

A Mutable Cloud

Fostering Community through Cloud Computing

Adam Murray

Nature is a mutable cloud which is always and never the same.

—Ralph Waldo Emerson, *Essays—First Series*

“The minute an organization becomes of a size where it is impossible for me to physically meet everyone that works here and become comfortable with who they are and what they do . . . you’re going to need social networking so that you can better leverage the asset we’re always talking about: our human resources.”

—Bryant Duhon¹

To say that the next generation of the Internet has changed things is to utter a severe understatement. While the Internet changed the nature of instant communication, it was constructed and utilized with a focus on a unidirectional distribution of content. Anyone who has ever worked collaboratively on a document is familiar with the headache of tracking changes, drafts, versions, and comments through endless e-mails, some of which were sent to everyone involved, and some of which were not. Web 2.0 and cloud computing have made collaborative efforts a Web-based social endeavor, one that can be customized and tailored to the individual or the institution’s needs without sacrificing efficiency or effectiveness. However, a system is only as good as its operator and design, and one that reinforces silos and barriers will, by its very nature, limit its own efficacy. To avoid silos and to make the most use of the social nature of cloud computing solutions for library workflow issues, library administrators and leaders must have an understanding of the building blocks of community.

Using McMillan’s and Chavis’s model of community as a framework of analysis,² this article examines how cloud computing and Web 2.0 technologies can be used by library administration and leadership to foster a sense of community and is guided by two questions: What are the core patterns of Web 2.0, and how can these technologies

facilitate bidirectional influence to promote a sense of emotional attachment and fulfill the needs of the community members? This article does not examine the seemingly infinite possibilities for using Web 2.0 technologies for community-building outside of the library as a marketing vehicle with the community of library users. Instead, the author examines trends in the literature dealing with Web 2.0 and libraries, outlines a brief history and definition of Web 2.0, and applies the framework of McMillan and Chavis to cloud computing solutions in libraries. Readers should gain an understanding of how library leadership can foster a wholesome sense of community within their organizations using easy-to-use, and often free, Web-based computing solutions.

Literature Review

There is much literature in the field of library science about Web 2.0 and cloud computing to interest an administrator, such as comparisons of APIs, lists of free software-as-a-service (SaaS) providers, ruminations on how Web 2.0 technology can streamline workflow, and analyses of savings generated through cloud computing versus platform computing. Given this article’s focus on community-building within the library organization (rather than on marketing and external relations), this literature review does not examine the trends regarding Web 2.0 technologies as a public relations vehicle.

Articles dealing specifically with cloud computing, Web 2.0, and library services display a number of significant trends. One of the primary trends showcases a level of concern over security and the control of content. McClure exemplifies the concern inherent in socially generated applications, and the possibility for strained relationships with information technology (IT) staff that cannot support an immense range of different applications.³ Recommendations for avoiding those situations by carefully and strategically selecting and implementing cloud computing solutions is subsequently a large trend, exemplified by McClure as well as Arnold, but also Kho, who states “cloud computing lets IT focus less on day-to-day administration and more on policy. Rather than spending time purchasing, deploying,

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and maintaining servers and software, IT managers are free to focus on higher-value activities.”⁴ Byrne outlines customizability, security and levels of support as things to examine carefully when selecting SaaS to implement.⁵

The second major trend in the field of librarianship examines how cloud computing and Web 2.0 solutions can be used to streamline workflows or to work collaboratively on various scaled projects. Many of these articles are shorter case studies of potential implementations of Web 2.0 solutions, as exemplified by Farkas, Carr, and Greenwood.⁶ Each of these articles focuses on very specific library issues and the potential ways a short list of cloud computing solutions can be implemented to resolve them. This trend is also displayed in longer articles that examine a wider range of Web 2.0 services, adoption rates by libraries, and ways to maximize the collaborative potential of these technologies.⁷ Hastings and Arnold are examples of these longer articles, examining business applications of collaborative interfaces and providing comparison charts of API providers and the ease of use in creating mashups.⁸ Hastings focuses specifically on how social networking sites such as Facebook, orkut, and hi5 can be adapted for business applications, while Arnold looks at SaaS providers such as Google, Amazon, and Microsoft that allow for the creation of mashups “that run in the clouds to create new and distinct web services.”⁹

A final significant trend in the library science literature is articles that examine the impact and potential uses of cloud computing and Web 2.0 technologies as a method of social information sharing and knowledge acquisition. Greenhow writes on social research and how social bookmarking can help educators deliver trusted content in a learning environment.¹⁰ Mitchell discusses how Web 2.0 technologies can be used to create a “learning architecture” within the context of efforts by Australia’s education agency to index educational tools.¹¹ Maggio et al. writes on the use of social tagging to teach students medical subject headings.¹² A final example of this trend—and one that is of great interest to many librarians—examines the creation of customized “just-in-time” webpages and resource guides using LibGuides, LibraryThing, RSS feeds, and other Web 2.0 technologies.¹³

However, very little literature—particularly in the field of library science—focuses on how social and collaborative Web-based software can be deployed by an effective library administrator or leader as a method of building community within the organization and with the larger community of users. One such rare article by Bowman looks at using cloud computing as a method of building communities of practice in art libraries. Another examines social networking and its potential use for the development of online readers’ circles.¹⁴ This type of investigation can more typically be found in different fields of sociology, particularly by researchers looking into computer-mediated communication or the implications of Web 2.0 on education. These types of studies frequently examine a specific population,

as exemplified in an article by Hjorth that looks at emerging online communities in the Asia-Pacific region.¹⁵ Pachler and Daly examine the role of narratives in the research process by looking at how cloud computing can facilitate the collaborative creation of narratives.¹⁶ Ravenscroft and Hemmi, Bayne, and Land provide examples of the many articles that investigate how the availability of Web 2.0 technologies is serving as a catalyst for evolving pedagogy.¹⁷ Hemmi’s ethnographies also take a look at how institutions of higher education tend to constrain and control “the more radical” aspects of social networking and collaborative Web interfaces.¹⁸

While Web 2.0, social and collaborative “software as a system,” and cloud computing are discussed heavily in many different fields, the examination of these collaborative technologies in the creation and sustainability of communities within library organizations does not represent a major trend in the literature.

Core Patterns of Web 2.0 and Examples of Cloud Computing Solutions

[Social networking is] people-to-people networking. So content may become a part of it, but we are calling them social networks because the primary focus is in a person-to-person exchange of knowledge.

—Bryant Duhon¹⁹

The term “Web 2.0” was coined in 2004 by Dale Dougherty of O’Reilly Media. The initial intent of the term was as the name of a conference on the next generation of the Internet, and how next-generation Web-based applications would be built on network effects. The term has, however, been widely adopted and now describes, according to Musser, “a set of economic, social, and technology trends that collectively form the basis for the next generation of the Internet—a more mature, distinctive medium characterized by user participation, openness, and network effects.”²⁰ Musser goes on to clarify that this definition of Web 2.0 is simply a “starting point because, in the end it is the underlying patterns that are much more important than a definition.”²¹ These “core patterns,” outlined below, become the framework upon which any Web 2.0 technology is built:

- Harnessing collective intelligence: create an architecture of participation that uses network effects to move from “one-to-many publishing” toward “many-to-many” publishing.
- Data is the next “Intel Inside”: use unique data sources.
- Innovation in assembly: build platforms . . . where remixing of data and services creates new opportunities and markets.
- Rich user experiences: go beyond traditional webpage

metaphors to deliver rich user experiences combining the best of desktop and online software.

- Software above the level of a single device: create software that spans Internet-connected devices and builds on the growing pervasiveness of the online experience.
- Perpetual beta: move away from old models of software development and adoption in favor of online, continuously updated software as a service model.
- Leveraging the long tail: capture niche markets profitably through the low-cost economics and broad reach enabled by the Internet.
- Lightweight models and cost-effective scalability: use lightweight business- and software-development models to build products and businesses quickly and cost-effectively.²²

Recently, the buzz over Web 2.0 has become somewhat superseded by the term “cloud computing,” which, because of its focus on Web-based “software as a service,” is really another manifestation of Web 2.0. Web 2.0 and the eight core patterns “manifest themselves under a variety of guises, names and technologies: social computing, user-generated content, software as a service, podcasting, blogs, and the read-write web.”²³ Throughout this article, the terms “Web 2.0” and “cloud computing” are used interchangeably.

To examine the potential uses of Web 2.0 technology for nurturing a sense of community within a library organization, it is useful to quickly outline some of the relevant cloud computing solutions available. This list is by no means exhaustive nor meant as an endorsement, and cannot possibly be kept up-to-date given the speed at which new applications are developed and disseminated. Each of these is built to facilitate communication (some more than others) through network effects (the notion that applications are more useful as more people add information to them). True to the core pattern of software above the level of a single device, most of these solutions are accessible from mobile devices.

Communication tools: with network effects as the driving philosophy behind Web 2.0, communication is one of the central activities that take place when any group of individuals use cloud computing solutions. However, some technologies are more directly aimed at facilitating communication. Among those are blogs, instant messenger collators, and video conferencing services such as Skype. Blogs are defined as “a form of web publishing characterized by a series of entries or posts.”²⁴ Blogs offer the ability to embed polling applications, provide control over audience, possess flexibility and anonymity for comments, and contain an archive feature. Instant messenger collators such as Meebo allow one to monitor multiple messaging accounts from a single location. Services such as Skype offer free Internet video conferencing and chat options, many of which can be transferred to mobile devices with similar

functionality. Each of these services directly addresses the ability of individuals to communicate with each other.

Collaborative project spaces: these cloud computing solutions capture the essence of all eight core patterns by providing Web-based platforms, rather than Web-based services, in which collaborative efforts can be undertaken. This type of Web 2.0 technology ranges from social desktop publishing applications (such as Google Docs) to social networking sites (such as Facebook, orkut, and hi5) to wikis. Google Docs gives users all the options and functionality of Microsoft Office applications and similar desktop publishing software packages, with the notable difference being that these files are commonly editable. In other words, multiple individuals can view and edit the same file simultaneously, without overwriting or erasing each other’s work. While Facebook and other social networking applications are more famous for their personality tests, these technologies do offer business applications that can be of use for collaborative projects, including the ability to upload and share a file with a group. Similarly, wikis can be used as a project platform, enabling members of a group to share information. Wikis are defined as “web sites that allow users to freely add and update pages directly from a web browser. They are often created and maintained as collaborative efforts.”²⁵ Each of these solutions offers users a social platform where group projects can take place asynchronously:

- *Calendars*: Social calendars can be used to check for availability, schedule events, and attach agendas.
- *RSS feeds and mashups*: Each of the previous technologies is about pushing content out to the world and sharing a common “workspace” for collaborative projects. This last category is about personalization and customization of a user’s private space on the Web. Really Simple Syndication (RSS) is an “XML text-based data format containing a list of items, each typically with a title, summary, URL link, and date.”²⁶ These feeds can be used to monitor the changes taking place in the source of the feed, and can be tailored to the individual’s needs and interests. Mashups are customizable webpages, in which content (such as RSS feeds or calendars) can be embedded, manipulated, and rearranged to suit the desires of the individual. Building off of the core pattern of rich users experiences, these technologies allow the experience of the Web to be much more dynamic than the more traditional, one-to-many distribution of information found in pre-Web 2.0 websites.
- *Harnessing of Collective Intelligence*: Web 2.0 represents a shift the way the Internet can facilitate the interaction of individuals. The harnessing of collective intelligence, as the foremost of the core patterns of Web 2.0, best illustrates that these technologies change the Web from a one-to-one or one-to-many method of distributing information to a many-to-many

method. This creates opportunities for enhanced communication, Web-based collaborative platforms for projects, and the customization of information for the individual's needs and interests.

Cloud Computing and Community

By recognizing the identity of users (e.g., through profiles), users can be (and often necessarily are) bound together in communities which share a similar context, whether physical, social, or subject-oriented. More than simply communication, Web 2.0 technologies open up ways of sustaining two-way and ongoing dialogues, creating spaces or platforms: it is communication that is quick and convenient, but also more substantial and interconnected.

—John Bowman²⁷

Web 2.0 technologies can easily be adapted to enhance workflow in a library organization, but their inherent social nature also means that they can be utilized by library administrators and leaders to help foster a sense of community within their organization. Doing so requires recognizing that these services and technologies are more than just effective and cheap methods of communication, but (as referenced in the quote at the beginning of this section), are more substantial. An understanding of what constitutes a community is also necessary. Using McMillan and Chavis's definition of community as a framework for examining Web 2.0 technologies answers the second question guiding this article.

McMillan and Chavis's 1986 definition of community was selected as the analytical framework for this article because it puts forward a definition that is "explicit and clear" with identifiable parts.²⁸ This definition outlines four elements of community, which are not tied to geographic or regional locations, acknowledging Durheim's observation that "modern society develops community around interests and skills more than around locality."²⁹ McMillan revisited the 1986 definition ten years later, reconceptualizing the elements of the definition with a more affective focus.³⁰ While the revision highlights the critical role of emotion in a sense of community, the 1986 definition was chosen over the 1996 revision for this article because it presents elements that do not focus on emotion exclusively, while still acknowledging the importance of affect.

Each of the four elements of McMillan and Chavis's definition of community are outlined below, with examples of their application on Web 2.0 technologies included.

Membership

On the Web 2.0, information order is about social order. What began as a network of information

sources has gradually begun to shift to a network of user.

—John Bowman³¹

Membership is defined as "a feeling that one has invested part of oneself to become a member and therefore has a right to belong."³² Membership is comprised of boundaries, emotional safety, a sense of belonging and identification, personal investment, and a common symbol system. Boundaries establish who belongs to a community, and who does not; those individuals who fall within the boundaries of a community are afforded a sense of emotional safety or security. This security leads to a sense of belonging and identification, which "involves the feeling, belief, and expectation that one fits in the group and has a place there, a feeling of acceptance by the group, and a willingness to sacrifice for the group."³³ Working to join the community leads to a feeling of personal investment, making membership "more meaningful and valuable."³⁴ A common symbol system helps reinforce the existence of boundaries.

Applying the element of membership and its constituent parts to cloud computing solutions reveals just how much these technologies can be used to nurture a sense of community. Blogs, wikis, shared calendars, social work platforms, and most other examples of social computing are built with the ability to share information as widely or as narrowly as desired. A wiki used to document position responsibilities and workflows can be limited to library personnel, effectively creating boundaries between those that work in the library and those that do not. These boundaries provide a feeling of security, allowing more detailed documentation of workflows that may not have taken place if the information was available to all Web users. New employees to the library undergo "initiation" when they are invited to participate in the library's social computing solutions, and the work of setting up one's account, profile, and user information helps continue the personal investment already begun during the interview process. Thus, inclusion in the library's Web 2.0 solutions provides evidence of acceptance by the community. A common symbol system will probably pre-date the adoption of Web 2.0 technologies, usually in the form of mission, vision, and value statements, taglines or logos. However, transferring these symbols into the cloud helps library personnel relate to the Web 2.0 technology as a part of their work life.

Influence

It's the basics of knowledge management; give folks a conduit for sharing knowledge. Stop reinventing the wheel and hopefully start expediting the rate of successful innovation and change because you are getting more intelligent input into your decisions.

—Bryant Duhon³⁵

Influence is a bidirectional element of McMillan and Chavis's definition of community: "In one direction, there is the notion that for a member to be attracted to a group, he or she must have some influence over what the group does. On the other hand, cohesiveness is contingent on a group's ability to influence its members."³⁶ These two directions do not have to be mutually exclusive, however, as the play of community influence on its members and of individuals on the community provides "consensual validation," or a feeling that one's worldview is justified. "Thus, uniform and conforming behavior indicates that a group is operating to consensually validate its members as well as to create group norms."³⁷

This element of community is perhaps the easiest to see at work in cloud computing implementations. Web 2.0 technologies can be implemented by library administration and leadership to facilitate the bidirectional nature of influence. For example, a blog that is used by library administration to disseminate information about library initiatives and changes can be used to influence members to conform to institutional policy. A sense of community can be nurtured by constructing the blog in such a way to allow for influence to be exerted by individuals on the community. Blogs can be set up to allow anonymous comments, and as was discussed under membership, can be limited to library personnel only, creating a sense of safety in which library personnel can voice their perspectives. This can be taken a step further, in that most blogs or other cloud computing solutions allow for the inclusion of applications such as polls. Allowing library personnel to vote on certain issues drives home the role they can play in library governance, especially when they see the results of their vote acted upon.

Integration and Fulfillment of Needs

Information has meaning for people; it is part of specific communities of exchange, for particular practices, for particular uses. The problem of information access, then, becomes not one of users "selecting" information, but of how users can connect meaningfully, how users can make sense of other users and the information they produce and exchange.

—John Bowman³⁸

The third element of McMillan and Chavis's definition of community is integration and fulfillment of needs. They immediately clarify this element as reinforcement, underscoring the importance of need fulfillment for individual members as a critical factor in the cohesiveness of a community.³⁹ However, for a community to be strongly cohesive, need fulfillment must go beyond basic survival needs, into the realm of shared values. Just as with a common symbol system under the membership element, a system of shared values will exist prior to any implementation of

cloud computing solutions and will vary from institution to institution, but it can be strengthened and reinforced by the interactions that take place through social computing.

This variance in a system of shared values is no different for libraries, which will have unique missions and visions based on the communities they serve. Despite these vast differences, Web 2.0 technologies can help foster a sense of community through the delivery of relevant information and the facilitation of communication and knowledge sharing. Social networking and social workplace platforms such as Facebook, Twitter, and Google Docs increase the chances personnel will get to know each other, both as methods of instant communication and through the inclusion of profile features. As this takes place, community cohesiveness increases as individuals learn more about their coworkers (e.g., who possesses different skill sets that can help the individual fulfill their needs). Direct work needs can be fulfilled by using RSS feeds or mash-ups to deliver relevant content directly to the appropriate individual, while still allowing for individual customization. Shared calendars can show how library administrators are working toward issues of importance to the values of the library personnel.

Shared Emotional Experience

The benefit is that the blog allows a person or a group to post information and receive feedback on those posts. . . . The blog enables discussion, ensures that clarification and follow-up information is distributed uniformly, and allows for the archiving of older blog posts, keeping information retrievable.

—Elizabeth Nelson⁴⁰

Shared emotional experience is the fourth and final element of McMillan and Chavis's definition of community. According to their article, "a shared emotional connection is based, in part, on a shared history."⁴¹ They go on to outline seven components of this element:

1. *Contact hypothesis*: the more people interact, the more likely they are to become close.
2. *Quality of interaction*: the more positive the experience and the relationships, the greater the bond.
3. *Closure to events*: if the interaction is ambiguous and the community's tasks are left unresolved, group cohesiveness will be inhibited.
4. *Shared valent event hypothesis*: the more important the shared event is to those involved, the greater the community bond.
5. *Investment*: the amount of interpersonal emotional risk one takes with the other members and the extent to which one opens oneself to emotional pain from the community life will affect one's general sense of community.

6. *Effect of honor and humiliation on community members*: reward or humiliation in the presence of the community has a significant impact on attractiveness (or adverseness) of the community to the person.
7. *Spiritual bond*: can be a religious or some other undefined sense of fellowship with the community.⁴²

Once again, much like a set of shared values and a common symbol system, Web 2.0 technologies can be used to augment many of these existing components of shared emotional experience. Twitter and Facebook are perfect examples of tools that work on the basis of contact hypothesis, increasing the frequency of contact between library personnel. Twitter can be used to quickly share new information with a wide audience, which offers many possible applications to a work environment. Facebook offers business-related applications that can bridge the site's social networking elements with work life, while preserving both. Facebook, Twitter, blogs and other media can also play a central part of shared valent event hypothesis. During a natural disaster or other emergency situations, these services can be utilized to deploy necessary information quickly, following a viral pattern as individuals re-tweet, repost, or otherwise redistribute information along existing social networks. Most of these technologies offer the ability to archive previous actions, whether it is a "review history" function in Google Docs or a history of previous posts to a blog. This ability helps new members to a community feel connected to the history of the institution, even if they did not personally take part in the events. Finally, social computing services can be an additional method for library administrators to honor individuals for jobs well done, posting praise on the different social media used by the library.

Each of the four elements of McMillan and Chavis's definition of community has the ability to be augmented by Web 2.0 technologies. Influence remains perhaps the strongest element of community that Web 2.0 can foster, allowing individuals in the library organization that may be verbally silent to be digitally active in library governance. From using blogs as a method of facilitating bidirectional influence to connecting community members during a crisis using social networking sites, Web 2.0 technologies can be implemented as methods of nurturing a sense of community among library personnel, particularly given the fast-paced and mobile environment in which libraries must conduct business.

Conclusion

Much literature in the field of librarianship discusses the implications of Web 2.0 on workflow within libraries. This article assumes the implementation of cloud computing solutions within libraries, and asks what are the core patterns of Web 2.0 and how can these be applied within a

library to foster a sense of community. By using McMillan and Chavis's definition of community as a framework of analysis, this article examines how cloud computing solutions can augment or enhance already existing elements of community within a library. Web 2.0 is defined by eight core patterns, foremost of which is harnessing collective intelligence. While Web 2.0 technologies offer cheap, customizable, and instantaneous solutions to workflow issues, their very foundations are rooted in network effects, making these tools—no matter their implementation or use—social in nature. Library administrators and leaders can seize the opportunities for social networking inherent in Web 2.0 workplace tools to nurture a sense of community among library personnel. As the application of the McMillan and Chavis definition of community to Web 2.0 indicated, cloud computing solutions cannot be the sole source of sense of community within a library or any other organization. Instead, their ability to connect individuals at a more substantial and personal level can be used to enhance what already exists within an organization. Cloud computing solutions such as blogs, wikis, collaborative project spaces, and social networking services can help define membership, provide opportunities for the exercise of influence, reinforce the benefits of inclusion in the community through the fulfillment of individual needs, and provide a history and context for shared emotional connections. The tools offered by Web 2.0 and the resulting opportunities for social networking can be used to help a group of library personnel become a more cohesive organization through a strengthened sense of belonging.

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