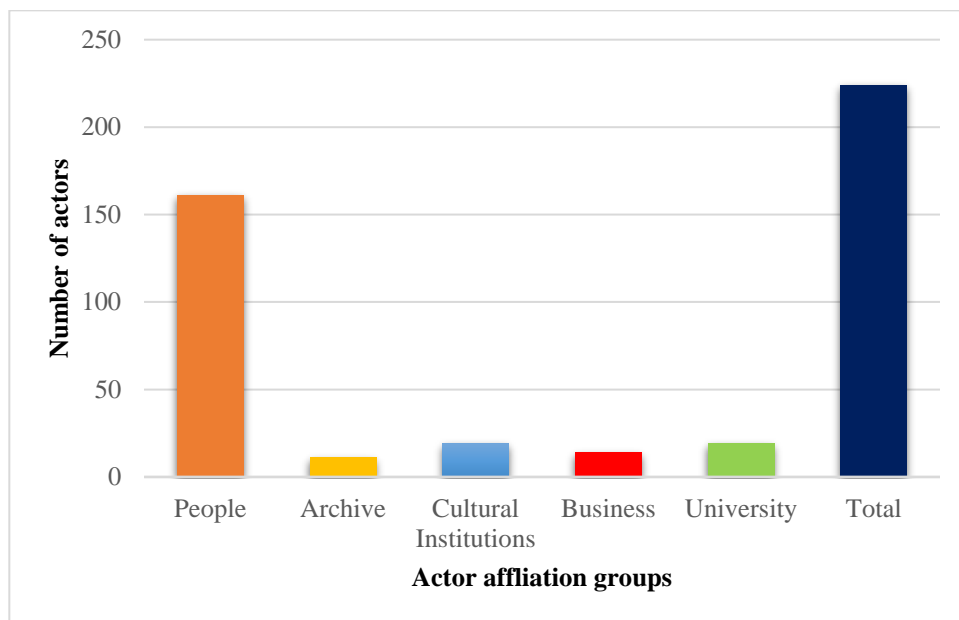
Figure 16. Finalized actor categories in the WAFC

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[4] *People* refer to individuals that interacted within the WAFC. The *people* category is further broken down into groups: *archives*, *cultural institutions*, *businesses*, *university*, and *other*. Those within the other category were unable to be identified or are part of a smaller group like *retirees*.
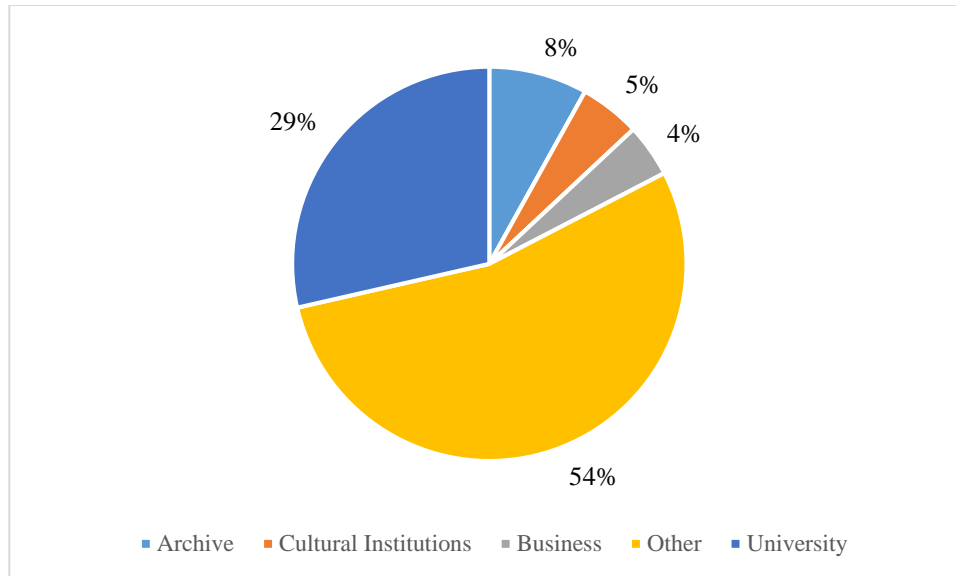
Figure 17. Breakdown of People categories in the WAFC

4.1.2   Description of statistical data from online activities

Publicly available posts were captured via NVivo's NCapture add-in expansion. Data was collected from Facebook from January 2014 to June 2014 ($n = 489$) from the seven Wisconsin archives that were selected. All posts were in English. Only posts found on the archive's profile page were analyzed. The thematic analysis method of selection is the same used and previously discussed in the *SNA* method section. The words were collected and analyzed from the same time period resulted, $n = 1001$.

As a result, the development of the social network matrix began; all of the potential actors went through a validation process. For example, every post that an archive made to their Facebook page and all the 'likes' associated with that post were examined; meaning that, every time a Facebook user 'liked' a post, that Facebook user becomes a part of the matrix. This process was carried out for each online activity 'like', 'share', 'tag', and 'comment'.

4.1.3   Matrix Development

In order to analyze the complexities of the data, a matrix combined 'like', 'comment,' 'share,' and 'tag' Facebook online activities to create the *Mega Matrix*. Each one of the

interactions builds upon the other; social media is complicated and the multi-level interactions create complexities. The final dimensions of the *Mega Matrix* were 223 x 223. Combining the matrices into a *Mega Matrix* ensured that the entirety of the WAFC was analyzed as a whole network.

In addition, by providing a weight to each matrix, the relationships between the many players were also analyzed. Through the analysis of the content using grounded theory, the data was collected in such a way that permitted the flow of information to be captured. The matrix development was command driven, meaning that the accumulation of information was done so to capture the online activities that took place on Facebook.

4.2   Findings for research question 1 (RQ1)

In this section research question, 1 (RQ1) is answered. Each section introduces the topic addressed, results, and the analysis. *Sections 4.2.2*, *4.2.3*, and *4.2.4* discuss the identification of key actors in terms of centralities. In each of these sections, the top twenty actor lists are provided. Actors who are not individual people have their complete name; those who are individuals have a code name that was just for this study listed in lieu of a full name. This was done to maintain the privacy of individuals; it does not take away from the discussion as all actors were coded by categories.

RQ1 is stated as the following:

RQ1:   Who are the key actors/players in the Wisconsin archival community when they exchange and share information on Facebook?

RQ1 is addressed in hypothesis H_{01}.

4.2.1 Hypothesis H_{01}

4.2.1.1 Hypothesis testing H_{01} result

The hypothesis is stated here:

H_{01} ***There are no significant differences among key players in the Wisconsin archive Facebook community (WAFC) in term of centralities (degree, closeness, and betweenness).***

RQ1 is answered by H_{01} through the *SNA* measurements: degree, closeness, and betweenness. These centrality measurements identify *who* the key actors and players are in the WAFC *and* how information is shared. First the process of the testing results is discussed followed by a description of WAFC key members. A deeper analysis of RQ1 and H_{01} is described in section *4.6.1Analysis of RQ1 & H_{01}*.

The *Mega Matrix* dataset was entered into UCINET and was used to conduct the *SNA* testing. The *Mega Matrix* is comprised of the online activity data from the WAFC. Three different *SNA* centrality measures were run: degree, closeness, and betweenness. A Friedman Test was then conducted with results from the *Mega Matrix* centrality testing results. SPSS was used to test the hypothesis. The result is that the proposed hypothesis is rejected as there was a significant difference among key players in the Wisconsin archive Facebook community (WAFC) in terms of centralities (degree, closeness, and betweenness), here $n = 223$, betweenness (mean = 433.78, *SD* = 1772.53), closeness, (mean = 1.58, *SD* = .428), and degree (mean = 21.2, *SD* = 61.55). *Table 22* illustrates the mean and standard deviation of each centrality.

	N	Mean	Std. Deviation
Betweenness	223	433.78	1772.53
Closeness	223	1.58	0.428
Degree	223	21.2	61.55

Table 22. Descriptive statistics from H_{01}

A non-parametric Friedman test of differences among repeated measures was conducted and rendered a Chi-square value of 147.794 which was significant ($p < .000$). *Table 23* illustrates the test statistics from H_{01}.

N	223
Chi Square	147.794
df	2
P value	0.000

Table 23. Test statistics from H$_{01}$

4.3 Findings for research question 2 (RQ2)

In this section research question 2 (RQ2) is answered. Each section introduces the topic addressed, results, and the analysis. *Sections 4.3.1*, *4.3.1.1*, *4.3.1.2*, *4.3.1.3* address the hypothesis testing.

RQ2 is stated as the following:

RQ2: ***What is the role of the actors within the Wisconsin archive Facebook community?***

RQ2 is addressed in hypothesis H$_{02}$, which is broken down into three sub-hypotheses H$_{02(a)}$, H$_{02(b)}$, and H$_{02(c)}$. The interactions defined in H$_{02}$ refer to centrality degree measurements from *SNA*. The sub-hypotheses deal with each centrality measurement: degree, closeness, and betweenness respectively.

4.3.1 Hypothesis H$_{02}$

The hypothesis is stated here:

H$_{02}$ ***There are no significant differences among actor affiliations in terms of interactions on the Wisconsin archive Facebook community.***

RQ2 is answered by H$_{02(a-c)}$ through the *SNA* measurements: degree, closeness, and betweenness. In contrast to RQ1, RQ2 kept actors within their specified groups: *archive*, *business*, *cultural institution*, and *university*. The term *role* here is generalized to these specific groups in order to ascertain a broad determination of the WAFC. These centrality measurements identify *who* the key groups are in the WAFC *and* how information is shared. First the process of the testing result is discussed followed by a description of WAFC key groups. A deeper analysis of RQ2 and H$_{02}$ is described in *Section 4.6.2 Analysis of RQ2 & H$_{02}$*. In addition to the determination

that there is a significant difference among WAFC group members, key groups were able to be identified from the H_{02} analysis.

The measurements of the interactions (degree, closeness, and betweenness) are in *Sections 4.3.1.1*, *4.3.1.2*, and *4.3.1.3*. The actor affiliations are comprised of four different areas: *archive*, *business*, *cultural institution*, and *university*. The *people* affiliation was not analyzed as the number of variables that separate people are too high to gather concrete findings. *Figure 17* illustrates the visual layout of the actor affiliations of the WAFC. It is evident from *Figure 17* that there are clear hubs within the WAFC; A5, A4, A2, and A8 are all associated with the *archive* affiliation. The intricacies of the WAFC are articulated in the rest of section 4.3.
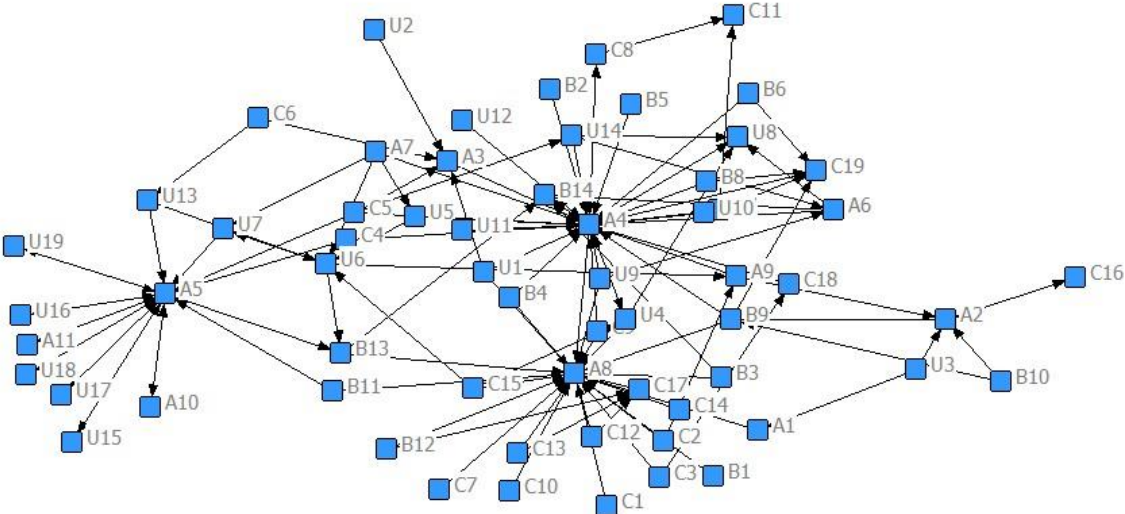
Figure 17. Visual display of the WAFC actor affiliations

4.3.1.1 Hypothesis testing H$_{02(a)}$ result

Hypothesis H$_{02(a)}$ is stated here:

H$_{02(a)}$ ***There are no significant differences among actor affiliations in terms of degree on the Wisconsin archive Facebook community.***

Within the degree results, the actor affiliations were sorted alphabetically. The analysis

was used to test the hypothesis; an ANOVA test was conducted using UCINET. The significance

level was .05. The result is that the hypothesis is rejected as there was a significant difference

among actor affiliations in terms of degree $[F(3, 59)] = 9.79$, $p = .0002$. *Table 24* illustrates the

test statistics from $H_{02(a)}$.

Source	DF	SSQ	F	Significance
Treatment	3	20293.6	7.487	0.0002
Error	59	533065		
Total	62	736000		

Table 24. Hypothesis H$_{02(a)}$ result

The comparison results between two affiliations using t-tests are illustrated in *Table 25*.

The p-values of all the t-tests are presented in the table. If a resultant p-value is smaller than 0.05

(marked by an * in the table), it indicates that there is a significant difference between the two

affiliations in terms of degree.

	Archive	Business	Cultural institution	University
Archive		0.001*	0.000*	0.006*
Business	0.001*		0.999	0.108
Cultural institution	0.000*	0.999		0.049*
University	0.006*	0.108	0.049*	

Table 25. P-Value for the t-tests for Degree

4.3.1.2 Hypothesis testing H$_{02(b)}$ result

Hypothesis $H_{02(b)}$ is stated here:

H$_{02 (b)}$ ***There are no significant differences among actor affiliations in terms of closeness on the Wisconsin archive Facebook community.***

Within the closeness results, the actor affiliations were sorted alphabetically. The analysis

was used to test the hypothesis; an ANOVA test was conducted using UCINET. The significance

level was .05. The result is that the hypothesis is rejected as there was a significant difference

between actor affiliations in terms of closeness $F(3, 59) = 9.794$, $p = .0002$. *Table 26* illustrates

the test statistics from $H_{02(b)}$.

Source	DF	SSQ	F	Significance
Treatment	3	4.64	9.794	0.0002
Error	59	9.32		
Total	62	13.96		

Table 26. Hypothesis H$_{02(b)}$ result

The comparison results between two affiliations using t-tests are illustrated in *Table 27*.

The p-values of all the t-tests are presented in the table. If a resultant p-value is smaller than 0.05

(marked by an * in the table), it indicates that there is a significant difference between the two

affiliations in terms of closeness.

	Archive	Business	Cultural institution	University
Archive		0.000*	0.001*	0.063
Business	0.000*		0.204	0.002*
Cultural institution	0.001*	0.204		0.034*
University	0.063	0.002*	0.034*	

Table 27. P-Value for the t-tests for Closeness

4.3.1.3 Hypothesis testing H$_{02(c)}$ result

Hypothesis $H_{02(c)}$ is stated here:

H$_{02 (c)}$ *There are no significant differences among actor affiliations in terms of betweenness on the Wisconsin archive Facebook community.*

Within the betweenness results, the actor affiliations were sorted alphabetically. The

analysis was used to test the hypothesis; an ANOVA test was conducted using UCINET. The

significance level was .05. The result is that the hypothesis is rejected as there was a significant

difference between actor affiliations in terms of betweenness $F(3, 59) = 6.6921$, $p = .0004$. *Table*

28 illustrates the test statistics from $H_{02(c)}$.

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Source	DF	SSQ	F	Significance
Treatment	3	156567152.4	6.6921	0.0004
Error	59	460115743.2		
Total	62	616682895.6		

Table 28. Hypothesis H$_{02(c)}$ result

The comparison results between two affiliations using t-tests are illustrated in *Table 29*.

The p-values of all the t-tests are presented in the table. If a resultant p-value is smaller than 0.05

(marked by an * in the table), it indicates that there is a significant difference between the two

affiliations in terms of betweenness.

	Archive	Business	Cultural institution	University
Archive		0.000*	0.002*	0.001*
Business	0.000*		0.001*	0.677
Cultural institution	0.002*	0.001*		0.633
University	0.001*	0.677	0.633	

Table 29. P-Value for the t-tests for Betweenness

4.4 Findings for research question 3 (RQ3)

In this section research question 3 (RQ3) will be answered. Each section introduces the

topic addressed, results, and the analysis.

RQ3 is stated as the following:

RQ3: *What does the content of each online activity (tagging, sharing, liking, and commenting) reveal about the Wisconsin archive Facebook community?*

RQ3 is addressed in the thematic analysis, which breaks down the content of the WAFC

posts and associated interactions (online activities). The associated hypothesis (H$_{03}$) is also tested

and the results are revealed in this section. H$_{03}$ is stated here:

H$_{03}$ *The online posts made by the Wisconsin archive Facebook community revealed no significant differences among the revealed subject schemas.*

4.4.1 Hypothesis H$_{03}$

The thematic analysis revealed much about the content being posted by the WAFC as well

as each online activity. The process of an online activity begins with a Facebook post. A

Facebook post is a message made to other Facebook users. The post appears on the user's profile and can be viewed by either the public or by the Facebook user's friends; posts can be a status update, and/or can contain a photo, link, or video. The purpose of a post depends on the Facebook user, and can vary from wanting to share information to engaging others in an activity, the list is endless. The coding schema uncovered four prominent themes: *archive story*, *communication*, *outreach*, and *information*.

4.4.1.1 Thematic analysis overview

All posts are in English. Only posts found on the archive's profile page were analyzed. The thematic analysis method of selection is the same used and previously discussed in the *SNA* method section. *Figure 18* is an illustration of the posts accumulated each month from January 1, 2014 to June 30, 2014. One post that was captured read, "This May Day celebration was filmed at Lawrence in 1929 – 85 years ago today! That's the old Carnegie Library in the background. If you think this is as awesome as we do, keep an eye out for news about recently digitized films from the Archives…" A theme was assigned to the post. The theme applied to the post was 'outreach' as it demonstrated a service provided by the archive (digitized collections available to the public). Certain identifiers of the post may be identified, for instance, the name of the archive being used or the use of the post to identify a particular activity such as education about history to the public, which adds an aspect of the archive's purpose and their identity.
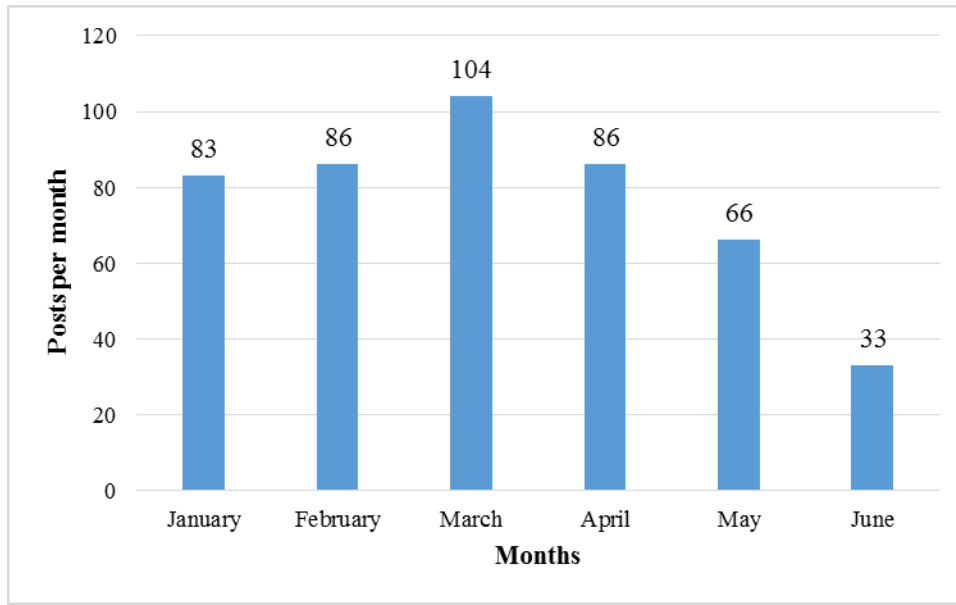
Figure 18. Monthly WAFC Facebook posts from January 2014 to June 2014

As previously stated, posts could be made by the *archive* or by another institution (affiliation being *business*, *university*, *cultural institution*), or by a fellow Facebook user. A post could also be created by another entity and then shared by an archive; however, most posts made by the WAFC were original. On average, 92% of the posts were original material created by the archive, 6% were created by an institution, 4% were posted by a WAFC member, and 5% were posts created by another entity and shared by an archive.

4.4.1.3 Themes from thematic analysis

Coding of the WAFC posts was conducted through an open coding process. The purpose of the thematic analysis was to identify the main ways that archives use Facebook. Two coders coded the Facebook posts independently. To evaluate the reliability assessment of the coding, a Kappa agreement analysis was conducted. A second observer, an archivist with a Master's degree

in Library and Information Science, was asked to code the posts independently from the researcher.[5] The observed agreement was kappa = .74.

Four main themes emerged from the thematic analysis: *archive story*, *communication*, *information*, and *outreach*. *Archive story* posts create awareness about the archive, and typically have an example from the archive's collection to go along with the details in the post. *Archive story* was also the most common post in the WAFC occurring 78% of the time. *Figure 19* is an illustration of the percentages of the thematic categories. *Communication* is the main type of Facebook posts used by WAFC to interact and accounts for 12% of WAFC posts. Announcements might be made in a *communication* post. *Information* Facebook posts are the most direct and the smallest category at 4%; these posts have weather updates, information regarding closing early or even job postings in the archive. Finally, *Outreach* posts are like announcements, but of a different kind. Instead of general announcements like in *communication*, *outreach* posts have a program or service that is going to be taking place that patrons could partake. *Outreach* posts occurred 6% of the time in the WAFC.

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[5] The second observer is a working archivist who has been working in the field of archival science since 2012. The observer obtained a Master's degree in Library and Information Science and Master's in History from the University of Wisconsin Milwaukee. The observer is an archivist at a corporate Wisconsin archive; that archive is not involved in this study.
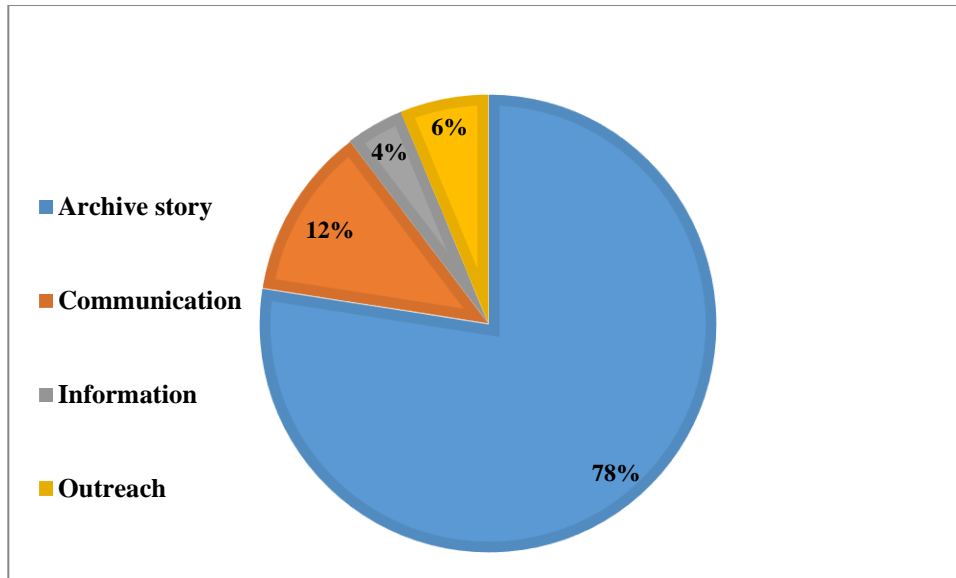
Figure 19. Thematic analysis themes use percentages in the WAFC

4.4.2 Hypothesis testing result

The associated hypothesis for RQ3 is

H_{03} ***The online posts made by the Wisconsin archive Facebook community revealed no significant differences among the revealed subject schemas.***

The categories tested come from the identified themes: *archive story*, *communication*, *outreach*, and *information*. These themes provide the foundation for the hypothesis test in H_{03}. The frequencies for each category come from the corresponding frequencies found for each theme, meaning, *archive story* had a frequency of 358, *communication* had 54, *outreach* was 28, and *information* had 18 for $n = 458$. These four themes and their corresponding frequencies provided the basis for the hypothesis testing. The significance level was 0.05. SPSS was used to test the hypothesis, and a Chi-Square test was conducted. The result is that the proposed hypothesis is rejected as resultant p-value .000 < than the significance level 0.05, the Chi Square value 699.373 and $df = 3$. The result means there is a significant difference among the subject schemas. *Table 30* illustrates the Chi-Square results.

	Theme_Code
Chi Square	699.373
df	3
Asymp. Significance	.000

Table 30. H$_{03}$ Chi Square Results

4.5 Findings for research question 4 (RQ4)

In this section research question 4 (RQ4) will be answered. Each section introduces the

topic addressed, results, and the analysis.

RQ4 is stated as the following:

RQ4: ***How do the post characteristics (use of pictures, use of embedded hyperlinks, and use of
digital collections) influence the online activities of the Wisconsin archival Facebook
community?***

RQ4 is addressed in three hypotheses (H$_{04}$, H$_{05}$, H$_{06}$); each associated hypothesis breaks

down the stated characteristics in RQ4.

4.5.1 Hypothesis H$_{04}$

4.5.1.1 Hypothesis testing H$_{04}$ result

The first hypothesis is stated here:

H$_{04}$ ***There is no significant relationship between using a picture in a post and not using a
picture in a post in terms of online activities on the Wisconsin archival Facebook
community.***

The 458 posts were divided into two categories, posts with pictures, and those without

pictures. Posts with pictures*,* valued at 136; posts without pictures, valued at 322, for a total

number of 458. Then breaking down the without pictures category further: hyperlink posts

numbered 202; video numbered 9; finally, there were 111 posts that contained no pictures, links,

or videos. It was the two main categories, posts with pictures and posts without pictures that

provided the foundation for the hypothesis test in H$_{04}$. The frequencies for both categories came

from the corresponding online activities associated with each category. Posts that contained

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pictures had online activities valuing 920 and posts without pictures valuing 677. The significance level was 0.05. UCINET was used to test the hypothesis; an independent T-test was conducted. The result is that the proposed hypothesis is rejected as there was a significant difference in the posts with a picture (mean = 6.7, SD = 9.02) and posts without a picture (mean = 2.1, SD = 4.97); $t(456) = 7.004$, $p = 0.0001$.

4.5.2 Hypothesis H$_{05}$

4.5.2.1. Hypothesis testing H$_{05}$ result

The second hypothesis is stated here:

H$_{05}$ *There are no significant differences between posts with embedded hyperlinks and posts without embedded hyperlinks in terms of their online activities on the Wisconsin archival Facebook community.*

The 458 posts were divided into two categories, posts with hyperlinks and those without hyperlinks. Posts with hyperlinks valued at 202; posts without hyperlinks valued at 256, for a total number of 458. It was the two main categories, posts with hyperlinks and posts without hyperlinks that provided the foundation for the hypothesis test in H$_{05}$. The frequencies for both categories came from the corresponding online activities associated with each category. Posts that contained hyperlinks had online activities valuing 288 and posts without hyperlinks valuing 1,309 for online activities which equaled 1,597. The significance level was 0.05. UCINET was used to test the hypothesis; an independent T-test was conducted. The result is that the proposed hypothesis is rejected as there was a significant difference in the posts with a hyperlink (mean = 1.42, SD = 3.17) and posts without a hyperlink (mean = 5.11, SD = 8.28); $t(456) = -5.9944$, $p = 0.0001$.

4.5.3 Hypothesis H$_{06}$

4.5.3.1. Hypothesis testing H$_{06}$ result

The third hypothesis is stated here:

H₀₆ *There is no significant difference between posts by those WAFC with digital collections and posts by those without digital collections in terms of their online activities on the Wisconsin archival Facebook community.*

WAFC posts were divided into two categories, posts associated with digital collections valued at 320 and posts not associated with digital collections valued at 138, for a total number of 458. Then, the total number of online activities was calculated per post which is 1,597. It was the two main categories, posts with digital collections and posts without digital collections that provided the foundation for the hypothesis test in H_{06}. The significance level was 0.05. UCINET was used to test the hypothesis; an independent T-test was conducted. The result is that the proposed hypothesis is rejected as there was a significant difference in posts with digital collections and those without digital collections in terms of their online activities. Posts with digital collections had a result: mean = 2.3, *SD* = 5.2, and posts without digital collections had a result: mean = 6.22, *SD* = 8.92; *t* (456) = -5.87, *p* = 0.0001.

4.6   Data analysis

There are four research questions and six hypotheses that were conducted in this study. In order to thoroughly examine each area, *4.6 Data analysis* breaks down each research question and its corresponding hypotheses.

4.6.1   Analysis of RQ1 & H₀₁

In addition to the determination that there is a significant difference among WAFC members, specific members were able to be identified from the H_{01} analysis. Degree identifies the "extent to which a node connects to all other nodes in a social network" (Knoke & Yang, 2008, p. 63). Degree measures both the in_ and out_degrees for an actor. A high degree measure means that the actor is sharing high amounts of information (out_degree), and receiving information from actors in the network (in_degree). The higher the total degree measurement, the more

connectivity the actor has with other actors in the network. The top 20 of the key actors in terms

of degree are listed in *Table 31*. Appendix A has the complete listing of the WAFC degree results.

	Name	Degree
1	UW-Green Bay Archive & Area Research Center	733
2	Ward Irish Music Archive	347
3	UW-Parkside Archive & Area Research Center	262
4	UWGB Cofrin Library	187
5	Person-Other	183
6	Staubitz Archive	153
7	UWGB	145
8	Person-Other	142
9	Lawrence University Archive	133
10	UW-GB Alumni	109
11	UW-Madison	88
12	UW-River Falls Archive & Area Research Center	73
13	UW-Parkside Library	67
14	Person-Other	47
15	Person-University	46
16	Person-Other	44
17	Person-University	39
18	Person-Other	32
19	Person-Archive	30
20	Person-Other	26

Table 31. Top 20 Actor degree centrality results

Four of the top five actors as measured by degree centrality are UW-Green Bay Archive &

Area Research Center (733), Ward Irish Music Archive (347), UW-Parkside Archive & Area

Research Center (262), and UWGB Cofrin Library (187). These four actors have the most

information flowing through them in WAFC, particularly, UW-Green Bay Archive and Area

Research Center which is incredibly influential with a degree centrality measure of 733.

Out of the top twenty actors of degree centrality, most actors were from the archive category. *People* in three different sub-categories accounted for another significant portion as well. Four of the five top actors are archives, the fifth entity is in a related category, cultural institution; what is more, UWGB Cofrin Library is on the same campus as the UW-Green Bay Archive & Area Research Center. *Figure 19* is an illustration of the categorical breakdown of actors in the top twenty of degree centrality.
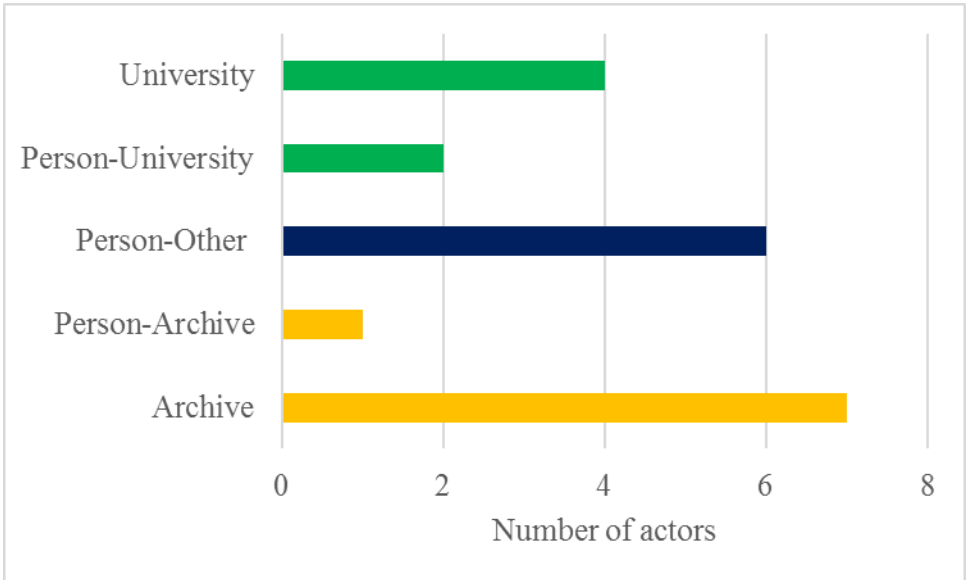
Figure 20. Categorical breakdown of the top 20 actors measured by degree

Closeness refers to how quickly nodes can interact with each other in a network without having another node function as an intermediary. Here, the higher the actor's centrality value, the more important it is in the network as the actor can reach other actors through a shorter distance. The top 20 of the key actors in terms of closeness are listed in *Table 32*. Appendix B has the complete listing of the WAFC closeness results.

Rank	Name	Closeness
1	UW Green Bay Archive & Area Research Center	2.006614089
2	Ward Irish Music Archive	2.005207479
3	Person-Other	1.984434783
4	Person-Other	1.984180093
5	Person-Cultural Institution	1.983045459
6	Person-Cultural Institution	1.983045459
7	Voyageur Magazine	1.981479883
8	Person-Other	1.979384542
9	Brown County Historical Society & Hazelwood	1.978451192
10	Person-Other	1.978437603
11	Person-Business	1.977381825
12	Person-Other	1.977381825
13	Staubitz Archive	1.975711823
14	Person-University	1.97530508
15	UW Digital Collections	1.974885404
16	Person-University	1.974722385
17	UWGB	1.97465682
18	Person-University	1.97444737
19	Person-Other	1.974385381
20	Person-University	1.973878026

Table 32. Top 20 Actor closeness centrality results

The top five actors as measured by centrality are UW-Green Bay Archive & Area Research Center, Ward Irish Music Archive, two *Person-Other*, and one *Person-Cultural Institution.* This means that in terms of closeness UW-Green Bay Archive & Area Research Center and the Ward Irish Music Archive have the most direct connections in the WAFC when measured by closeness. In the practical sense, having a high closeness measurements means that the top five actors have the most direct connections within the WAFC. However, out of the top twenty actors, the category of *Person-Other* had the most participants. In fact, the category of *people* was a highly influential group in terms of closeness, other than a couple of archives and

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cultural institutions; it is *people* that comprise the most connected closeness group. *Figure 20* illustrates the categorical breakdown of the closeness centrality by actor affiliation.
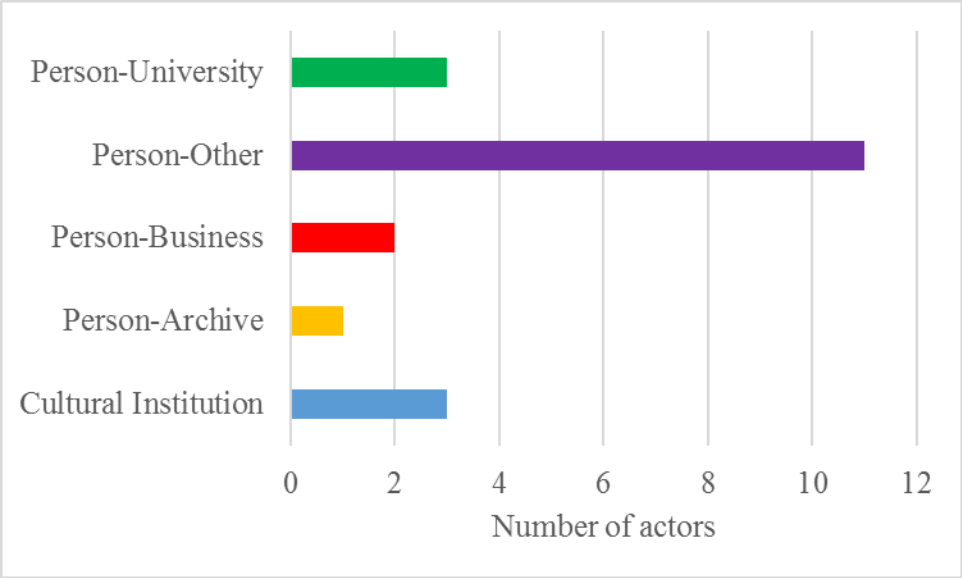
Figure 20. Categorical breakdown of the top 20 actors measured by closeness

Betweenness is determined by measuring each pair of nodes and the "proportion of all shortest paths from one to the other pass through the focal node" (Borgatti, Everett, & Johnson, 2013, p. 174). In other words, the betweenness measure uncovers who the gatekeepers of information are in a social network, as information that reaches a high betweenness actor can either be permitted to continue to spread through the network, be stopped, or modified in some way. The top 20 key actors in terms of betweenness are listed in *Table 33*. Appendix C has the complete listing of the WAFC betweenness results.

	Name	Betweenness
1	Reference, Access & Outreach Section of the Society of American Archivists	20945.48633
2	Person-Other	9565.336914
3	Person-University	7010.133301
4	Person-Archive	6608.621582
5	The Lawrentian	4021.584473
6	Person-Other	3801.711426
7	Person-Other	3175.937988
8	American Folklife Center	3168.350098
9	Person-Other	3091.373047
10	UWM ArtHistory	3044.569092
11	Person-Other	3041.214844
12	Person-Cultural Institution	2491.459473
13	Person-Other	2407.5
14	Leprechaun's Gate	2325
15	Person-Other	2114.161377
16	Person-Other	1687.019043
17	Person-Other	1565.467651
18	Gogebic & Iron Country Happenings	1158.544434
19	Person-Other	1123.977783
20	Person-University	1123.977783

Table 33. Top 20 Actor betweenness centrality results

The top five actors measured by betweenness are Reference, Access & Outreach Section of the Society of American Archivists (20945.49), *Person-Other* (9565.32), *Person-University* (7010.13), *Person-Archive* (6608.62), and The Lawrentian (4021.58). The betweenness measure has several interesting results. First, is discovering that the top betweenness measurement is from the Society of American Archivists, which is the professional affiliation of American archivists. Second, is that *archive* is the top category in betweenness. *People*, *business*, and *cultural institutions* are also significant in the top 20 betweenness measurements. *Figure 21* illustrates the

categorical breakdown of the betweenness centrality by category. This means that *archive* is the major gatekeeper of information in the WAFC.
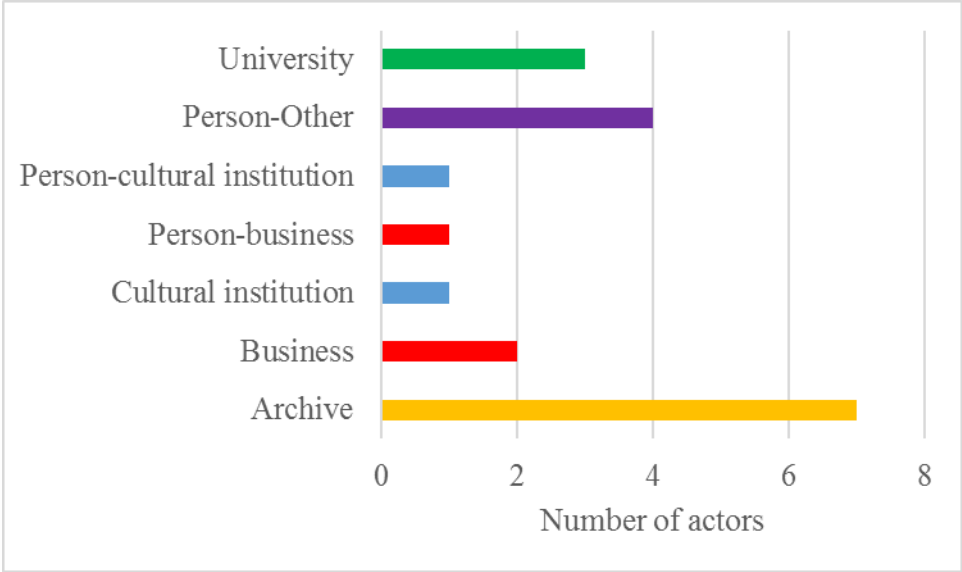
Figure 21. Categorical breakdown of the top 20 actors measured by betweenness

In summary, each centrality measurement uncovered who the key/actors and players were in the WAFC and determined how information moved throughout the network. Degree is the overall number of ties. Closeness is how central a node is within the network. Betweenness measurement illustrates how often a node is used as a bridge to other nodes in the network. University of Wisconsin Green Bay Archive & Research Center and Ward Irish Music Archive have the highest measurement in both degree and closeness. However, neither of these archives appear in the betweenness top five actors. A comparison chart is listed in *Table 34* which indicates the top five actors in each measurement. The top five actors of the betweenness measurement are not actual archive institutions. This finding indicates that archives are isolating themselves within the WAFC. In other words, few connections are being made to other entities within the network. Archives are adding friends and are sharing information that they create and post themselves, but are not bringing in information from other members of the WAFC.

Betweenness	Measurement	Degree	Measurement	Closeness	Measurement
Reference, Access & Outreach Section of the Society of American Archivists	20945.48633	UW-Green Bay Archive & Area Research Center	733	UW Green Bay Archive & Research Center	2.0066
Person-Other	9565.336914	Ward Irish Music Archive	347	Ward Irish Music Archive	2.005207
Person-University	7010.133301	UW-Parkside Archive & Area Research Center	262	Person-Other	1.9844
Person-Archive	6608.621582	UWGB Cofrin Library	187	Person-Other	1.98418
The Lawrentian	4021.584473	Person-Other	183	Person-Cultural institution	1.983045

Table 34. Top five actors of each centrality measurement

4.6.2   Analysis of RQ2 & H_{02}

RQ2 focused on the relationships and the sharing of information in the WAFC amongst groups. These groups were identified as *archive*, *business*, *cultural institution*, and *university*. H_{02} consisted of three different measurements: degree ($H_{02(a)}$), closeness ($H_{02(b)}$) and betweenness ($H_{02(c)}$). Each sub-hypothesis and its distinct analysis are discussed here.

4.6.2.1 Analysis of $H_{02(a)}$

$H_{02(a)}$ revealed that there is a significant difference among actor affiliations in terms of degree centrality. *Figure 22* provides a visual layout of the average degree centrality of the WAFC. *Figure 22* illustrates that the actor affiliation that has the highest mean degree measurement is *archive* with a value of 165.4. The next highest actor affiliation is *university* which has a value of 34.2. Both *business* and *cultural institution* have similar values (9.57 and 9.53 respectively), which are significantly lower than the other two actor affiliations.
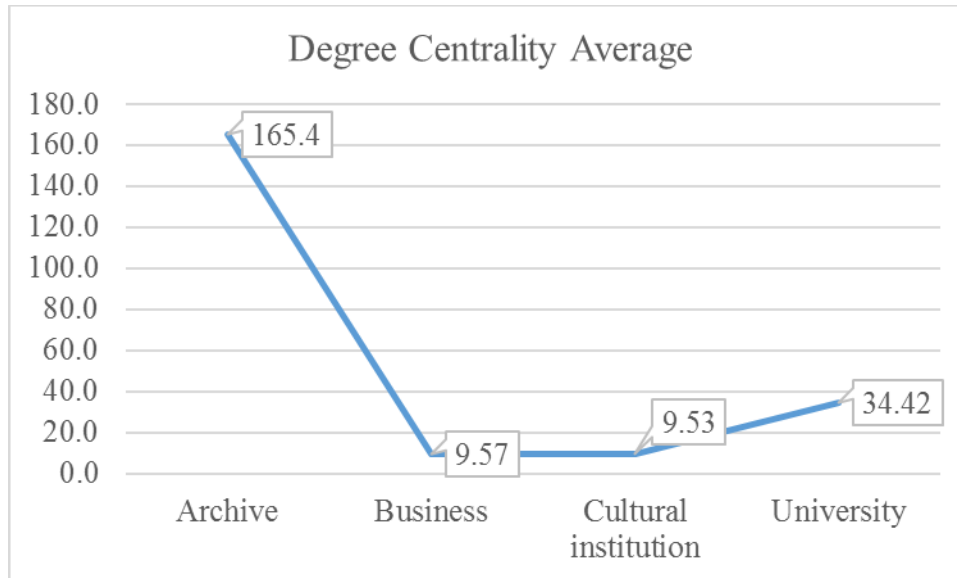
Figure 22. Degree centrality average amongst WAFC actor affiliations

The findings indicate that *archive* has a high influence on information in the WAFC. This means that information typically travels through an *archive* node before reaching other nodes in the network. *Figure 23* provides a full display of the WAFC as determined by degree centrality; in *Figure 23*, the larger the node, the higher the degree value.
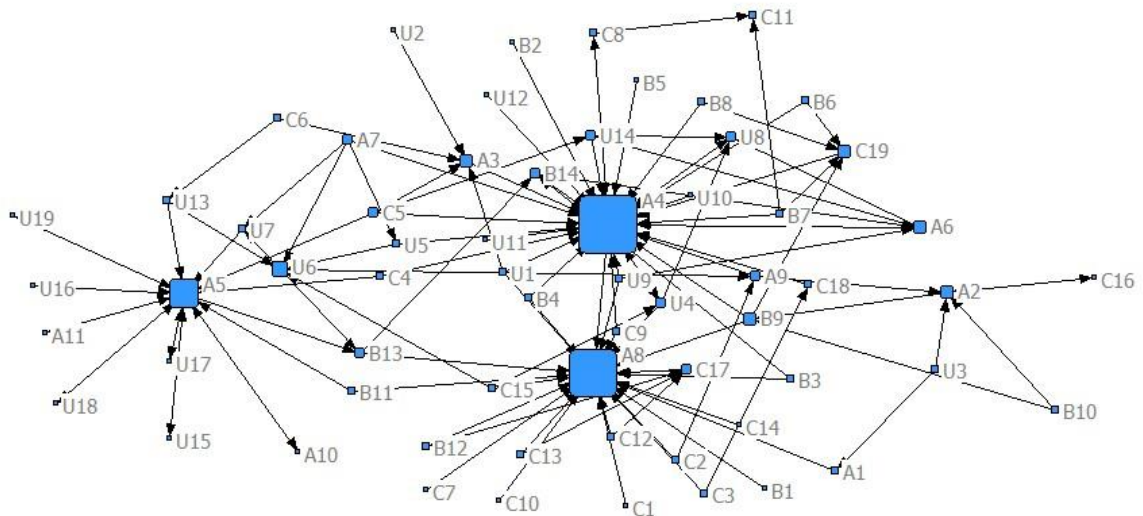

Figure 23. Visual display of the WAFC actor affiliations as determined by degree centrality

It is clear from *Figure 23* that some *archive* nodes are in control of other actor affiliations. For instance, node A8 has a high number of *cultural institutions* nodes that it has influenced. Whereas, node A5, is in control of a high number of *university* actor affiliation nodes. However, node A4 appears to have a mix of *business*, *cultural institutions*, and *university* nodes. These nodes also have a higher connection to other nodes within that cluster, it is important to be connected to nodes that also are highly connected themselves. As determined in section 4.1, node A4 (UW-Green Bay Archive & Area Research Center) was, in fact, the highest ranked degree centrality node and had a degree centrality score of 733.

However, there is room for improvement. *Section 4.2* determined that the highest possible degree score for the WAFC was 809 for individuals. This means that even though the actor affiliation, *archive*, scored highest out of the actor affiliations, there are still many missed connections that *archive* could connect to influence the network more directly.

4.6.2.2 Analysis of $H_{02(b)}$

$H_{02(b)}$ revealed that there is a significant difference among actor affiliations in terms of closeness centrality. *Figure 24* illustrates that the actor affiliation that has the highest mean closeness measurement is *archive* with a value of 1.95. The next highest actor affiliation is *university* which has a value of 1.74. Both *business* and *cultural institutions* have smaller values (1.19 and 1.41 respectively), which are significantly lower than the other two actor affiliations.
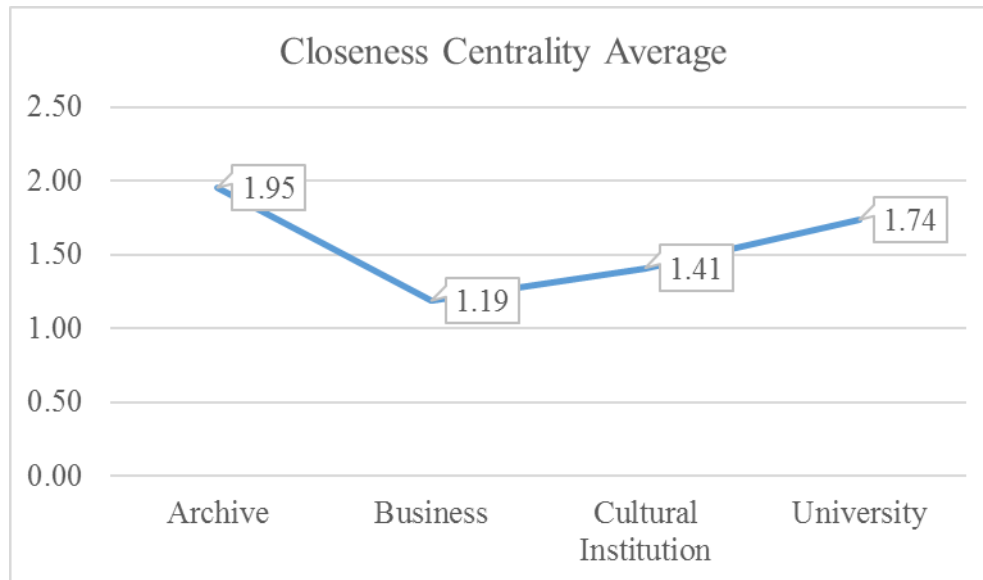
Figure 24. Closeness centrality average amongst WAFC actor affiliations

Within centrality degree, the paths that information takes through the nodes is important. An actor has a strong centrality degree if the reach of the actor is able to get to many other actors in the network. *Figure 25* provides a visual layout of the average closeness centrality of the WAFC; the node's importance increases with size. *Figure 25* also illustrates that even though *archive* is an actor affiliation and has the highest centrality degree, there are other actors within the network that have a stronger centrality degree as evident by the size of the node. For instance, *Figure 25* demonstrates that there are a number of *cultural institutions* that have a higher closeness centrality than *archive* actor affiliation, and as determined in *Section 4.2, cultural institutions* accounted for 15% of the total actors that had the highest closeness centrality.
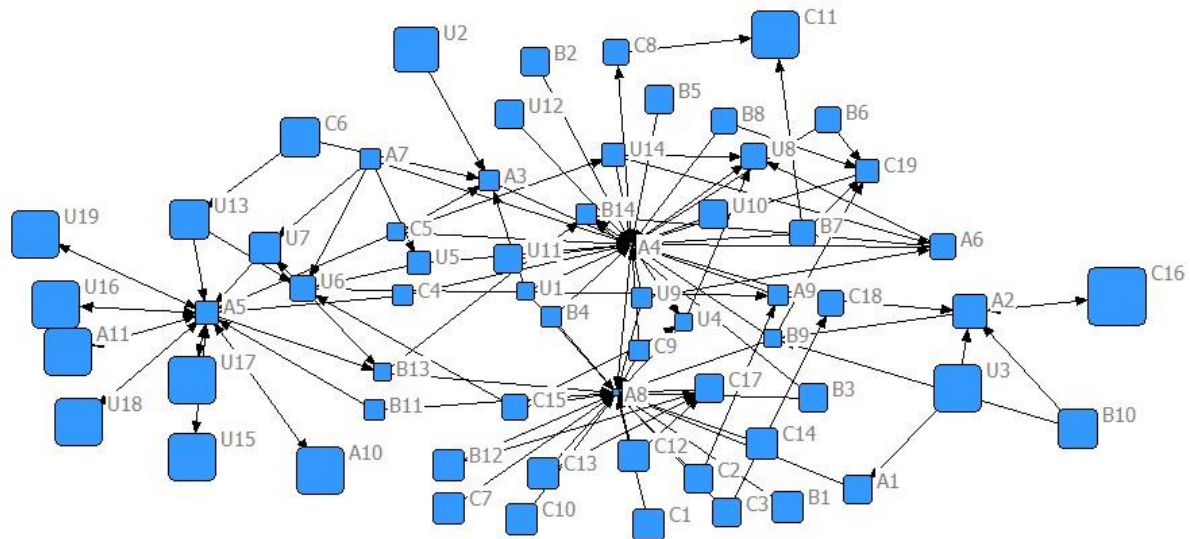
Figure 25. Visual display of the WAFC actor affiliations as determined by closeness centrality

4.6.2.3 Analysis of $H_{02(c)}$

$H_{02(c)}$ revealed that there is a significant difference among actor affiliations in terms of betweenness centrality. *Figure 26* illustrates the average betweenness centrality amongst actor affiliations in conjunction with betweenness centrality. Then comparing between other different actor affiliations, there is a great divide of betweenness. For instance, the *archive* affiliation ranks far higher in betweenness centrality than any other affiliation.
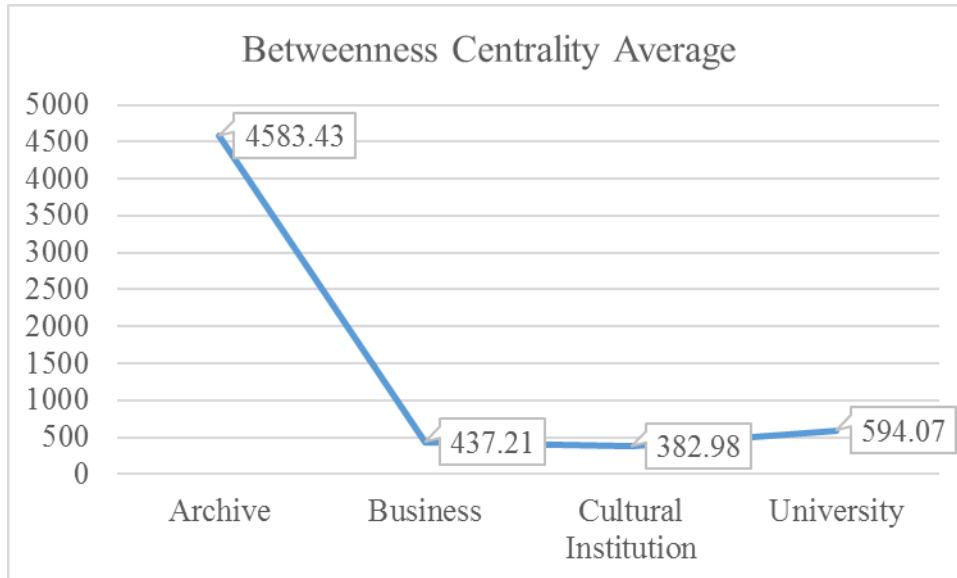
Figure 26. Betweenness centrality average amongst WAFC actor affiliations

Section 4.6.1 found that on an individual basis, *archive* is the keeper of information, as actors from this affiliation had the highest betweenness centrality measurement. *Figure 27* provides a visual layout of the betweenness centrality of the WAFC; the node's importance increases with size. It is evident from *Figure 27* that *archive* is an important player for betweenness.

The findings from H_{01} revealed that on an individual basis *archive* is the keeper of information, these findings are strengthened by $H_{02(c)}$, which determined that as a whole unit, *archive* again is the most important affiliation when defined by betweenness centrality. *Figure 26* also illustrates that *archive* has the highest betweenness centrality measurement with a value of 4583.43; however, when actor affiliations are grouped together, connectivity between nodes can be diminished. Meaning that it is important to remember that there can be a disparity amongst actors within the same affiliation. This further emphasizes the importance of connecting with other actors outside of one's own affiliation group, as "betweenness reaches its maximum value when the node lies along every shortest path between every pair of other nodes" (Borgatti,

Everett, & Johnson, 2013, p. 174). The disparity will be discussed more in *Section 4.6.1 Unique findings.*
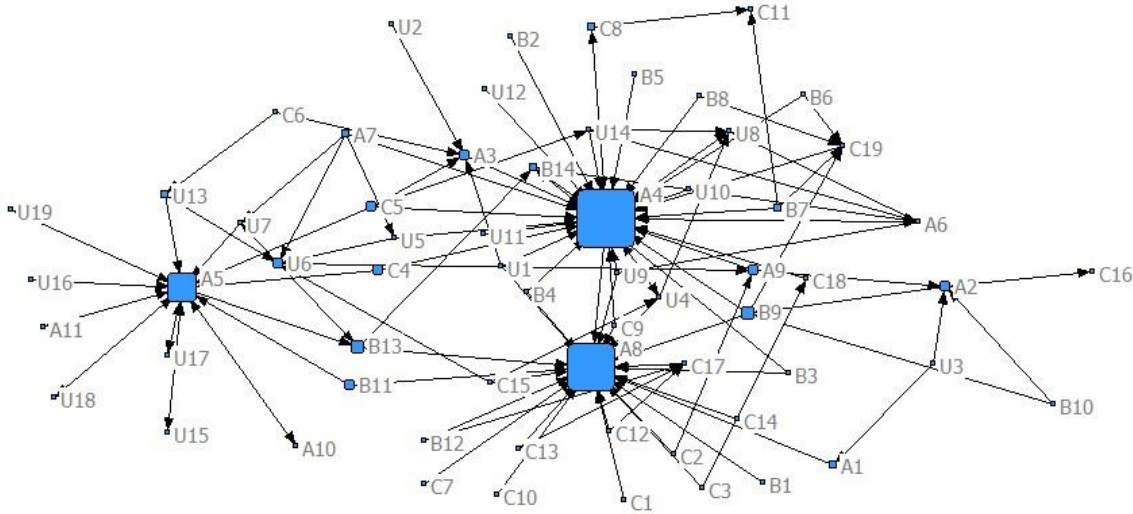
Figure 27. Visual display of the WAFC actor affiliations as determined by betweenness centrality

In summary, each centrality measurement uncovered who the most influential groups were in the WAFC and determined how information moved throughout the network. As in RQ1, degree is the overall number of ties. Closeness is how central a node is within the network. Betweenness measurement illustrates how often a node is used as a bridge to other nodes in the network. Whereas RQ1 focused on individual actors and found that archives are only included in the top five measurements of degree and closeness; when grouped together archives have the top measurement for all centrality. This means that overall archives behave in a similar fashion in an online setting, at least on Facebook. The findings indicated that while archives do have the top centrality score, other groups have a competitive score. This illustrates that there are connections that are not being reciprocated by archives. This finding is further backed by the findings from H_{01}, which demonstrate on an individual basis that there are individual actors that far outscore

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archives in all measurements because out of the top five spots for each centrality measurement, archives only appear 27% of the time.

4.6.3 Analysis of RQ3 & H$_{03}$

RQ3 sought to understand the content of each online activity ('tag', 'share', 'like', and 'comment'), and what the content and online activities revealed about the Wisconsin archive Facebook community. This question was answered by conducting a thematic analysis of the posts. Four themes were revealed by the thematic analysis, *archive story*, *communication*, *outreach*, and *information*. *Archive story* was defined as, "creates awareness about the archive, and is associated with the archive's identity. The promotion and marketing of the archive might be embedded in the post. There is also information regarding general archiving techniques, such as processing and collections." *Communication* was defined as "provides relatability for the archive. Announcements like new staff members, retirements, and Throwback Thursday posts all create avenues for the archive to interact with the public. Communication can also include incentive posts to entice interaction". *Outreach* was defined as, "includes different services that the archive provides, such as, events, workshops, and educational programs. Some posts are 'mini' educational pieces, providing information about how to go about researching genealogical information." Finally, *information* was defined as, "includes information regarding the hours of the archive, weather, and job postings."

RQ3 was also answered by conducting Chi Square analysis on the associated hypothesis (H$_{03}$) which stated, *"The online posts made by the Wisconsin archive Facebook community revealed no significant differences among the revealed subject schemas"*. H$_{03}$ was rejected as the Chi Square analysis revealed that there are significant differences among the subject schemas.

RQ3 sought to better understand the content of posts from the WAFC. The keywords extracted from each post revealed that there were few shared keywords amongst the WAFC.

Archive story yielded the most use by the WAFC; it also had the highest number of interactions. *Communication* was the second highest, *outreach* was the third, and *information* was the least used.

4.6.4 Analysis of RQ4 & H_{04}

H_{04} revealed that there is a significant relationship between using a picture in a post and not using a picture in a post. Further analysis revealed that the posts with pictures category generated the highest value of online activities for all online activity types ('like', 'comment', 'comment like', 'share', and 'tag'). *Figure 28* is an illustration of the difference of online activities per post.
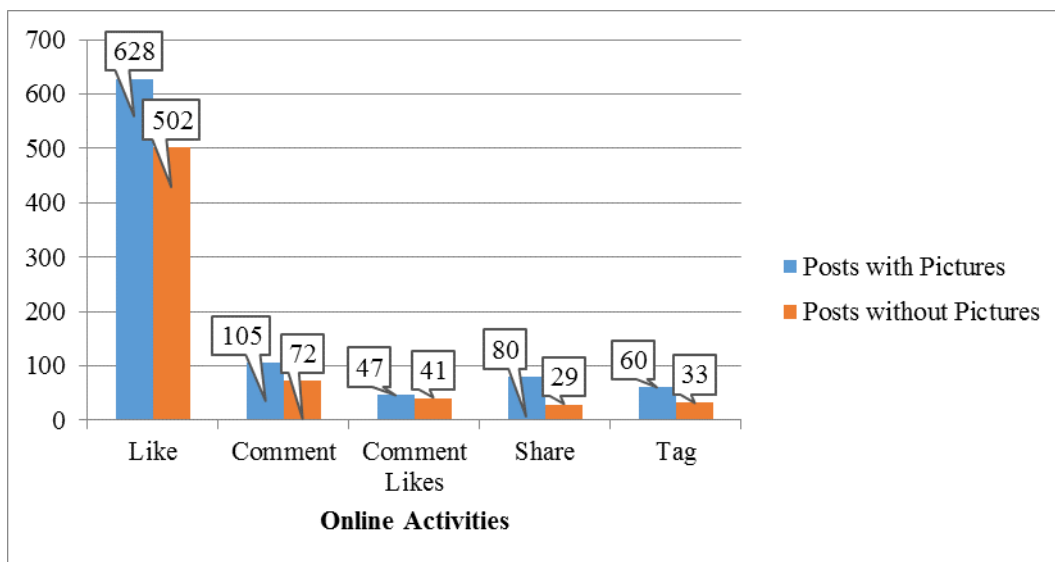
Figure 28. Comparison distribution of online activities across posts with and without pictures

Within the *archive story* theme, posts without pictures had a much higher percentage of use at 76% as compared to posts with pictures which yielded 24%. However, posts with pictures that were also categorized as *archive story* had a higher online activity rate at 56%, as compared to *archive story* posts without pictures, 44%. As a result, posts categorized as *archive story* and had a picture associated with that post had an online activity value of 12% above all other posts.

Figure 29 is an illustration of the distribution themed posts with and without pictures across themes.

The remaining three themes (*communication*, *outreach*, and *information*) did not have an obvious difference of online activity rates when posts were combined with or without pictures.
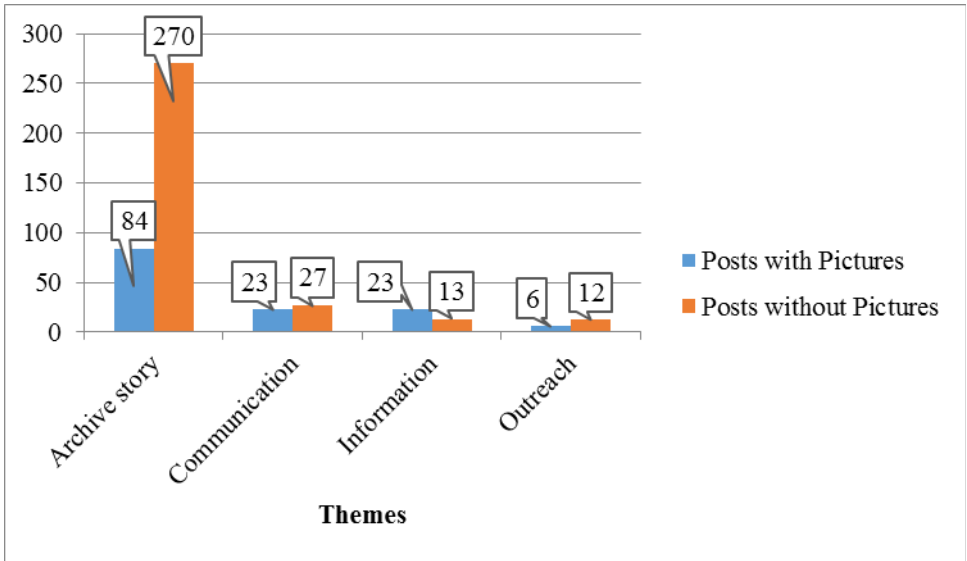
Figure 29. Comparison distribution of posts with and without pictures and across themes

The primary reason for the rejection of H_{04} is that the WAFC has different emphases on posts with pictures and those without pictures. The WAFC had more posts that did not contain pictures with a total of 322, however, posts with pictures (even though it was a lower frequency of occurrence with a total of 136) had a higher value of online activities. This finding means that suggestions will be able to be developed for archives in terms of what followers interacted with the most. In addition, the themes combined with online activities provide a deeper analysis of the WAFC. For instance, *archive story* posts that contained a picture had an online activity value of 11.44% higher than other *archive story* posts.

4.6.5 Analysis of RQ4 & H_{05}

The result is that the proposed hypothesis is rejected as there was a significant difference in the posts with a hyperlink and those without a hyperlink. Posts without hyperlinks generated

more online activity than posts with a hyperlink. Further analysis revealed that the posts without hyperlinks generated the highest number of online activities for all types ('like', 'comment', 'comment like', 'share', and 'tag'). *Figure 30* is an illustration of online activities for posts with and without hyperlinks.
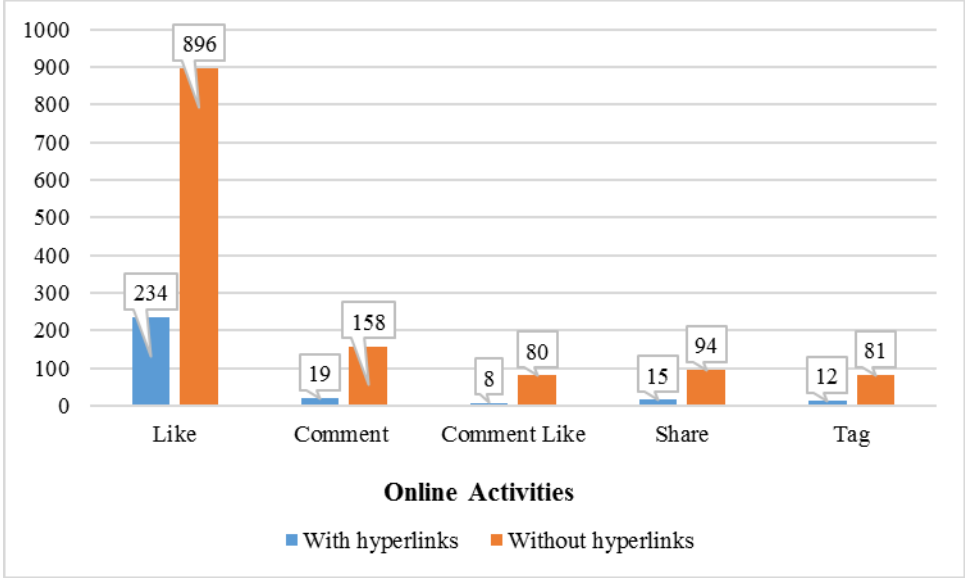

Figure 28. Comparison distribution of online activities across posts with and without hyperlinks

Posts with and without hyperlinks were most widely associated with the *archive story* theme. *Figure 31* is an illustration of the themes as distributed by posts with hyperlinks and those without. Across all the themes, posts without hyperlinks outnumbered posts with hyperlinks. In addition, posts without hyperlinks had a much higher online activity concentration across all posts, for instance, posts without hyperlinks accounted for over 56% of total online activity.
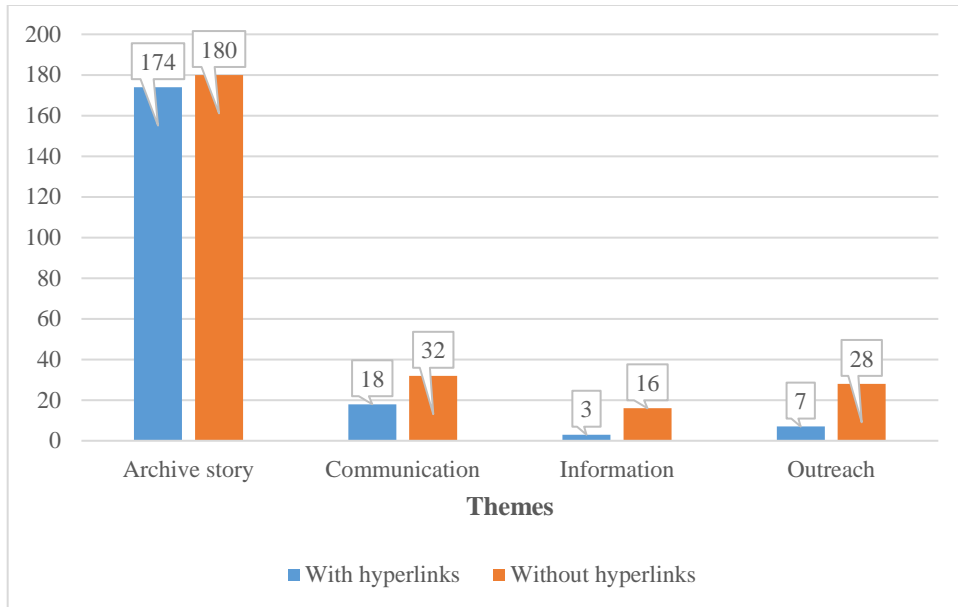
Figure 29. Comparison distribution of posts with and without hyperlinks across themes

The primary reason for the rejection of H_{05} is that the WAFC had different behaviors on posts with hyperlinks and those without hyperlinks. The WAFC had more posts that did not contain hyperlinks (with a value of 256), and those posts without hyperlinks had a much higher online activity rate than posts with hyperlinks. The findings of H_{05} suggest that embedded hyperlinks did not boost the online activities. People may prefer direct information in a post rather than indirect information hidden in a hyperlink. In addition, the themes combined with online activities provide a deeper analysis of the WAFC. For instance, *archive story* posts had the highest online activity rate for posts both with and without a hyperlink.

4.6.6   Analysis of RQ4 & H_{06}

H_{06} revealed that there is a significant relationship between WAFC posts with a digital collection and the number of online activities associated with each post. Interestingly, many posts came from WAFC posts that have a digital collection and had a value of 320 posts; WAFC posts without digital collections were valued at 138 posts. However, most online activities came from WAFC posts without digital collections. The total online activity of WAFC posts with digital collections was valued at 738; WAFC posts without digital collections numbered 859, yielding a

total of 1,597. *Figure 32* is an illustration of the distribution of all online activities types ('like',
'comment', 'comment like', 'share', and 'tag') per posts with and without digital collections.

Posts without digital collections had a much higher percentage of 'commenting' and
'sharing' than posts with digital collections. Overall, 'commenting' accounts for 11% of total
online activity in the WAFC, however, posts without digital collections accounted for 66% of
those 'comment' online activities. In addition, 'sharing' accounted for 7% of total online
activities, but posts without digital collections accounted for 70% of those total 'shares'.
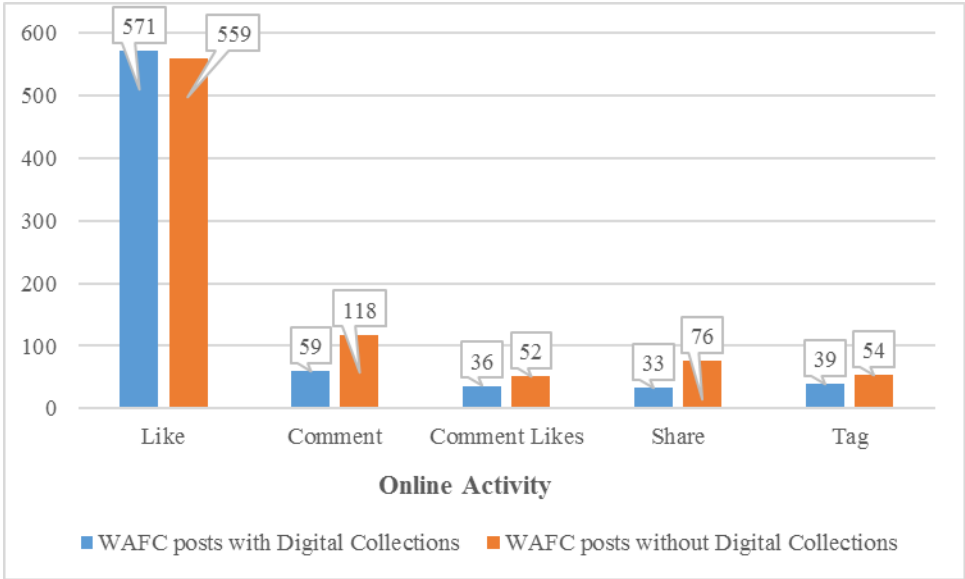
**Figure 30. Comparison distribution of online activities for WAFC posts with and without
digital collections**

The thematic distributions were not evenly distributed across posts with and without
digital collections. Posts with digital collections were largely responsible for *archive story* posts;
over 76% of *archive story* posts came from WAFC posts with digital collections as opposed to
24% from WAFC posts without digital collections. The remaining three themes (*communication*,
outreach, and *information*) did not have an obvious difference of online activity rates when posts
were combined with or without digital collections. *Figure 33* shows the distribution of online
activities across themes and WAFC posts with and without digital collections.
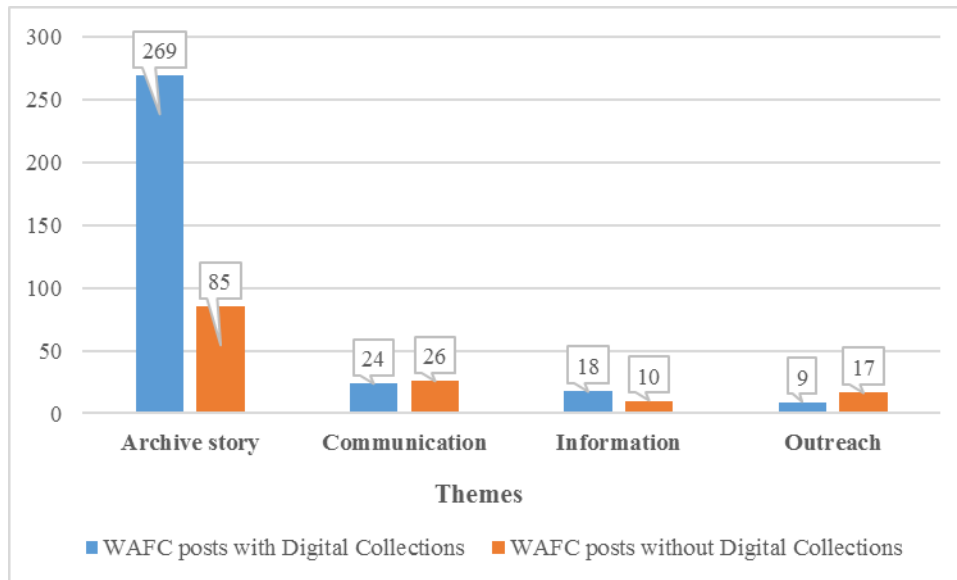
Figure 31. Comparison distribution of online activities within themes and across WAFC posts with and without digital collections

The primary reason for the rejection of H_{06} is that WAFC posts with digital collections and those WAFC posts without digital collections have a different online activity rate. WAFC posts with digital collections consisted of most posts in the WAFC, valued at 320; however, WAFC posts without digital collections did have a higher rate of online activity, valued at 859. In addition, WAFC posts with digital collections had many *archive story* theme posts, valued at 269. This finding means that WAFC posts with digital collections may be posting more *archive story* theme posts because they have easy access to archive stories and pictures.

4.6.7 Data analysis summary

RQ1 sought to identify who the key actors/players in the Wisconsin archival community were when they exchange and share information on Facebook. Consequently, H_{01} measured the WAFC in terms of closeness, betweenness, and degree. Most of the actors that had a high degree centrality were *archives* in the WAFC. This means that most information that is shared within the WAFC is being created and disseminated by *archives*. However, there were a significant percentage of *people* that were highly ranked degree actors as well as *cultural institutions*. This

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means that if *archives* can harness and open their network, more information from other actors can be created and shared as well, thus developing a stronger online community.

       People are highly connected in the closeness centrality measure; this category has the highest direct connectivity out of any other group in the WAFC. This finding demonstrates the importance of engaging with other WAFC members as it is not just the influence from *archive* institutions that is important, but also the finding that the online activity of *people* is a highly influential direct group.

       Archive was found to be the top holders of betweenness measurements in the WAFC. This means that archives have a lot of power over the information that is shared and distributed in the network. However, this puts more pressure on archives to ensure that they are the makers of their own design within the network; meaning that other participants are not in a position in the WAFC network to create new ties. Consequently, it is important for archives to articulate to other participants of other information within the network as this will ensure healthy growth of the network and bring in other ideas and information. These three centrality measurements: degree, closeness, and betweenness all provided critical information about the WAFC.

       RQ2 sought to determine the differences among the actor affiliations in the WAFC when they exchange and share information on Facebook. H_{02} was created to answer RQ2, which stated, there are no significant differences among actor affiliations in terms of interactions (degree, closeness, and betweenness) on the Wisconsin archive Facebook community. H_{02} was divided into three sub-hypotheses to measure each interaction. $H_{02(a)}$, $H_{02(b)}$, and $H_{02(c)}$ were rejected as there were significant differences among actor affiliations on the Wisconsin archive Facebook community (WAFC) in term of centralities (degree, closeness, and betweenness). The actor affiliation that had the highest measurement for each centrality was *archive*. This means that most information is controlled by *archive* as compared to other actor affiliations.

The degree, closeness, and betweenness centrality measurements findings emphasize the importance that other affiliation groups can strengthen one's connectivity within the network. For instance, *university* and *cultural institutions* often had high degree and closeness measurements. However, those two measurements illustrate that in a network environment, it is not enough to be connected to one's own affiliation; meaning the more diverse the group, the more likely that the influence of information can be betweenness measurements, not as large as *archive*, but still important results. Consequently, diversifying the actors within one's network can strengthen the connectedness within the network as it increases the likelihood that other networks and actors can be reached.

Three major areas of analysis were revealed by RQ3: first, the originality of the posts; second, the keywords and their uniqueness. The third and final area is the themes revealed by the thematic analysis and the testing of the associated hypothesis H_{03}. These areas are discussed in this section. More emphasis on the practical significance of these findings is in *Section 4.6.1.2 Content sharing* and *4.7 Implications*.

The thematic analysis schema reveal four major areas that WAFC members create: *archive story*, *communication*, *information*, and *outreach*. The associated hypothesis, H_{03}, was rejected, meaning that there are significant differences amongst the subject schema. For instance, *Archive story* relates to the emphasis that an archive places on its collection, history, and community. Being the largest subject topic discussed, it has obvious importance to the WAFC. Posts in this category are centered on connecting a WAFC member with an item or items in the archive collection; for instance, announcing that a new collection was donated by a university and employee A was currently processing the material. The post might also entail a picture of the employee working on the collection, and might include information regarding how processing worked.

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The importance of the use of *archive story* is further emphasized by the keyword analysis where 'year' (55% reoccurrence), 'archive name' (10% reoccurrence), 'archive material' (5% reoccurrence), 'cultural institutions' (4% reoccurrence), and 'holiday' (3% reoccurrence) were all important keywords in the WAFC. In addition, these posts were made by adding a picture which yielded a high return in interactions. However, posts with videos were the highest interaction return type.

Communication posts were the second highest category in the WAFC. Part of many archives' mission statements is to reach out and connect with the community. The purpose is two part, one to help the community realize that the archive holds important material that is available to many people (unless the archive is private), and secondly, to ensure that the community will continue to utilize archive services through future donations of archival material. *Communication* had the second highest number of interactions.

Outreach posts were the way that archives articulated workshops, events, and other face to face engagements. These posts provided information to other WAFC members of events going on at the archive. There were some instances of the archive sharing information regarding an event going on locally by maybe a parent institution or a local gallery that was hosting an event. *Outreach* posts also entailed the engagement of sharing archival practices with WAFC members. *Outreach* did not yield a lot of interactions. It is possible that by 'tagging' other people or institutions in the post or by providing more information regarding an event other than a simple link (just like the communication posts that utilized links the most) might generate more discussion amongst users. For instance, if the archive is hosting an event, perhaps by 'tagging' a local entity that might be interested in the event as well could be a way to make new connections.

Information posts were the most basic posts made by the WAFC. Time pending information was often articulated; for instance, the archive closing early to due to a weather

warning or other types of information posts included job postings. *Information* had the lowest

number of interactions, which is not unexpected given the 'one and done' type of content shared

via these posts.

The primary reason for the rejection of H_{03} is that the WAFC has different emphases on

the four themes in terms of their interactions on Facebook. The WAFC was more focused on

archive story (358) than *communication* (54), *outreach* (28), and *information* (18). This finding

means that suggestions will be able to be developed for archives in terms of what followers

interacted with the most. For instance, if archivists were to balance the type of posts, instead of

focusing on only *archive story*, different types of discussions could take place. The themes

combined with the interaction activities provide a deeper analysis of the WAFC.

There were differences in the number of interactions that occurred within the thematic

analysis. *Archive story* yielded the highest number of interactions with 1,005, followed by

communication with 367, then *outreach* at 138, and *information* had 87 for a total number of

interactions of $n = 1,597$. The interactions include 'like', comment', 'comment likes', 'tag', and

'share'.

RQ4 sought how to understand characteristics about posts (use of pictures, use of

embedded hyperlinks, and use of digital collections) and their influence on online activities by the

WAFC. Three hypotheses were generated from RQ4. H_{04} measured the influence of pictures in

posts in the WAFC and found a significant difference in posts with a picture and without a

picture. H_{05} measured the influence of hyperlinks in posts in the WAFC and found that there was a

significant difference in the posts with a hyperlink and posts without a hyperlink. H_{06} measured

posts by those WAFC with digital collections and posts by those without digital collections and

found that the hypothesis was rejected as there was a significant difference in posts with digital

collections and those without digital collections in terms of their online activities. Interestingly,

the use of hyperlinks decreases the likelihood that interaction will occur. Likewise, the lack of a digital collection typically had more interaction in themes regarding *information*, *communication*, and *outreach*. These findings are discussed in more depth in *Section 4.6.1.3 WAFC Post Characteristics*.

The rejection of the three hypotheses revealed that posts with pictures had increased online activity levels, whereas, hyperlink posts boosted little online activity. In addition, the presence of a digital collection to a post had increased online activity.

4.7   Discussion

This section includes a discussion of unique findings, irregular and unexpected findings, and a comparison of this study's findings with previous findings.

4.6.1   Unique findings

This study identified four research questions. *Sections 4.2 – 4.5* provided the findings for each of those questions. Each question dealt with a different area; *4.2* identified key actors of the WAFC in terms of centralities, *4.3* identified the affiliations and their influence in the WAFC in terms of centralities, *4.4* took a qualitative approach and conducted a thematic analysis of the posts, finally *4.5* identified characteristics of posts within the WAFC to discover what was the most influential. These findings are discussed in the following sections.

4.6.1.1 Information flow

Archives were identified as the main actors that have control over information flow in the WAFC; each one of the centrality measurements (degree, closeness, and betweenness) measured *archives* as the major contributor. However, *people* were also found to be highly connected within the WAFC. This means that instead of archives creating their own content to share in the WAFC, they could draw more from what their fellow WAFC members are posting to Facebook. This could generate not only new information being circulated, but it opens the possibility for other

Facebook users to join the WAFC. Some *archive* actors have diversified their followers and interacted with other WAFC member posts; these actors have the highest centrality measurements like UW-Green Bay Archive and Area Research Center and the Ward Irish Music Archive.

Group affiliation measurements (degree, closeness, and betweenness) of the online activities from RQ2, discovered the role of the actors within the Wisconsin archive Facebook community and found archives as a group to be the most influential in the WAFC. However, to have a well-rounded online community, it takes several contributors not just one group. As RQ2 identified, there is variability within the *archive* affiliation group. Hypotheses from RQ1 found that archives far out measured other actors, and hypotheses from RQ2 found that *archive* again as a group out measured other affiliation groups. However, there is a wide range of variability within each affiliation not just *archive*. For instance, *university* and *cultural institution* affiliations had instances within degree and closeness centrality measurements that were high, but due to varying averages within the group, the overall score was not high enough to out measure *archive*. These implications are discussed in depth in *Section 4.7 Implications*.

4.6.1.2 Content sharing

The thematic analysis uncovered the relatedness between the content and online activity (tagging, sharing, commenting, and liking) in the WAFC. Four major themes were identified by the thematic analysis *archive story*, *communication*, *outreach*, and *information*. *Archive story* was the most used theme by the WAFC and was associated with a high interaction rate. *Communication* was the second highest, *outreach* was the third, and *information* was the least used. While *archive story* was widely used, there was a lot of variability within this theme. For instance, there are few keywords shared amongst the WAFC; this finding reflects on the uniqueness of archives and their collections, but also demonstrates archives are not connecting with fellow archives.

The originality of the posts illustrates that the WAFC has interests that are unique to them at their perspective institutions. However, it also demonstrates that the WAFC is not using social media to its full potential. Sharing enables people and institutions to connect via a social media platform. Continuously creating new and original material is good, but should come with sharing of posts from community members. The sharing of posts enables archives to open themselves up to other potential community members. For instance, if an archive in another state recently digitized a collection and makes an announcement on Facebook, the act by another archive to 'share' that announcement and 'tag' that archive thereby allows the 'friends' of that archive to see the former archive.

The emphasis on originality is further emphasized by the lack of reoccurring words in the posts. Members of the WAFC are linked by their interest in archives. The keywords emphasize the archive collections that are unique to each archive, and on the same note, its history. Archives are defined by their communities and the collections that they oversee maintaining; all the WAFC members have this in common. By sharing posts from similar archives or other cultural institutions, the archive is still staying closely aligned to its core purpose and potential audience. However, in sharing, the archive has now reached beyond its own borders and could connect with followers of another archive. Part of the success of Facebook is the interactive process provided to users; marketing research suggests that sharing not only encourages participation from existing group members but also allows the potential for new network connections to be forged (Hsu, 2012).

4.6.1.3 WAFC post characteristics

Each Facebook post has unique characteristics associated with it. In addition to who posted it and the content of the post, there are several different pieces that can be added to bolster the post. For instance, the use of pictures, embedded links, and video can all be added to a post to

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make it more dynamic. Furthermore, due to the unique nature of the WAFC and the use of digital material, the fourth research question also analyzed the use of digital collections and their influence on WAFC posts.

Not surprisingly, posts that were associated with pictures yielded a higher interaction rate. Posts that had embedded hyperlinks which ultimately brought WAFC members out of Facebook, were not utilized. Posts that were associated with the theme *archive story* and had a picture had the highest online activity rate. The online activity of 'commenting' was also the highest when combined with the two previously mentioned variables. 'Commenting' is a dynamic way for Facebook users to interact. It is also the most time sensitive activity; whereas with embedded hyperlinks, 'liking' was the main online activity chosen to interact with those posts. 'Liking' is a minimally time sensitive action. If posts were associated with hyperlinks, the interaction rate decreased dramatically. Hyperlinks seemed to limit the amount of interaction that took place in the WAFC. This is most likely since the user would have to leave Facebook to go to that link to find out more information. As a result, more information should be added to the post regarding the link.

In addition, posts associated with digital collections had a higher online activity rate. These online activities were also more time sensitive like 'commenting'. *Archive story* posts were most widely associated with digital collections as well. This is most likely because it is less time consuming for an *archive story* post to be created if there is an existing digital collection from which to draw from. However, all other themes (*communication*, *information*, and *outreach)* had higher interaction rates with posts not associated with a digital collection. The major takeaway from these characteristics is that WAFC members like pictures, particularly pictures that have a short caption associated with them, as doing so generates discussion amongst community members.

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4.6.2 Irregular or unexpected findings

Some of the findings from this study were unexpected and require more elaboration. For instance, even though *archives* scored the highest out of the affiliation groups, considering what the total score could have been for each centrality measurement, *archives* did not even achieve even 60% optimization of the WAFC. There is a lot of improvement that can and should occur as far as archives taking advantage of the potential connectivity of social media.

Secondly, the incentives behind what drives users share on Facebook have a lot to do with the content of the post. This study found that videos were by far the most highly interactive piece of media on the WAFC. For instance, Facebook posts can have a photograph, link, or video attached to the post. There were 136 photograph posts, 202 link posts, 9 video posts, and 111 other posts. Overall, photographs yielded the highest number of interactions with 920, then link with 288, other with 281, and video with 108. With online social networking the return cost does not refer to a return on investment; rather a return on interaction means for every type of post (video, photograph, hyperlink, other) how many interactions occur. The return of interactions per post illustrates the interesting findings of which *Figure 34* provides a visual of the data. Posts that contained a video by far had the highest number of return interactions with 12, picture also had a high return rate with 6.76 interactions, other yielded 2.53, and hyperlink had 1.43. *Table 35* demonstrates the type, number of posts, interactions, and return rates of interactions.
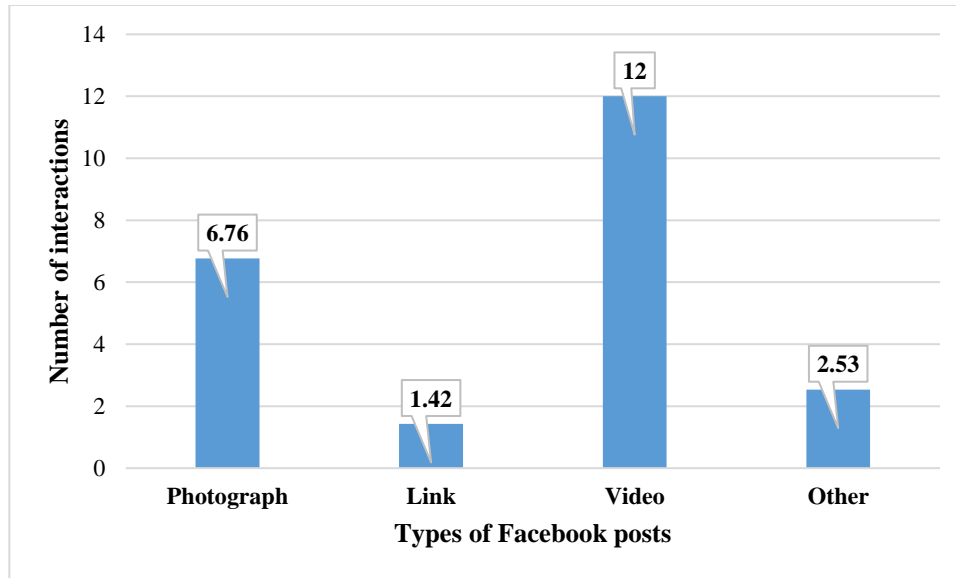
Figure 32. Interaction return of Facebook posts

Type	Number of posts	Interactions	Return rates
Photograph	136	920	6.76
Link	202	288	1.43
Video	9	108	12
Other	111	281	2.53

Table 35. Types of Facebook posts and return rates as calculated as number of posts divided by interactions

4.6.3   Comparison between these findings and previous findings

It is not surprising that archives have a noticeable hold on the information flow in the

WAFC, as other studies have shown that how a user presents their identity on Facebook is closely

tied to their social capital in the real world (Ellison, Steinfield, & Lampe, 2007). Other studies

have found that characteristics of users play a key role in the dissemination of information in a

social network (Carrera, Lee & Jung, 2016). However, what is surprising are the instances when a

diversity of affiliations was permitted into the flow, improved the reach of the actors. This finding

stems from the complexities of human behavior. How users engage with a social media

community can be driven by several things, however, groups do share some characteristics. The shared identity, even if within a limited capacity, creates a community; sub-communities and peripheral communities can exist concurrently (Kietzmann, Hermkens, McCarthy & Silvestre, 2011). The key part is being able to tap into the sub- and peripheral communities to continue to grow the larger community.

The content that is distributed on Facebook can have a lot of influence on whether users decide to share the information. For instance, this study found that *archive story* was the most common theme among WAFC posts and had the most online activity associated with it. Fu, Wu, and Cho (2017) found that content type had a significant correlation to whether it was shared or not on Facebook; particularly content types that were centered on commercial messages, lifestyle affairs, and personal opinions.

The type of content is related to the media that is attached to it. For instance, this study found that *communication* posts were more likely to be connected to a link instead of a picture, however, links are often ignored if not explained well or do not open correctly (Nielsen, 2000). In the case of the WAFC, hyperlinks are ignored. Fogg (2009) referred to 'clicking' as a target behavior, which requires effort by the user. Nielsen (2000) noted that if possible it is always better to show photos of tangible things which are related to a topic in lieu of an abstract link.

In addition, Sabbar and Hyuan (2016) found that Facebook posts had an increased chance of receiving 'likes' if one of the following features was a part post: satire, artistic materials, family relationships, relationship with the opposite sex, emotional materials, and admiration of individuals. Likewise, visual displays have been found to be a dynamic way for interaction and sense-making activities to take place (Tolins & Samermit, 2016). This certainly fits with the WAFC which found that pictures and video posts had the most interactions (although videos were scarcely used).

CHAPTER V
IMPLICATIONS

There are several important findings from this study that have meaningful outcomes for

the archive community. These implications of these findings are discussed in the following

Sections: *5.1 Theoretical*, *5.2 Methodological*, and *5.3 Practical*.

5.1   Theoretical

Archival theory goes hand in hand with archival practice; one cannot have one without the

other. According to Eastwood (1994), "the first object of archival theory is the nature of archival

documents or records. The archival discipline consists in building knowledge about archival

documents and acting upon them in methodical ways to protect the properties that they

have" (p. 125). What is currently missing from archival science is the knowledge surrounding

social media. One of the solutions is provided from the methodology and findings of this study;

this study provides a method to permit the analysis of social media used by the archival

community from a research standpoint.

While there is no other research that examines archival science and *SNA*, there are other

subject areas that have improved their knowledge base through network analysis. For instance,

Norman, Nordin, Din, Ally, and Dogan (2015) used *SNA* to measure social participation among

students. Norman et al. determined that social participation was represented in four areas: lurkers,

gradually mastering members/passive members, recognized members, and coaches. Having a

better understanding of one's user base is one way that social media knowledge gaps can be

closed. The findings by Norman et al. are similar to the findings of this study; archives were the

most influential group in all *SNA* measurements. Businesses were often on the periphery of each

measurement, which is similar to the lurker finding by Norman et al.

A take away from this indication is that perhaps incorporating businesses into social media posts might make the group more active overall. This in turn then has the potential to bolster the overall reach by an archive and will increase awareness and potential outreach relations. Users influence the network and understanding their interests paves the way for more successful social media experiences. del Fresno García, Daly, & Segado Sánchez-Cabezudo (2016) found that user influences to be in one of three categories: disseminator, engager, and leader. Certain members of the WAFC are more influential than others.

Archival science is at a difficult place now. Social media is often considered ephemeral; however, archives can and should use social media to connect with the community. In addition, as social media continues to be used, the need for archivists to understand how to deal with the media increases. Archivists will be unable to advise members of their institutions of proper saving techniques if they are unaware of how the media is being used within their own community. This leads directly to issues of appraisal in archives and how social media can be incorporated into the appraisal process; currently, there are few suggestions and practice guidelines provided on the matter.[6]

More and more states consider social media a record, which quickens the need for archivists to grasp the media before the information is lost. For instance, in the state of Wisconsin, 2013 WI Act 208, social media is a record and retention of that record must be maintained. In addition, the UNESCO Charter on the Preservation of Digital Heritage (2003) presses the importance of long-term preservation of digital heritage material, stating that "unique resources of human knowledge and expression" many of which "have lasting value and significance" (Article

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[6] Appraisal is the process of "establishing the value of documents made or received in the course of the conduct of affairs, qualifying that value, and determining its duration. The primary objective of appraisal is to identify the documents to be continuously preserved for an unlimited period of time" (Duranti, 1994, p. 329).

I). Here lies many importance issues with the retention of social media: the value, and significance.

It is difficult if not impossible for archivists and records officers to offer professional advice on how to manage social media if they are unaware of how it is being used. A great place to start is by understanding how archivists and archive institutions and their online communities are using social media. This study has begun the foundational point of answering those questions. In addition, Nathan and Shaffer (2012) discussed the preservation of social media as a 'wicked problem' and noted that "the difficulties of preserving the documentary artefacts created through these interactions with citizens has strong ethical (and legal) implications" (p. 7).

Challenges of recording keeping are part of a complex networked environment (Duranti, 2016). However, this study is the start of building the understanding around some of these networked spaces. A first step for archivists is developing a social media strategy as conducting a full *SNA* study is outside the scope for an archive. However, developing social media strategy and social media policy are the first steps that an archive can do to do social media better. Even if extracting social media from the application to keep as a 'record' is outside the scope or ability of the archive, a social media policy is a good practice to point to if issues arise.

5.2 Methodological

The implications of this study's methodology are threefold. One being that the methods employed in this study can be replicated and adapted to any number of social media applications. Secondly, the methods bring together social network analysis and social media in a sound way. Finally, the methodology provides a foundational point for archival science to continue the long development of establishing more quantitative work to grow the field in the ever-expanding arena of digital material.

The methodology of this study brought together many different types of analysis to discover how the Wisconsin archive Facebook community functioned. The inclusion of *SNA*, inferential statistics, and a qualitative analysis of the Facebook posts provides a well-rounded picture. These analyses are adaptable to different media; meaning that the methodology employed in this study can be replicated in several different ways. For example, many different social media applications could be analyzed using the procedures outlined in this study. Only the different online activities would have to be changed. For instance, if an online community using Twitter was analyzed, rather than 'share', 'tag', 'comment', and 'like' as exist on Facebook, a study using *SNA* of a Twitter community would analyze 'like' and 'retweet'. Likewise, with a different media like Tumblr that is image based, the different types of images could be analyzed using a weighting system. While adding the analyses of images to the study increases the difficulty of constructing a weighting system, the general concept is the same.

Social media is a means for people to communicate online, thereby creating an online community of sorts. As a result, for obvious reasons, *SNA* and social media research have gone hand in hand since the conception of social media applications in the early 2000s. However, when *SNA* was developed it was designed for face to face communities and not online communities. When conducting *SNA* and social media research, the researcher must take certain precautions to ensure the integrity of the data. This study determined that by weighting online activities, the meaning of interactions can be deconstructed and then reconstructed in a sound manner to measure quantifiably without compromising the integrity of the data.

There have been few quantitative studies conducted within the field of archival science that analyze the use of social media by archive institutions. This study provides a foundational base from which additional work can be conducted. The findings indicated that Wisconsin archive institutions that use Facebook are central in the network; however, they are missing connections

and therefore limiting their amount of potential reach. This reach if achieved at a higher level could result in more participation from community members, the growth of the network, and overall awareness about the archive.

This study established a base line for *SNA* and archival science. Additional studies are needed to discover if there are differences in social media use in different contexts. In addition, temporal studies are needed to analyze changes over time. Social media is an ever expanding and changing atmosphere. Self-evaluations and social media critiques are often conducted by archivists for their archive. Implementing these same procedures for social media is of the upmost importance, as critiquing social media outputs will start a dialogue about what is working and what should happen for future social media planning.

5.3   Practical implication

The findings of this study have practical implications for archival practice and research. These areas are the information flow, content/context of the post, and a base level knowledge of how Wisconsin archive institutions use Facebook; these areas are discussed in length in regards to suggestions for actually carrying out of these procedures. While this study was able to determine, that *SNA* is a sound method to address the emerging issue of how social media is used particularly by the archive community; this study is not suggesting that archivists conduct a *SNA* study in their archive - that is not practical. However, there are a few procedures that enable archivists to more thoroughly understand the process surrounding social media and its day to day functions. These procedures include implementing a social media strategy, including a mix of themes, using of media in posts, and posting to social media for awareness not just promotion.

The first step is to create a social media strategy. When a team meeting takes place, take the time to discuss what social media posts the archive might like to make for the month. In addition, taking turns by archival staff of posting information can give a fresh voice to the social

media posts. This study uncovered what actual archive institutions are posting and how they are posting information. What was determined was that there is not a balance of what is being posted; posting a variety of voices may increase the interaction rate and therefore the reach of the archive. Many posts created for the WAFC were of the *archive story* theme, which revolves around information specific to an archive like a date, short caption, and then a picture.

Literally changing the voice of the archive is not always possible, as in a lone arranger situations. However, lone arrangers can achieve the same effect by sharing information posted by another entity, thus broadening the voice of the archive. Another option is to share information from the larger institution, meaning, if the archive is part of a parent entity, share what another department is doing. This also creates stakeholders in the archive and will raise awareness of their existence within the archive's own institution, which could be helpful for other areas of archiving like record management. This also matches with the findings of information flow. The information flow in the network does involve archive institutions as the central hub, as indicated in the degree, closeness, and betweenness measurements. However, the measurements also revealed that different affiliations like *cultural institutions* and *universities* try to connect with archives but the relationship is not always reciprocated. Reaching out to other entities has the potential for a high return of interaction.

Likewise, not only does the content of the post matter but so does the media that is attached to the post. Pictures and videos that were attached to the post yielded much higher interaction rates than those without. Hyperlinks yielded very little interaction rates. This finding means that media should be added to the post to increase interaction. When hyperlinks are needed, the adding of more information to the post itself will help to explain to the viewer what the link includes. The more context that is provided also increases the likelihood that a discussion will take place on that particular social media post.

A common theme within archival science is that it is difficult to create a system that will work for archives due to the uniqueness of the collection. This is one of the reasons why EAD (encoded archival description) which is XML standard for coding archival finding aids (a description of an archival collection), took many years to create. This study found that at least in Wisconsin, archive institutions have similar behaviors in an online space. This researcher is not denying that these unique characteristics exist, however, at least in terms of *SNA* and social media, archives are more alike than originally thought when one breaks down the statistics behind the online interactions. To generalize, this means that instead of posting for promotion, archives should try to post for awareness. Ultimately, having this base level of knowledge of how archive institutions behave in an online setting will be to help produce more research and encourages archives to have more open discussions about why and how they are using social media.

5.4   Summary

The purpose of this study was to uncover how the Wisconsin archive community uses Facebook. This study identified and collected Facebook data produced from the Wisconsin archive community. A *Mega Matrix* was created from the data which combined Facebook online activities – 'like', 'comment,' 'share,' and 'tag'. The final dimensions of the *Mega Matrix* are 223 x 223. Weight was considered amongst the online interactions to maintain the integrity of the social media nature of the data.

Four research questions and six hypotheses were developed to determine the main actors, the role of the actors, content of each online activity ('tagging', 'sharing', 'commenting', and 'liking'), and post characteristics. Unique findings of this study were found regarding the information flow of the WAFC and the content. For instance, the research questions determined that archives are a central hub within the WAFC; however, other affiliations like cultural institutions and universities are other contributors to the information flow. Four different themes

were discovered by the thematic analysis: *archive story*, *communication*, *information*, and *outreach*. The most popular theme was *archive story*. If posts were made with a picture or a video, the posts interaction reach was much higher than posts with media or an embedded link.

The methodological, theoretical, and practical implications of this study were discussed. The methods selected for this study were found to be not only a sound methodology but also provided a foundation for other social media and archive online communities to be evaluated using *SNA*. The use of SNA in future social media and archive research is both a theoretical and methodological addition to archival science. Finally, the practical implications are addressed in the discovery of information flow, content/context of the post, and a base level knowledge of how Wisconsin archive community use Facebook. These findings provided a foundation of how other archive communities can make effective use of Facebook and potentially other social media applications.

CHAPTER VI
CONCLUSIONS

The final chapter summarizes the research problem, significance, and findings. The

limitations of the study are also discussed. Finally, future research directions are addressed in

Section 6.3.

6.1   Summary of research problem, findings, and significance

The primary research problem was the investigation of the information exchange within

the Wisconsin archive Facebook community (WAFC): the roles of both Wisconsin archives and

their followers within the online community, discussion content, and characteristics of online

activities that attribute to the sharing of information and connectivity of the social network,

Facebook. Four research questions were derived from this research problem.

Research question 1 (RQ1) is restated here: ***Who are the key actors/players in the***

Wisconsin archival community when they exchange and share information on Facebook?

The first research question analyzed who are the major players in the WAFC, and how the

players exchange and share information. The significance of RQ1 was the discovery of

quantitative evidence which was necessary to examine the information exchange within the

WAFC. H_{01} was created to measure differences among key players in the Wisconsin archive

Facebook community (WAFC) in terms of centralities (degree, closeness, and betweenness): $n =$

223, betweenness (mean = 433.78, SD = 1772.53), closeness, (mean = 1.58, SD = .428), and

degree (mean = 21.2, SD = 61.55).

Most of the actors that had a high degree and betweenness centrality were *archives* in the

WAFC. This means that most information that is shared within the WAFC is being created and

disseminated by *archive*, and that archives have a lot of power over the information that is shared

and distributed in the network. However, there were a significant percentage of *people* that were

highly ranked degree actors as well as *cultural institutions*. This means that if *archives* can

harness and open their network, more information from other actors can be created and shared as

well, thus developing a stronger online community. The expansion of an online network can be

done in a few different ways. For archivists using Facebook, expansion can be achieved by

becoming 'friends' with an archive of a similar subject area or becoming 'friends' with an archive

that is larger, i.e. an archive of medium sized becoming 'friends' with the Library of Congress,

which has a large user base. Another avenue would be for an archive that is part of a larger

institution, for instance, a university archive, making a post and 'tagging' the university or

university alumni group or 'sharing' a post from one of these groups. The post itself might not be

'archival' in nature, but it provides other Facebook users who are friends with that group to

become aware of the existence of the archive.

Research question 2 (RQ2) is restated here: **What is the role of the actors within the**

Wisconsin archive Facebook community?

Actors are key to understanding a social network. The significance of RQ2 was the

determination that archives play a key role within the WAFC. RQ2 also revealed that there are

other actors that play supporting roles but could be larger contenders within the network if

archives change their sharing strategy. H_{02} and three sub-hypotheses were developed to signify

differences among actor affiliations in terms of interactions on the Wisconsin archive Facebook

community. All three hypotheses were rejected: degree [F (3, 59) = 9.79, *p* = .0002]; closeness [F

(3, 59) = 9.794, *p* = .0002]; betweenness [F (3, 59) = 6.6921, *p* = .0004].

The actor affiliation that had the highest measurement for each centrality was *archives*.

This means that most information is controlled by *archives* as compared to other actor affiliations.

Affiliations *university* and *cultural institutions* often had high degree and closeness

measurements; this means that diversifying the actors within one's network can strengthen the

connectedness within the network because it increases the likelihood that other networks and actors can be reached.

Research question 3 (RQ3) is restated here: ***What does the content of each online activity (tagging, sharing, liking, and commenting) reveal about the Wisconsin archive Facebook community?***

RQ3 sought to understand the content of each online activity ('tag', 'share', 'like', and 'comment'), and how the content and online activities revealed information about the WAFC. This question was answered by conducting a thematic analysis of the posts. Four themes were revealed by the thematic analysis: *archive story*, *communication*, *outreach*, and *information*. RQ3 sought to better understand the content of posts from the WAFC. The keywords extracted from each post revealed that there were few shared keywords amongst the WAFC. H_{03} was developed to determine if online posts made by the Wisconsin archive Facebook community revealed significant differences among the revealed subject schema. The hypothesis was rejected (p-value .000 < than the significance level 0.05, the Chi Square value 699.373 and $df = 3$) meaning that there is a significant difference between themes.

Archive story yielded the most use by the WAFC with 78% usage; it also had the highest number of interactions. *Communication* was the second highest at 12%, *outreach* was the third at 6%, and *information* was the least used at 4%. This finding means that suggestions will be able to be developed for archives in terms of what type of posts yield the most interaction and reach.

Research question 4 (RQ4) is restated here: ***How do the post characteristics (use of pictures, use of embedded hyperlinks, and use of digital collections) influence the online activities of the Wisconsin archival Facebook community?***

RQ4 analyzed how characteristics influence a post on Facebook. This question was answered by addressing the research question in three hypotheses (H_{04}, H_{05}, and H_{06}). Each

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hypothesis uncovered particular unique areas of how post characteristics have an influence on the material and subsequent online activities. For instance, H_{04} analyzed the use of pictures, and it was revealed through the use of an independent T-test that the proposed hypothesis was rejected due to a significant difference in the posts with a picture (mean = 6.7, SD = 9.02) and the posts without a picture (mean = 2.1, SD = 4.97); $t(456)$ = 7.004, p = 0.0001. H_{05} analyzed the use of hyperlinks, and it was revealed through the use of an independent T-test that the hypothesis was rejected due to a significant difference in the posts with a hyperlink (mean = 1.42, SD = 3.17) and posts without a hyperlink (mean = 5.11, SD = 8.28); $t(456)$ = -5.9944, p = 0.0001. Finally, H_{06} analyzed whether digital collections made a difference in posts, and it was revealed through an independent T-test that the hypothesis was rejected due to a significant difference in the posts with a digital collection, mean = 2.3, SD = 5.2, and posts without digital collections had a result: mean = 6.22, SD = 8.92; $t(456)$ = -5.87, p = 0.0001.

The rejection of the three hypotheses revealed that posts with pictures had increased online activity levels, whereas, hyperlink posts had little online activity. In addition, the presence of a digital collection in a post had increased online activity. There was much interaction variability between the different characteristics. For instance, posts without hyperlinks had a much higher online activity rate than posts with hyperlinks. Posts with pictures and videos had the highest rate of online activity. In addition, when the themes are combined with the characteristics, even more information can be extrapolated. Even for posts within the same theme, those with pictures had a higher online activity rate, here *archive story* posts that contained a picture had an online activity value of 11.44% higher than other *archive story* posts. Likewise, WAFC posts with digital collections had many *archive story* theme posts.

The significance of this research is found in three areas: theoretical, methodology, and practical. The theory of archival science opens the door to social media and more electronic work

to be included. What this study provides is a means to conduct further research into the interworking of how archives behave in an online space. *SNA*, offers a sound way to do such analysis. The methodology of this study laid out the necessary techniques, such as weighting and the construction of multiple matrices to deal with the different online activities that are associated with each type of social media application to ensure the integrity of the data. Finally, the practical aspects are that the field of archive science has a base knowledge of how at least one group of archivists uses social media. This research also establishes that social media is being used by the archive community and therefore, continued research should be conducted to learn more to enable the field to develop practical guidelines to implementation, and continued use of social media. It also begins the process of learning how social media should be preserved.

6.2   Limitations

There are a number of areas of this study that present limitations: the use of only Facebook, limited timeframe, lack of qualitative interviews with archivists, and a relatively small sample. Facebook was the only social media application addressed in this research. There are dozens of social media applications, many of which are most certainly used by the archive community. However, to begin the analysis of how archive institutions use social media, Facebook was selected. The long existence of the application and ample use made it a good candidate to analyze its overall use by a community. In addition, due to the lack of knowledge in the field of archival science as to how archives use a social media space, it was necessary to limit the range of potential community spaces to build a solid foundation for future research to take place.

This study only analyzed six months of Facebook data. This was done as the there was no other research to compare archive's use and *SNA*. As a result, the *SNA* matrices had to be developed manually, there was no automation of the matrices. In addition, the thematic analysis

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was also conducted manually, no automated sorting of the Facebook posts was done. The reason for the manual nature of the study was to thoroughly and completely understand the process and to get a better insight into the behaviors of archives in a social media space. Now that these behaviors are better understood, more data for longer periods of time should be extracted for study. A temporal study is critical to continuously understanding the process of online behavior and use.

Social media is all about behavior. This study identified and examined the quantitative side and only a part of the more qualitative nature of social media. Understanding the needs and actions behind posts needs to be understood to truly see the whole picture. However, this study did not interview archivists that are involved with their Facebook pages. The inclusion of interviews was outside the scope of this study, but should be conducted in the future.

This research study had limited the size of the sample to a specific geographic area: Wisconsin. Consequently, it cannot be stated with one hundred percent certainty that how the WAFC interacts on Facebook is how all archive institutions will interact on Facebook, subsequent research is required to gather more information on archive use of social media applications. This study made a point to only analyze archives that had their own Facebook page. This was done to discover how archives and only archives are posting material and sharing information with their online community. Part of the reason for the small sample was that this study needed to establish a baseline for archives' use of Facebook. Consequently, only archives that had their own Facebook page were analyzed. Archives that shared a Facebook page with a parent institution were not included as the data would be skewed from archives.

The establishment of a baseline now permits the ability for future studies to expand the scope and sample size as these archives are a part of the wider community and should be included. The inclusion of a wider range of archives using social media will provide a more well-

rounded view of use. This research study does provide a foundation for future research on the subject as well as begin to point to the fact that archive institutions (at least in the same state) behave similarly online, which is an argument against the common talk that archives are too unique to have any similarities.

6.3   Future work

Archivists need statistics and programming skills. Unfortunately, when one brings up math or programming or coding of software to a group of archivists, many archivists are intimidated and that needs to change. This researcher is not implying that all archivists need to learn *SNA,* but the field does need to become more comfortable with statistics and programming because these are the skills that are now needed to be successful in the field and ensure the longevity of archives. And it can be done; this research is the start for archival science research to become more technical. More research in this area such as expanding the size of the sample and including other social media applications will only expand the knowledge base of how archives use social media.

The interdependence of online human behavior and the interaction tools that are available have a high influence on each other. Currently, *SNA* is frequently used to analyze online networks. Social network analysis was created to analyze face to face communities, so while it can be used for social media, painstaking efforts need to be considered in order to ensure that the social network is intact. A future research goal of this researcher is to refine and adapt social network analysis to better suit online networks. Conducting a full range *SNA* study in an archive is not practical. Suggestions for social media use policy was provided in *Section* 5.3 *Practical implications*, however, in order to more thoroughly understand the needs and wants of archivists, it will be necessary to conduct interviews with archivists involved with social media to ensure that suggestions for social media use are practical and sustainable.

Social media is often considered ephemeral, however, how are archivists supposed to save information and to advise their institution on how to save information if they do not have the skillset to do so. Research needs to be continuously conducted simultaneously with these applications. Otherwise, the gravity of the communication channels could be lost. Without this information, researchers and practitioners will have decades of lost communication. A complication with this research is that human behavior changes. In a time when both Facebook and Twitter have been widely used for more than a decade, it can be easily forgotten how these two applications have adapted their interaction features throughout the years. Temporal studies should be conducted to better understand how both social media applications and people change over time. This study provides a solid foundation from which additional social media research in archives can be conducted. While the sample of this study is small, the data that was extrapolated was rich in detail about the entirety of the WAFC. The findings from this study provide a sound base from which larger research can be done. In order for data analytics to continue to evolve and incorporate the necessary tools to remain relevant, more adaptable methods need to be created to sustain the ever-evolving world of data analytics, which includes social media.

Additional future work will include an approach to bridging the gap in how entities build networks today. In order to fill the knowledge gap, temporal analysis with social network analysis work will also be applied. This includes the evolution of the adaptation and incorporation of necessary tools to remain relevant; more adaptable methods need to be created to sustain the ever-evolving world of data and social analytics. The construction of different databases and interdisciplinary collaboration will enhance our understanding of the infrastructure that desperately needs to be understood.

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Appendix A:
WAFC Degree Results

Name	Degree
UW Green Bay Archives & Area Research Center	733
Ward Irish Music Archive	347
UW-Parkside Archives & Area Research Center	262
UWGB Cofrin Library	187
Person-Other	183
Staubitz Archives	153
UWGB	145
Person-Other	142
Lawrence University Archives	133
UW GB Alumns	109
UW Madison	88
UW River Falls Archives & Area Research Center	73
UW Parkside Library	67
Person-Other	47
Person-University	46
Person-Other	44
Person-University	39
Person-Other	32
Person-Archive	30
Person-Other	26
Person-Archive	26
Shamrock Club of Wisconsin	26
Person-Other	26
Person-Other	25
UWRF AARC	25
Person-Other	25
Person-Archive	23
Person-University	23
UW Digital Collections	23
Person-Other	22
Person-Business	22
Person-Archive	22
Person-Other	22
Person-University	21
Person-University	20

Person-Other	20
Person-University	20
Person-Cultural Institution	19
Person-University	19
Person-Other	19
Person-Other	19
Person-Other	19
Western Great Lakes History	19
The Lawrentian	18
Person-Other	18
Person-Other	18
Seeley G. Mudd Library at Lawrence University	18
Person-University	17
Person-Business	17
Carthage College Hedberg Library	16
Green Bay Phoenix Softball	16
Person-Other	16
Person-University	16
Person-Other	16
Person-Business	15
Brown County Historical Society & Hazelwood Historic House	15
Person-Archive	15
Person-Other	14
Green Bay Packers	14
Green Bay Phoenix	14
Person-University	14
Person-Other	14
Windows Into Wauwatosa	14
US National Archive	14
Person-Other	13
Heritage Hill State Historical Park	13
Person-Other	13
Reference, Access & Outreach Section of the Society of American Archivists	13
Person-Other	13

Person-University	12
Person-Other	12
Person-Other	12
Lawrence University	12
Person-Business	12
Person-Other	12
Person-Other	12
UWGB News	12
Voyageur Magazine	12
Person-University	12
Person-Other	11
The Gloaming	11
Person-Other	11
Person-Other	11
Person-Archive	11
The Civil War Museum	10
Person-Cultural Institution	10
Irish Traditional Music Archive/Taisce	10
Person-University	10
Mead Public Library	10
Person-University	10
Person-Other	10
Person-Other	10
Person-Other	10
Person-Other	10
UW River Falls Alumni Association	10
UWM ArtHistory	10
Archive-Person	10
Person-University	9
Person-Other	9
Person-Other	9
Person-Other	9
Person-Other	9
Person-University	8
Person-Other	8
Person-University	8
Carthage College	8
CBS 58	8
Person-Other	8

Person-University	8
Person-Other	8
Person-University	8
Person-Archive	8
Person-Other	8
Person-University	8
Person-Other	8
Person-University	8
Person-University	8
Person-Archive	8
Person-Other	8
Person-Other	8
Person-Archive	8
UWRF Veterans Services	8
Wriston Art Galleries	8
Person-Other	8
Person-University	7
Person-Other	7
Person-University	7
Green Bay Phoenix Nordic Skiing	7
Person-Cultural Institution	7
Person-Other	7
Person-Other	7
Person-Other	7
Milwaukee Irish Fest	7
Milwaukee Irish Fest School of Music	7
Person-University	7
Person-University	7
Person-Other	7
Person-Other	7
Person-Other	7
Person-Other	6
Person-Cultural Institution	6
Person-Other	6
Person-Business	6
Person-Other	6
Person-Other	6
History Museum at the Castle	6

Person-University	6
Person-University	6
Pipes n Fiddle	6
Person-University	6
Person-Business	5
Person-University	5
Person-Other	5
College of Irish Culture & Heritage	5
Person-Other	5
Person-Other	5
Person-Cultural Institution	5
Person-Cultural Institution	5
Person-Other	5
ALBA GU BRATH Scottish and Proud Vote 2014 Free Scotland	4
Person-Other	4
American Association for State and Local History	4
American Folklife Center	4
Brown County Central Library	4
Person-University	4
Person-Other	4
Person-Other	4
Person-Other	4
GBP NFL Owner Lee	4
Gogebic & Iron Country Happenings	4
Person-Business	4
Greater Green Bay Convention & Visitors Bureau	4
Person-University	4
Person-Other	4
Person-Archive	4
Person-Other	4
Person-Other	4
Person-Other	4
Leprechaun's Gate	4
Lyons Irish Pub	4
Person-Other	4
UW GB Sustainability	4

Person-Other	4
Dunn County Historical Society	4
Harvey Hall (UW Stout)	4
UW Stout baseball	4
UW Stout	4
UW Stout Library	4
Person-Other	3
Person-Other	3
Person-Other	3
Person-Other	3
Person-Cultural Institution	3
Person-Other	3
Person-University	3
Person-Archive	3
Person-Other	3
Person-Other	3
Person-Other	3
Person-University	3
Person-Other	3
Person-Other	3
Person-Other	3
Person-Cultural Institution	3
Person-Other	2
Person-Other	2
Person-Other	2
Person-Other	2
Irish Music and Dance Association	2
Person-University	2
Person-University	2
Person-Archive	2
New Line Genealogy	2
Person-Other	2
Person-Other	2
Person-Other	2
Person-Other	2
Person-Other	2
Person-Other	2
Person-Other	2
Person-Other	2
UW Stout Library	2

| Person-Other | 1 |

Appendix B:
WAFC Closeness Results

Name	Closeness
UW Green Bay Archives & Area Research Center	2.006614089
Ward Irish Music Archive	2.005207479
Person-Other	1.984434783
Person-Other	1.984180093
Person-Cultural Institution	1.983045459
Person-Cultural Institution	1.983045459
Voyageur Magazine	1.981479883
Person-Other	1.979384542
Brown County Historical Society & Hazelwood Historic House	1.978451192
Person-Other	1.978437603
Person-Business	1.977381825
Person-Other	1.977381825
Staubitz Archives	1.975711823
Person-University	1.97530508
UW Digital Collections	1.974885404
Person-University	1.974722385
UWGB	1.97465682
Person-University	1.97444737
Person-Other	1.974385381
Person-University	1.973878026
Person-University	1.973843098
Heritage Hill State Historical Park	1.973436594
Person-Archive	1.973335981
Person-Other	1.972297311
Person-Other	1.971973538
Person-Other	1.971121669
Person-Other	1.970310807
Person-Cultural Institution	1.970224023
Wriston Art Galleries	1.967053652
Person-Other	1.965585887
Lawrence University	1.96396327
Person-University	1.96368438
UWGB News	1.961536586
UW Madison	1.960330427

Person-Other	1.959896743
Person-Other	1.958503485
UWGB Cofrin Library	1.958302736
Person-Archive	1.956355572
UW River Falls Archives & Area Research Center	1.956110179
Green Bay Phoenix Softball	1.955408275
Person-Other	1.953321099
UW Parkside Library	1.952608466
Person-University	1.951168537
Lawrence University Archives	1.951032817
Person-Other	1.950881243
History Museum at the Castle	1.950318098
Person-Other	1.950285256
Person-Other	1.949613094
Person-Other	1.949222565
Person-Other	1.947428048
Person-Other	1.945920408
Person-Other	1.944430113
Person-University	1.943388104
Windows Into Wauwatosa	1.941796362
Irish Traditional Music Archive/Taisce	1.938387573
UW-Parkside Archives & Area Research Center	1.935001791
UWRF AARC	1.933393896
Western Great Lakes History	1.933068573
Person-Other	1.931904614
UW River Falls Alumni Association	1.931580842
Person-Other	1.931121528
Person-Business	1.930767238
Person-University	1.930199206
Person-University	1.930112541
Dunn County Historical Society	1.928600609
Person-University	1.928600609
Person-Other	1.928600609
Harvey Hall (UW Stout)	1.928600609
Archive-Person	1.928600609
UW Stout baseball	1.928600609

UW Stout	1.928600609
UW Stout Library	1.928600609
Person-University	1.928600609
Person-University	1.928600609
Person-Archive	1.928600609
New Line Genealogy	1.928600609
Person-Other	1.928600609
Person-Other	1.928600609
Person-Other	1.928600609
Person-Other	1.928600609
Person-Other	1.928600609
Person-Other	1.928600609
Person-Other	1.928600609
Person-Other	1.928600609
UW Stout Library	1.928600609
Person-Other	1.9283005
Person-Other	1.928126633
Person-University	1.928126633
Person-Business	1.927923679
Shamrock Club of Wisconsin	1.927527964
Person-Other	1.92742157
Person-Archive	1.925694823
Person-University	1.924747348
Person-University	1.924000859
Person-Other	1.921508133
Seeley G. Mudd Library at Lawrence University	1.920539558
Person-Other	1.919754922
Person-University	1.919754922
Person-Other	1.919754922
Person-Other	1.919545591
Person-Other	1.919482112
Person-Archive	1.918587208
Person-Other	1.917958498
UWRF Veterans Services	1.917732894
Person-Business	1.917204857
US National Archive	1.913828194
Person-Other	1.91199255
Person-Cultural Institution	1.910161376
Person-Other	1.909969568
Person-University	1.908948004

Person-University	1.907733738
Person-Other	1.905413449
Person-Archive	1.905026197
Person-Archive	1.904612422
Person-Other	1.901900649
Person-Other	1.901107132
Person-Other	1.900875866
Person-Other	1.898652852
Person-University	1.897507191
Pipes n Fiddle	1.895085335
UW GB Alumns	1.893162072
Person-University	1.880134344
Person-University	1.552443117
Person-Business	1.54140994
Person-University	1.491483182
Person-Other	1.4914812
Person-Other	1.490471214
Person-Other	1.487444967
Person-Archive	1.483432502
Person-Other	1.483300701
Person-Other	1.481435746
Person-Other	1.481435746
Person-Other	1.481008738
Person-Cultural Institution	1.462683454
Person-Other	1.461535543
Mead Public Library	1.458371371
Person-University	1.457411498
Person-University	1.456726879
Person-Other	1.456316441
Person-Archive	1.456316441
Person-Other	1.456316441
Person-University	1.436799854
Person-Other	1.435608834
Person-Other	1.43508026
Person-University	1.43508026
Person-Other	1.43508026
Person-Other	1.433892697
Person-Archive	1.433892697
Person-Archive	1.433892697
Person-Other	1.432444304

Person-Other	1.432444304
Person-Other	1.432444304
Person-Other	1.432444304
Person-Other	1.432444304
Person-University	1.41405341
Person-University	1.412644997
Person-Other	1.411635011
Person-Cultural Institution	1.411635011
Person-University	1.411635011
The Gloaming	1.002016395
The Civil War Museum	0.991797
Person-University	0.991270795
Person-Other	0.986787349
Person-Other	0.986473173
Green Bay Phoenix	0.985369787
Brown County Central Library	0.985114604
Person-Cultural Institution	0.985114604
Carthage College	0.984489232
Person-Other	0.984228939
Person-Other	0.983812839
Person-Other	0.983449191
Person-Other	0.983449191
Gogebic & Iron Country Happenings	0.983449191
Person-Other	0.983449191
Green Bay Packers	0.982982069
Green Bay Phoenix Nordic Skiing	0.982982069
Greater Green Bay Convention & Visitors Bureau	0.982826501
UW GB Sustainability	0.982826501
GBP NFL Owner Lee	0.982722849
Person-Other	0.982722849
Reference, Access & Outreach Section of the Society of American Archivists	0.982515544
The Lawrentian	0.979934186
Person-Cultural Institution	0.979882747
American Association for State and Local History	0.979471415
Person-University	0.979060501

Person-Archive	0.979060501
UWM ArtHistory	0.978840545
Person-Other	0.978701383
Person-Other	0.978701383
Person-Other	0.978701383
Person-Other	0.978445023
Milwaukee Irish Fest	0.977984101
Milwaukee Irish Fest School of Music	0.977984101
Person-Business	0.977779418
American Folklife Center	0.977677077
Person-University	0.97731927
Person-Other	0.976910681
Leprechaun's Gate	0.976553589
Carthage College Hedberg Library	0.976247758
Person-University	0.975433439
Person-Other	0.975077718
Person-Other	0.972395331
Lyons Irish Pub	0.972092897
Person-Other	0.972092897
CBS 58	0.972042471
Person-Business	0.971992105
Person-Other	0.971992105
ALBA GU BRATH Scottish and Proud Vote 2014 Free Scotland	0.971841007
Person-Other	0.971841007
Person-Other	0.971841007
Person-Other	0.971841007
Person-Other	0.971841007
Person-Other	0.971841007
Person-University	0.971841007
College of Irish Culture & Heritage	0.971841007
Person-Other	0.971841007
Irish Music and Dance Association	0.971841007
Person-Other	0.971841007
Person-Other	0.971841007
Person-Other	0.971841007
Person-Other	0.971841007

Person-Other	0.971841007
Person-University	0.449440464

Appendix C:
WAFC Betweenness Results

Name	Betweenness
Reference, Access & Outreach Section of the Society of American Archivists	20945.48633
Person-Other	9565.336914
Person-University	7010.133301
Person-Archive	6608.621582
The Lawrentian	4021.584473
Person-Other	3801.711426
Person-Other	3175.937988
American Folklife Center	3168.350098
Person-Other	3091.373047
UWM ArtHistory	3044.569092
Person-Other	3041.214844
Person-Cultural Institution	2491.459473
Person-Other	2407.5
Leprechaun's Gate	2325
Person-Other	2114.161377
Person-Other	1687.019043
Person-Other	1565.467651
Gogebic & Iron Country Happenings	1158.544434
Person-Other	1123.977783
Person-University	1123.977783
Greater Green Bay Convention & Visitors Bureau	972.4833374
Person-Other	960.3190308
UWRF Veterans Services	899.7023926
Person-Other	808.1405029
Person-University	808.1405029
Person-Other	641.0666504
Person-Other	567.6619263
Person-University	512.027771
Carthage College	488.9285583
Person-Other	478.5404663
Green Bay Phoenix Nordic Skiing	294.4500122
UW GB Sustainability	279.6666565
Mead Public Library	279.277771

Person-Other	271.0470581
Person-Cultural Institution	268.2190552
Person-Other	250.6666718
Green Bay Packers	241
Person-Other	232.0500031
Person-Other	221.9095306
Person-University	221.8333282
Person-Other	194.9880981
Person-Other	181
Person-Other	178
Person-Other	174.1333313
Person-Other	170.5
Person-Other	165.6111145
UW-Parkside Archives & Area Research Center	165.6111145
Person-Other	158.8333282
Person-Other	158.3803864
Person-Archive	152.8166656
Person-Other	148.5666656
Person-Other	132.6111145
Person-University	127.4380951
Person-Other	118.8666687
UW Stout	115.5
Person-Other	115.4761887
Person-Other	112.0666656
Person-Other	98.69047546
Milwaukee Irish Fest	77.30952454
UW Parkside Library	75.43571472
Person-Other	69.58333588
Person-Business	65.16666412
Person-Other	58.51372528
Person-Archive	52.08333206
Person-Other	48.54999924
Person-Other	40.96666718
Person-Archive	40.5
Seeley G. Mudd Library at Lawrence University	38.84705734
GBP NFL Owner Lee	37
Person-University	28.5
Person-Other	28.33333397
Person-Cultural Institution	22.73333359

Person-Archive	19.63039207
Person-Other	19.5
Person-Archive	18.88039207
Person-Archive	17.74229622
Person-Other	17.70000076
Person-Other	14
Carthage College Hedberg Library	12.16666698
UWGB Cofrin Library	11.80000019
Person-Business	11.19999981
Person-Other	9.309523582
Person-Other	8.559523582
Person-University	8.5
UW GB Alumns	8.471428871
Person-Other	8.21372509
Person-Other	6.466666698
Person-Business	4.75
Person-University	4.25
Person-University	2.166666746
Person-University	2
Staubitz Archives	1.380392194
Person-University	1.380392194
Western Great Lakes History	1.380392194
Person-Other	1.380392194
UW Green Bay Archives & Area Research Center	0
Ward Irish Music Archive	0
Person-Other	0
Person-Cultural Institution	0
Person-Cultural Institution	0
Voyageur Magazine	0
Person-Other	0
Brown County Historical Society & Hazelwood Historic House	0
Person-Business	0
UW Digital Collections	0
Person-University	0
UWGB	0
Person-University	0
Person-Other	0

Person-University	0
Person-University	0
Heritage Hill State Historical Park	0
Person-Other	0
Person-Cultural Institution	0
Wriston Art Galleries	0
Lawrence University	0
Person-University	0
UWGB News	0
UW Madison	0
Person-Other	0
Person-Archive	0
UW River Falls Archives & Area Research Center	0
Green Bay Phoenix Softball	0
Person-Other	0
Person-University	0
Lawrence University Archives	0
Person-Other	0
History Museum at the Castle	0
Person-Other	0
Person-Other	0
Person-Other	0
Person-Other	0
Person-University	0
Windows Into Wauwatosa	0
Irish Traditional Music Archive/Taisce	0
UWRF AARC	0
UW River Falls Alumni Association	0
Person-Other	0
Person-University	0
Dunn County Historical Society	0
Person-Other	0
Harvey Hall (UW Stout)	0
Archive-Person	0
UW Stout baseball	0
UW Stout Library	0

Person-Archive	0
New Line Genealogy	0
Person-Other	0
UW Stout Library	0
Person-Other	0
Person-Other	0
Person-University	0
Shamrock Club of Wisconsin	0
Person-Other	0
Person-Archive	0
Person-University	0
Person-University	0
Person-Other	0
Person-Other	0
Person-Other	0
Person-Archive	0
US National Archive	0
Person-Other	0
Person-University	0
Person-University	0
Person-Other	0
Person-Archive	0
Person-Other	0
Person-Other	0
Person-University	0
Pipes n Fiddle	0
Person-University	0
Person-University	0
Person-Business	0
Person-Other	0
Person-Other	0
Person-Other	0
Person-Other	0
Person-University	0
Person-Other	0
Person-University	0
Person-Other	0
Person-Other	0
Person-Other	0
Person-Other	0

Person-Other	0
Person-Other	0
Person-Other	0
Person-University	0
Person-University	0
Person-Cultural Institution	0
Person-University	0
The Gloaming	0
The Civil War Museum	0
Person-University	0
Green Bay Phoenix	0
Brown County Central Library	0
Person-Cultural Institution	0
American Association for State and Local History	0
Milwaukee Irish Fest School of Music	0
Person-Business	0
Person-Other	0
Lyons Irish Pub	0
Person-Other	0
CBS 58	0
Person-Business	0
Person-Other	0
ALBA GU BRATH Scottish and Proud Vote 2014 Free Scotland	0
Person-Other	0
Person-Other	0
Person-Other	0
Person-Other	0
Person-Other	0
Person-University	0
College of Irish Culture & Heritage	0
Person-Other	0
Irish Music and Dance Association	0
Person-Other	0
Person-Other	0
Person-Other	0
Person-Other	0

Person-Other	0
Person-University	0

Appendix D:
Raw Keyword Data from Thematic Analysis

1795
1800
1851
1863
1864
1872
1873
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1970
1971
1972
1974
1976
1978
1979
1980
1983
1991
1997
1998
2004
2011
2012
2013
2014
11th Wisconsin infantry
12th Wisconsin history
167 years ago
1920s
1950s
1960s
1980s

2006-2013
22nd Wisconsin Infantry
37th Wisconsin Infantry
4th Wisconsin Cavalry
A.W. Lund Company
Person-Archives
Person-Cultural Institution
American Association for State and Local History
another day in history
Anthology of American folk music
anyone
April Fool's
archival research
archives
archives day
archives department
archivists
Army Surgeon
available online
band
Band Day
Barber war
baseball
baseball exhibit
Battle of Mansfield
Battle of Monett's Ferry
Battle of Paducah
Battle of Plymouth
Battle of the Wilderness
Behlmer Carisch
benefit
birthday
blog
Bob Burke
Boys of Company F
Brown County Historical Society
C.F. Winter
Camden Expedition
Campbell Bailey Hutchinson
campus
Campus Chest Drive
Captain Robert C Eden

Carthage
chancellor
Chris Allen
City council
Civil War Museum
Closed
Coach Keller
Cofrin Library
collection
Colonel Dahlgren
commencement
communication office
Conestoga
Confederate
conference
correspondence
county
course
creamery
curling
curriculum committee
Dahlgren affair
Danny boy
death
death certificate
Deaths of Three Union Generals
Person-Other
derussy
diaries
Digital archives
digital collection
digital initiative librarian
digitization
disc
disc fans
Downer Feminist Council
Dr. Barnard
Dr. Dawson
Dr. Jolet
Draft
Dunn County
Dunn family collection
E. H. Kleinpell

Eagle Regiment
Earth Day
Education seminar
Edwin Levings
Elizabeth Kuebler-Ross
Person-Cultural Institution
Ellsworth Burnett
Emilie Berliner
Epitaph
event
exhibits
extension
Facebook
faculty
Falls theater
family day
family history
Father's day
FBI
film
Fine Arts Week
first day of classes
first day of string
fisherman crab shack
Fort Pillow Massacre
Founder's Day
Freedom summer
frozen duck wrappers
gas stations
Gaylord Nelson
genealogy
General Forrest
General grant
Gerald Butler
Gettysburg Cemetery
Glen G. Dewey
graduate
graduating class
graduation
grant
Grant Wood
great depression
Great Midwest Trivia Content

Green Tie event
Greenwood
Groundhog day
Harvey Hall
Person-Archives
Hello Girls
history
History department
Homecoming
horse and buggy
hospital
hours
ice
images
Information
Irish
Irish census records
Irish culture
Irish fest
Irish traditional music archives
J.C. Penny
Jazz fest
Kampus Kapers
Person-Cultural Institution
Kenosha
Kentucky
Keyword
Kristi Edminster
KSTP
Kulstad Brothers
Larsen Canning Company
Laura Mason
Lawrence Conservatory
Lawrence University
Lawrentian
Lee
letters
library
library card catalog
Lillian Trager
Lincoln
Lincoln Memorial
local soldiers

logging camp
lumber company
magazine
mail
Main hall
Main street
March
Martin Luther King Day
Mary Edwards Walker
Massacre Fort Pillow
Maya Angelou
Mayor Spike Hoffman
Person-Archives
Person-Other
Person-Other
Milwaukee day
Milwaukee Downer
Milwaukee Downer Alumni
Milwaukee Downer College
Milwaukee Downer newspapers
Minnesota
Molner
Mother's Day
Mount Elba
Mr. Mengers
Mudd Gallery
museums
music
Person-Other
National
National History day projects
Naturalization papers
New Year
New York Times
newsletter
Niemann
Nixon
Northwest Wisconsin
Northwestern Telephone Company
NPR
Old Man
Olympics
online

open
opening day
P.V. Wise
Packe Dolan
Packers
parking
patron
Person-Other
Person-Other
Pete Seeger
Phil Paynter
photograph
Pi Day
Pierce County
Pintrest
Polk County
postcard
postcard party
presentation
president
prisoners
prisons
probate records
Processed
Psi Chi Honor Society
Racine
radio
Recollection Wisconsin
records
recruitment
Red River Battles
register
research
research assistants
researchers
Richmond
Person-Other
River Falls
River Falls Clinic
River Falls Elementary
River Falls Flying Club
River Falls High School
River Falls Journal

River Falls Normal School
River Falls Propane Gas Company
River Falls State Teachers college
River Falls Teachers College
Person-Other
Robert P. Knowles
Robert S. Swanson
rubber
Saint Croix
scans
scrapbooks
Senator
Shamrock Club of Wisconsin
sheet music
slides
small fights all around
Smithsonian
Society of American Archivists
softball team
south hall
spouses
spring
Spring Break
St Brigid
St Patrick's day
St. Paul
staff event
state militia
statistics
storage container
student
Student group
Student union
study abroad
Sunset Valley Dance Show
Tartan day
Telephone company
The Gloaming
The Monuments Men
the snapshot
Person-Other
Throwback Thursday
tours

twitter
underground railroad
Union
University of Wisconsin Milwaukee
urbanization
UW Madison
UW Stout
UWGB
UWGB Alums
UWRF alumni association
UWRF archives
vacation plans
Vatican
Valentine's Day
volunteers
Walt Disney
war
Washington
weather
website
Weidner Center for the Performing Arts
white cabinets
William Quinn
Wisconsin
Wisconsin historical society
Wisconsin National History day
Wisconsin regiment
Wisconsinites
Workshop
WWII
Your highness

Curriculum Vita
Jennifer A. Stevenson

2017, August   PhD, University of Wisconsin - Milwaukee
Information Studies
Minor: Digital archives
Dissertation Title: "*Social Network Analysis of the Wisconsin Archival Facebook Community*"
        Advisor: Dr. Jin Zhang

May 2011   Certificate of Advanced Study-Digital Libraries
University of Wisconsin - Milwaukee

December 2010   MLIS Concentration in Archival Studies
University of Wisconsin - Milwaukee

May 2008   B.A.   History and Social Science
University of Wisconsin - Platteville

Academic Awards
2012 – 2017   CGSA Information Studies Scholarship
2012 – 2017   School of Information Studies PhD Scholarship
2013 - 2016   University of Wisconsin Milwaukee Chancellor's Award

Research Experience
June 2013 - Present   **Research Assistant, School of Information Studies**
University of Wisconsin-Milwaukee
Milwaukee, Wisconsin
- Worked to develop both quantitative and qualitative research using advanced statistical analysis, and advanced knowledge of research theory
- Evaluation design and methodology, knowledge in the use of information systems
- Data extraction, preparation and analysis; and report generation
- Use of NVivo, SPSS, R, SQL, Python, SAS.

August 2012 – May 2013   **Project Assistant, School of Information Studies**
University of Wisconsin-Milwaukee
Milwaukee, Wisconsin
- Projects ranged from social media research, digital curation, and course development

Publications (Peer reviewed)

Zhang, J., Zhai, S., **Stevenson, J.**, & Xia, L. (2016). Optimization of the Subject Directory in a Government Agriculture Department Web Portal. *Journal of the Association for Information Science and Technology*. 67 (9), 2166-2180.

Zhang, J. Zhai, S., Liu, H., & **Stevenson, J.** (2016). Social Network Analysis on a Topic Based Navigation Guidance System in a Public Health Portal. *Journal of the Association for Information Science and Technology*. 67 (5), 1069-1088.

Stevenson, J. & Zhang, J. (2015). A Temporal Analysis of Institutional Repository Research. *Scientometrics*. 105 (3), 1491-1525.

Xie, I. & **Stevenson, J.** (2014). Social Media Application in Digital Libraries. *Online Information Review*. 51 (1), 1-4.

Professional Experience

August 2016 – Present   **Chief Records Officer**, **University of Wisconsin-Extension, University of Wisconsin-Colleges**
Madison, Wisconsin

- Responsible for following UW System policies and procedures regarding the scheduling of retention and disposal of the records for the institution
- Create local policy and instructional materials
- Lead workshops on digital repository use and electronic record management
- Respond to digital records retention requirements of the university and establish appropriate repositories and security measures
- Development of on-line tools and services to facilitate data and aid in retrieval and access of information

September 2013 – Present   **Archivist, Archdiocese of Milwaukee**
Milwaukee, Wisconsin

- Liaison between Archive and Information Technology department
- Lead workshops on digital repository use and electronic record management
- Development of digital repository for the archdiocese
- Accessioning, arranging, and describing of archive collections
- Market and promote the digital repository to all departments

June 2014 – October 2015   **Digital Archivist, University of Wisconsin-Extension**
Madison, Wisconsin

- Web development
- Collaborated to create social media policy
- Collaborated with a number of different departments to bring more awareness to the wiki

September 2011 – March 2013 **Digital Archivist, Wisconsin Veterans Museum**
Madison, Wisconsin

- Development of digital archive for in house use
- Market and promote the digital archive to all departments

Teaching Experience

September 2015 – 2016   **Adjunct Instructor, School of Information Studies**
University of Wisconsin-Milwaukee
Milwaukee, Wisconsin
        Course taught:
            110: Introduction to Information Science and Technology

September 2014 – 2016   **Teaching Assistant, School of Information Studies**
University of Wisconsin-Milwaukee
Milwaukee, Wisconsin

Online courses:
       682: Digital Libraries
       591: Introduction to Research Methods in Library and Information Science
       410: Database Information and Retrieval System
       210: Information Resources for Research
       110: Introduction to Information Science and Technology

Onsite courses:
       110: Introduction to Information Science and Technology

August 2011 - May 2012   **Adjunct Instructor, Edgewood College**
                                  Madison, Wisconsin
           Courses taught:
                 105: Digital Life through Multimedia
                 200: Computer Technology and Information for Social Science

Conference Presentations and Posters

Stevenson, J. (2016). Social Network Analysis: Wisconsin Archive Facebook Community. Presented at Archival Education Research Institute. Kent, Ohio. July 2016.

Stevenson, J. (2016). (poster). @Archivist_Community: UCINET Social Network Analysis and Archivists on Twitter Presented at iConference. Philadelphia, PA. March 2016.

Stevenson, J. (2015). Visual Archive Prototype. Presented at Society of American Archivists Research Forum. Cleveland, OH. August 2015.

Conference Presentations and Posters (continued)

Stevenson, J. & Benoit, E. (2015). @Archivist_Community: Social Network Analysis & Archivists on Twitter. Presented at Archival Education Research Institute. College Park, MD. July 2015.

Stevenson, J. (2015). (poster). Wisconsin 4H: Building a Social Wiki. Midwest Archival Conference. Lexington, KY. May 2015

Stevenson, J. (2015). Visual Information Retrieval: A Case Study. Visual Resources Association. Denver, CO. March 2015

Xie, I. & Stevenson, J. (2014). (poster). Functions of Twitter in Digital Libraries. Presented at ASIST. Seattle, WA. November 2014.

Stevenson, J. (2014). (poster). Exploratory Social Network Analysis of Midwest Archives and Social Media Use. Presented at Society of American Archivists Research Forum. Washington, D.C. August 2014.

Stevenson, J. (2014). Quantitative Analysis of Social Media Use in Archives. Presented at the Archival Education and Research Institute, Pittsburg, PA. July 15, 2014.

Stevenson, J. (2014). Case Study: User Behavior in e-Publication@Marquette Digital
Institutional Repository. Presented at the Wisconsin Association of Academic
Librarians. Wisconsin Dells, WI. May 2014.

Stevenson, J. (2014). (poster). Visual Information Retrieval: In a Digital Archive
Environment. Presented at the Visual Resources Association. March 2014.

Stevenson, J. (2013). (poster) Using Social Media to Connect Users to Digital Archives.
Presented at the Society of American Archivists Annual Meeting Research Forum. New
Orleans, LA. August 2013.

Stevenson, J. (2013). Archivists' Use of Social Media: An Exploratory Study. Presented
at the Archival Education and Research Institute, Austin, TX. June 17-21, 2013.

Stevenson, J. (2013). (poster). Using Social Media to Connect Users to Digital Archives.
Presented at the CurateThyself: Defining and Cultivating an Academic Trajectory in
Digital Curation. University of North Carolina at Chapel Hill. March 17, 2013.

Professional guest presentations
"Archivists' use of social media." Fall 2013. Southeast Wisconsin Archival Group.

Course guest lectures
- "Electronic records management and Digital Archives." Introduction to Archival
Science.
Fall 2016.School of Information Studies, University of Wisconsin – Milwaukee.

- "Digital archives and social media." Archival outreach. Spring 2016. Louisiana State
University.

- "Development of digital archives." Arrangement and Description in Archives. Fall 2015.
School of Information Studies, University of Wisconsin – Milwaukee.