

## The Social Networking Adoption Matrix (SAM) Prototype: Helping Healthcare Organizations Effectively Choose Social Networking Technologies

Alan Rea  
Western Michigan University  
Haworth College of Business  
Department of Business Information Systems  
Kalamazoo, MI 49008-5412  
269.387.1444  
[rea@wmich.edu](mailto:rea@wmich.edu)

Robert Landeros  
Western Michigan University  
Haworth College of Business  
Department of Management  
Kalamazoo, MI 49008-5429  
269.387.5802  
[robert.landeros@wmich.edu](mailto:robert.landeros@wmich.edu)

Tristan Stempien  
Western Michigan University  
Haworth College of Business  
Department of Management  
Kalamazoo, MI 49008-5429  
(269) 387-5860  
[tristan.stempien@wmich.edu](mailto:tristan.stempien@wmich.edu)

**Abstract:** Healthcare organizations looking to increase communication and educational offerings to their community, providers, and healthcare consumers need to implement social networking technologies. However, without a thorough needs analysis a healthcare organization may waste valuable limited resources with very little return on investment. In this paper, the authors discuss preliminary research targeted to help organizations adopt relevant technologies using a Social Networking Adoption Matrix (SAM). SAM helps organizations decide which social networking technology categories are necessary to meet their strategic goals via the Social Network Adoption Matrix Expert System (SAMES). As a result, organizations can successfully increase communication opportunities and balance the necessary resource investment.

### KEYWORDS

Social Networking, Technology Adoption Model, Decision Matrix, Expert Systems

### INTRODUCTION

On most days one can read a newspaper, turn on the television, or read a blog posting that discusses the constant struggle of non-profit organizations to meet its constituents' needs (O'Connell, 2010). Many healthcare organizations fall into this category as well (Eysenbach, 2008; Boulos and Wheeler, 2007). Whether it is a lack of resources, staffing issues, or other internal dynamics, an organization needs to fulfill its mission; most organizations must still

find ways to keep people informed and engaged in their own personal healthcare or the organization's mission and goals.

In the past, many organizations used a combination of print newsletters transformed into static websites, and e-mail distribution lists would deliver and remind people of the newsletter and perhaps some events (Gilbert, 2006). Although these changes allowed some cost savings (e.g., reduced printing costs), they still did no more than replicate existing communication practices.

### **The Social Networking Choice Challenge**

However, the massive influx of social networking technologies and their widespread adoption by the general population has created the perfect storm for healthcare organizations willing to invest resources in these technologies to regularly connect with constituents (Farmer, et al., 2009). No longer does an organization need to wait for a quarterly newsletter or enough information for an e-mail missive. Instead, the organization can post short bursts of information about potential opportunities, future and recent events, healthcare education, etc. to current healthcare consumers, providers, or the community at large who subscribe to one of the organization's social networking accounts, or visit one of its sites. These targeted information snippets keep the organization at the forefront of people's minds on a recurring basis with little to no active effort on the recipient's part.

Why then, have studies shown that social networks are still a mixed bag when it comes to effectively using them to support an organization's mission and goals (Cravens, 2010; Kaplan and Haenlein, 2009)? Cravens notes that particularly in non-profits the lack of in-house expertise and budget restrictions are the two primary reasons why organizations do not use social networking sites (19). The point is underscored with successful organizations committing staff and training to utilize the social networking resources without, at times, a "demonstrable return on the investment along with measurable contribution to their mission" (11) yet in place. In other words, there is a large front-end investment without a measurable ROI since these social networks are not only new endeavors but also defy accepted measurements of success (NTEN, Common Knowledge, & ThePort Network, 2010). It is easy to imagine that these conditions exist in healthcare organizations as well given budget and staff constraints.

It seems to us then that although we can encourage healthcare organizations to devote staff time and acquire training in the use of social networking technologies, as researchers we are not able to provide these items within the context of our study. Instead, we can help by examining the decision processes, rationales, and social networking implementations of organizations that are currently using these technologies. From these findings we can then develop a heuristic that will enable organizations to make social networking decisions that have a better chance to succeed within their particular organizational culture and available resources.

### **Paper Organization and Purpose**

This paper is part of a larger research project that looks at developing an expert recommendation mechanism for technology adoption. In this particular paper, we look at how management can best choose the social networking technologies that it needs to meet an organization's mission and goals. This is an ongoing research project and we welcome input as we revise and hone approaches to this ongoing challenge.

In this paper we will first define social networks in order to create a set of categories through which we can present the various features, options, and potential use of social networks to organizations implementing specific technologies to meet their needs. We will then present our Social Network Adoption Matrix (SAM) used to determine what social technologies best meet the needs of an organization. From there, we will provide an example SAM to illustrate how evaluations and rankings can be used to present the best ranked choice to meet an organization's social networking endeavors. Next, we will move into a discussion that implements the SAM into our Social Network Adoption Matrix Expert System (SAMES) prototype. We end with future research directions.

## DEFINITION OF SOCIAL NETWORKS

For our study we do adhere to one of the more common definitions of a social network as "patterns or regularities in relationships among interacting units" (Wasserman & Faust, 1994). However, we must also consider the technology mediation among these relationships as opposed to more traditional geographically bound social networks. Wellman notes this shift from the definition of community from "densely-knit, bounded neighborhood groups" to a set of computer-mediated relationships that provide "sociability, support, information, and a sense of belonging" (p. 2031).

In other words, although social networks could provide connections for those who live in the same street, town, or region, they now also extend beyond geographical boundaries and provide less of a strong group bond and more of a loose association. This can be a challenge for many organizations wishing to create a close knit group of constituents, but can be a boon for educating people about a particular cause or providing information on support options. Moreover, even without strong group bonds, targeted information can be sent that applies to healthcare consumers, providers, and the community at large.

## CATEGORIES OF SOCIAL NETWORKS

In order to limit the scope of this initial study, we have pre-selected the following social networks. They were chosen because they best represent current social network technologies. However, we envision that this list will need to be adjusted as the study moves forward because of the user input we receive compounded by ever-changing social network offerings.

- **Large Social Networks:** Facebook and MySpace are two of the main offerings in this category. High user densities with various embedded tools to facilitate interaction have made these social networks desirable destinations for organizations. We do see additional market penetration from Google+, but this does not yet have the widespread adoption among communities beyond early tech adopters to be significant yet in this study.
- **Professional Social Networks:** LinkedIn and Plaxo help organizations manage contacts and, in the case of LinkedIn, provide areas for focused group discussions. Both offer paid options that provide more support and management tools and are quickly increasing user numbers. In particular, LinkedIn now boasts over 115 million users with 83% growth of user accounts since 2010 (Taylor, 2011).
- **Custom Social Networks:** Ning and Wall.fm enable an organization to create a customized Web area with collaboration and discussion tools. Both offerings enable an organization to create a tailored social networking presence versus other offerings that only provide a single theme for all users. For example, most Facebook pages look very similar, but every Ning space reflects the organization's theme, with various layouts, components, and tools to choose from. Ning and Wall.fm have free and paid levels of service and support.
- **Blogs:** Blogs provide a public platform for sharing ideas, news, and other organizational events with interested users. Blogs are one of the first Web 2.0 technologies to be adopted in a widespread manner. Effective blogs require regular updates to content, but are easy to maintain. Sites such as Blogger, Xanga, and Wordpress offer various levels of support and services depending on the subscription model.
- **Micro-Blogs:** New to the social networking sphere, micro-blogs provide organizations with a delivery mechanism for short information messages or calls to action. Twitter has the largest user base and can provide an organization with a powerful communication medium. For longer messages, Google Buzz and Tumblr are a better choice. All have easy to use interfaces and support integration into other social networking tools.
- **Social Ranking Aggregators:** Although not platforms for creating new media for distribution, these social networking tools can be used to provide recommendations of not only organizational postings and newsletters but also related topical areas that can create interest in organizational missions and goals. By posting Web and article recommendations to Digg, StumbledUpon, and Reddit an organization can create a greater awareness of its causes. In addition, an organization can embed integration buttons back to the aggregator sites from its social media offerings, thereby encouraging site visitors to provide recommendations.

- **Social Network Q&As:** Although a staple in the technical community for many years via UseNet, BBSes, and discussion lists, community-driven question and answer sites have become a viable social networking area for discussing various topics of interest well beyond technology. These easy to use social networking sites allow an organization to educate users on relevant organizational topics such as recycling. Currently, StackExchange (2011) and Quora lead in this area.
- **Social Network Images:** Although not normally considered social networking platforms, image-sharing sites allow an organization to post and promote events and causes. Many sites, such as Flickr and Photobucket, allow for comments and user rankings as well as integration with other social networking sites via integration buttons.
- **Social Network Donation Portals:** Social networking sites that promote involvement within a larger community have seen an increase in membership and participation. Some, such as Kiva, have a specific focus for donations. How it differs, though, is that users take part in working with others to make loans towards a specific cause. Other sites, such as Give2Gether (2011), allow an organization to create a campaign that leverages social networking tools. Healthcare organizations can use these sites for specific donations to causes or charity events.

## SOCIAL NETWORK ADOPTION MATRIX (SAM)

In order to determine what categories of social networks to recommend as a result of the survey, we have developed a preliminary matrix that embodies the major rationales for choosing a particular social network option as well as the challenges (i.e., staffing and training) that most organizations note precludes them from adopting social network technologies. Previous studies (Burns and Wholey, 1993; Rice, et al., 1990) on matrix adoption in healthcare and technology were used as starting point for our Social Network Adoption Matrix (SAM). SAM measures six criteria ranked on a scale from 1-5 (low to high requirements):

### Network Density

Network density is measured in the number of social network participants. For example Facebook with over 500 million members has a high network density (2011) whereas a tailored social network centered on a specific topical area, such as Freecycle (2011) with a little over eight million members would have a lower network density. However, caution should be exercised if an organization's focus is recycling a social network like Freecycle already consists of those interested in the specific cause and may be appropriate to the targeted mission and goals.

### Interactivity

Interactivity is measured by the number of posts and interactions among the social network members. Twitter has a high interactivity level whereas LinkedIn in general has a much lower level. However, once again, the organization needs to be aware that targeted groups in LinkedIn can have a higher quality level in terms of the posts than those in Twitter.

### Visibility

Visibility is measured by how often the social network technology appears in search engines and is linked by other networks. The ability to easily link from an organization's web site to Facebook, Twitter, Google Buzz, and MySpace via integration button links is paramount to increasing the visibility ranking. The linkage of Web 2.0 content and news aggregator sites, such as Digg, StumbledUpon, and various others are also a measure of increased visibility for the social network (van Zyl, 2009).

## Ease of Use

Ease of use equates with a set of parameters ranging from how easy it is for organizational staff to create accounts on the social network, how quickly posts can be made, and how easy it is to customize and maintain the social network area. This includes membership management, tailored information, and a myriad of other items. Of all the matrix items this can be the most subjective of the measurements, but can play directly into how well an organization can keep interactions among users at the forefront of its strategy (Simon, 2010).

## Support Options

Support options fall into three categories: 1) what support is available on the social networking site itself in the form of FAQs, a Knowledge Base, and user support boards 2) what support available external to the site in terms of organizations (e.g., TechSoup) or support sites (e.g., WordPress user groups) and 3) the lack of support needed to run the site. For example, Twitter requires very little training to begin to use it.

<b>Social Network Adoption Matrix (SAM)</b>						
	<b>Network Density</b>	<b>Interactivity</b>	<b>Visibility</b>	<b>Ease of Use</b>	<b>Support Options</b>	<b>Total</b>
<b>Large Social Networks</b>						
Facebook	5	4	5	4	1	19
MySpace	4	4	3	4	1	16
<b>Professional Social Networks</b>						
LinkedIn	4	5	5	4	2	20
Plaxo	3	4	4	5	1	17
<b>Custom Social Networks</b>						
Ning	4	5	4	4	3	20
Wall.fm	2	5	4	4	2	17
<b>Blogs</b>						
Blogger	4	3	3	4	2	16
WordPress	5	5	5	4	5	24
Xanga	4	4	4	3	2	17
<b>Micro-Blogs</b>						
Google Buzz	5	3	4	4	1	17
Tumblr	4	4	4	5	2	19
Twitter	5	5	5	5	1	21
<b>Social Ranking Aggregators</b>						
Digg	5	5	5	4	2	21
Reddit	5	5	4	4	2	20
StumbledUpon	3	4	4	3	2	16
<b>Social Network Q&amp;As</b>						
StackExchange	5	5	4	5	1	20
Quora	4	3	4	4	3	18
<b>Social Network Images</b>						
Flickr	5	5	4	4	2	20
PhotoBucket	5	3	4	4	1	17
<b>Social Network Donation Portals</b>						
Give2Gether	3	4	4	4	5	20
Kiva	4	3	4	4	2	17

**Table 1: Social Networking Adoption Matrix**

## SAMPLE MATRIX RANKING OF SOCIAL NETWORKING TOOLS

In order to create our first prototype, we used our preliminary social networking tools list. The rankings in place are based on our evaluation of the preliminary matrix rankings gleaned via discussions, user experiences, and overall industry reports (Gartner, 2011). We expect these rankings to fluctuate given the volatile nature of many social networking options, as well as the influx of new offerings (e.g., Google+) that occur in a relatively short period of time within the social networking technology sphere. However, we wanted to create a baseline from which to start the research and have factored in for industry changes, as well as SAM and SAMES revisions as more survey results come in and are analyzed. However, these rankings were used in our preliminary prototype of the Social Network Adoption Matrix Expert System (SAMES) for testing purposes.

## RESEARCH INSTRUMENT

With our Social Network Adoption Matrix (SAM) in mind, we developed a research instrument designed to examine what makes for the successful--or perhaps unsuccessful--use of social networking technologies in the healthcare sector. To guide our survey formation, we framed our research around the following questions:

- What are the major constraints in social networks as they affect decision-making?
- What type of information can an organization distribute via social networks?
- What type of information can an organization gather from social networks?
- How does the organization's ideology affect the adoption and use of social networking technologies?

### Instrument Questions

Using Davis's Technology Acceptance Model (Davis, 1989), we created a set of questions organized in categories that would help us understand how an organization views social networks either in use or ones that they might intend to use.

Questions are posed within a seven-point Likert scale as well as within a qualitative context of open-ended questions followed up with interviews where appropriate.

#### Intention of use

- What does your organization attend to achieve through the use of social networks?

#### Satisfaction

- How would you rate your overall satisfaction with the use of social networks for your organization's overall purpose?
- How likely are you to recommend the use of social networks to other organizations?

#### Trustworthiness

- How would you rate your overall trust/confidence in the use of social networks to accomplish your organization's purpose?
- How would you rate social networks as a reputable means of accomplishing your organization's purpose?

#### Perceived Usefulness

- How would you rate the quality of social networks in achieving your organization's purpose?
- How would you rate the functionality/benefit/utility provided to your organization's stakeholders through the social networks that you use?

- How would you rate the sufficiency of the social networks used in communicating your desired message?
- How would you rate the improvement achieved from the use of social networks in your organization?
- Using social networks such as Facebook, Twitter, etc. would enable your organization to accomplish its purpose more quickly?
- Using social networks to communicate to stakeholders would increase the organization's performance?
- Using social networks would enhance your organization's effectiveness of its communication to internal and external stakeholders?
- Using social networks would make it easy to communicate to internal and external stakeholders?

#### Perceived Ease of Use

- How would you rate the overall ease of using social networks for communicating your organization's purpose?
- Would you find it easy to get social networks to accomplish what you want them to?
- Do you feel the interaction with social networks used in your organization is clear and understandable?
- How would you rate the flexibility of the use of social networks in achieving your organization's purpose?
- How would you rate your organization's knowledgeableability of the use of social networks?
- Would it be easy to become skillful at effectively using social networks for communicating your organization's purpose?

#### Influence

- Who influences your use of social networks? (e.g., managers, donors, etc.)

## **SOCIAL NETWORK ADOPTION MATRIX EXPERT SYSTEM (SAMES) PROTOTYPE**

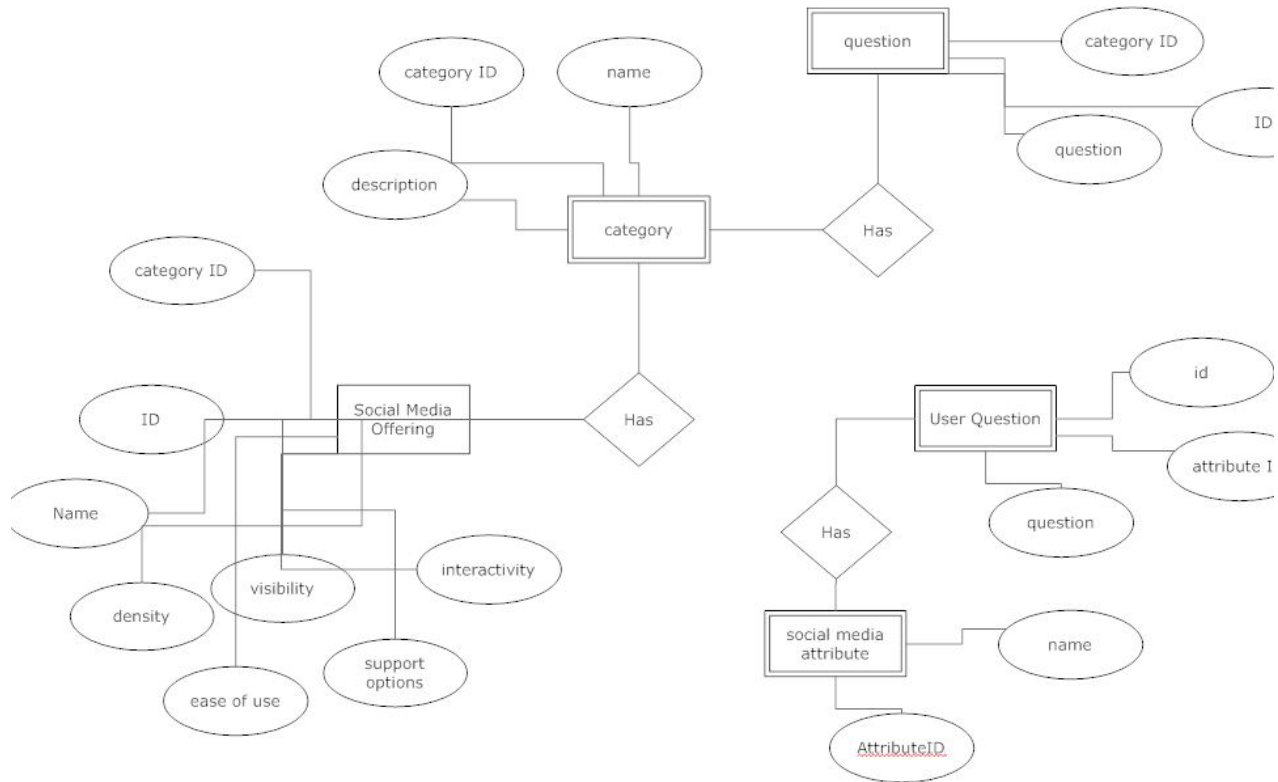
Although more adoption model testing for question refinement is necessary, our preliminary trial shows promise. We combined SAM with our acceptance model to create a prototype of our Social Network Adoption Matrix Expert System (SAMES). In this system we are able to ask an organization's management not only what their needs are in terms of communication, outreach, education, etc. but also balance these against their current resources and staffing that would be required to effectively implement and manage social networking technologies. The preliminary results indicate that this could prove quite effective in winnowing down social networking technology choices for those organizations that have specific mission goals.

### **SAMES Architecture**

In developing the SAMES prototype, we needed to encapsulate each entity within its own object because the decision was made to create the prototype using object-oriented principles to ensure maximum portability and rapid application development (see Figure 1). We had made a preliminary decision to use Python (2011) in combination with Pyke (2011) to allow for server side control and processing with an expert system wrapper for increased logical flexibility. All data is stored in a PostgreSQL database (2011) with each object in an individual table. Ultimately, we wanted a fast system that required minimal processing on the user's computer. In the next prototype, we will web-enable the interface to allow maximum access and increased usability.

As a result of our object focus, we grouped the social media offering as a separate entity organized with SAM attributes. This will also permit us to incorporate new social technologies into SAMES as they become proven. It will also enable us to remove some of the very technologies we currently have in SAMES as necessary (e.g., MySpace).

In order to ensure flexibility as our prototype evolves through multiple revisions, we decided to store the decisions in a separate entity keyed to the specific questions. Using this structure illustrated in Figure 1, we were able to then make decisions based on the questions presented to the users.



**Figure 1: SAMES Architecture**

## SAMES Walkthrough

We enabled the user decisions using skip and branching logic to control the question flow according to the user's answers. A brief walkthrough (see Figure 2) illustrates the power of SAMES in assisting an organization to choose the most applicable social networking technology.

The organization is first presented with a list of nine questions to determine its overarching need. An organization can choose to repeat this process for different needs as well (e.g., communication versus recruitment), but in this example we will work through a single iteration of the SAMES decision process.

The preliminary questions in Figure 2 are the first step in helping SAMES meet an organization's needs. Each question helps SAMES focus the user in terms of intent rather than approaching the decision from a technology. This is important because technology changes and what might work for a specific purpose may no longer work within the span of a few months. For now, the user must only choose one of the nine questions, but plans are underway to allow for a combination of choices.



```

-----
Is a large concern of your organization raising funds for a charitable cause and/or are you interested in giving back to
in need?
Answer Number - 1
-----
Is your key purpose reaching a broad large audience regardless of who or where?
Answer Number - 2
-----
Are you trying to reach a specific demographic? That is are you concerned with creative control and the ability to tailo
ings to your specific needs and/or user groups.
Answer Number - 3
-----
Do you need to be heard often? Meaning is it important that you can quickly share and receive tidbits of information or
ce content with parties internal or external to your organization in real time?
Answer Number - 4
-----
Do you have a great deal of graphic content for people to see? That is do you wish to place and manage a significant amo
images online.
Answer Number - 5
-----
Are you interested in a platform to answer and/or ask questions? In other words, harnessing the power of collective info
to solve problems.
Answer Number - 6
-----
Are you concerned with staying up to date with respect to the web community? That is, focusing on what is popular online
spect to an online community or the interest said community has in your organization's presence in the community.
Answer Number - 7
-----
Are you primarily concerned with reaching out to other professionals, finding new employees, and/or developing new conta
h the business community?
Answer Number - 8
-----
Do you have a lot to say? That is, it is important for your organization to maintain and easily update a significant amo
content such as news, articles and/or advice.
Answer Number - 9
-----
Please enter the the number that corresponds to your answer: 9

-----
How important is the size of the online community you are trying to reach ?
Please enter a value 1 - 5
Your answer:

```

**Figure 2: SAMES Opening Screen**

Once a goal is selected, a particular question pool is queued. From this pool of questions, SAMES will select the first in a potential series depending on each user selection. In most cases, a set of five questions is standard. In Figure 3, we can see that these questions mirror our SAM. As the organization answers these questions on a likert scale of 1-5, with 1 as the lowest, SAMES can determine which current social networking technology the organization should consider. Although Figure 3 shows these questions in one screen, they are presented to the user one at a time and then displayed with the results.

In our example, then, the organization has decided that it needs "to maintain and easily update a significant amount of content" (Figure 2). Knowing that some social networking technologies are not designed to meet this need, such as Twitter, SAMES can eliminate certain potential solutions. From this response, the organization is asked to rate questions according to SAM needs such as audience size, features, visibility, ease of use, and training and support.

```

-----
How important is the size of the online community you are trying to reach ?
Please enter a value 1 - 5
Your answer: 4
-----
How important are advanced capabilities and features, such as user accounts, user customization and things of that nature?
Please enter a value 1 - 5
Your answer: 2
-----
How important is it that people see your organization online? Think if you will be directing traffic to the site from your business or if you are hoping to spread the word about your organization?
Please enter a value 1 - 5
Your answer: 5
-----
How easy to use would you like your social media offering to be? Think in terms of your skill level and your target users?
Please enter a value 1 - 5
Your answer: 3
-----
Please rate how important support options are? If you need help how much would you like to rely on a respective social media organization?
Please enter a value 1 - 5
Your answer: 4
-----
blogger
[2, 1, 2]
-----
wordpress
[1, 2, 1, 1]
-----
xanga
[1, 2, 2]
-----
SAMES recommends your organization adopt: blogger
-----

```

**Figure 3: SAMES Custom Recommendations**

The results presented in Figure 3 show the organization the social networking technologies that are the top three choices with a suggestion--in this case, blogger--as to which one it might use. The numbers in parameters are for our research use as we track the arrays of data that SAMES choose in making this decision. In final versions, these numbers will not be present.

### SAMES Shortcomings

Although the SAMES prototype enables an organization to quickly narrow its list of potential social networking technologies from an ever-growing Web 2.0 miasma, it does need improvement and refinement. In the next prototype revision we will present the SAMES interface via a Web browser. With the use of forms, graphics, and CSS, we can make for a more familiar and usable experience to our users. For example, instead of entering a "1" on the keyboard, a user will be able to select a radio button. With the addition of graphics we will also be able to offer screenshots of the various social networking technologies as well as provide links to them and potential support sites.

In addition to ease of use considerations addressed with a Web interface, increased selection of social networking technologies will be an ongoing endeavor. Moreover, permitting users to select more than one goal and answer criteria along the way that may result in a complete package of social networking technologies is being pursued. This will take more work in terms of the logic used to make selections, but will be more welcome than requiring the organization to run through multiple iterations of SAMES selection to fulfill all of its needs.

## FUTURE RESEARCH DIRECTIONS

As noted in the SAMES shortcomings, our research into the most effective paths for social network adoption for healthcare organizations needs to evolve and expand to not only include more social networking technologies but also other types of organizations.

We also need to return to our technology adoption model to ensure that we are addressing all needs. Although we do not foresee this resulting in the removal of any SAM areas, it is likely that current areas will need refinement and possible that additional constructs might need to be measured. We welcome input to these ends.

Our preliminary prototype of the Social Network Adoption Matrix Expert System (SAMES) is definitely in the beginning stages and needs to be refined in the ways noted above. We hope to produce a refined prototype in the coming year and deploy it to a larger set of organizations from which we can survey and refine the SAMES based of their interaction and recommendations.

## REFERENCES

- Boulos, M. and Wheeler, S. (2007). The Emerging Web 2.0 Social Software: An Enabling Suite of Sociable Technologies in Health and Health Care Education. *Health Information and Libraries Journal*, 24, 2-23.
- Burns, L. and Wholey, D. (1993). Adoption and Abandonment of Matrix Management Programs: Effects of Organizational Characteristics and Interorganizational Networks. *The Academy of Management Journal*, 36(1), 106-138.
- Cravens, J. (2010). Nonprofit Organizations and Online Social Networking: Advice and Commentary. Coyote Communications. Retrieved February 27, 2011 from <http://www.coyotecomunications.com/outreach/osn.html>
- Davis, F. (1989). Perceived Usefulness, Perceived Ease Of Use, and User Acceptance. *MIS Quarterly*, 13(3), 319.
- Eysenbach, G. (2008). Medicine 2.0: Social Networking, Collaboration, Participation, Apomediation, and Openness. *Journal of Medical Internet Research*, 10(3).
- Facebook (2011). Facebook Statistics. Retrieved February 26, 2011 from <http://www.facebook.com/press/info.php?statistics>
- Farmer, A.D., Bruckner-Holt, C.E.M., Cook, M.J., and Hearing, S.D. (2009). Social Networking Sites: A Novel Portal for Communication. *Postgraduate Medical Journal*, 85(1007).
- Freecycle (2011). Retrieved February 26, 2011 from <http://www.freecycle.org/>
- Gartner Group. (2011). Various Technical Reports. Retrieved August 21, 2011 from <http://www.gartner.com/technology/home.jsp>
- Gilbert, M. (2006). The Guide to Nonprofit Email. Nonprofit Online News. Retrieved February 27, 2011 from <http://news.gilbert.org/pub/GNE>
- Give2Gether. (2011). Retrieved February 27, 2011 from <http://www.give2gether.com/>
- Kaplan, A. and Haenlein, M. (2009). User of the World Unite: The Challenges and Opportunities of Social Media. *Business Horizons*, 53(1), 59-68.
- NTEN, Common Knowledge, & ThePort Network (2010). NonProfit Social Network Benchmark Report. Retrieved January 3, 2011 from <http://www.nonprofitsocialnetworksurvey.com/>

- O'Connell, J. (2010). "Nonprofits Struggle to Survive and Maintain Services. The Washington Post. Retrieved February 27, 2011 from <http://www.washingtonpost.com/wp-dyn/content/article/2010/11/05/AR2010110507410.html>
- Parr, B. (2011). Reddit Grew 230% in 2010 at Digg's Expense. Retrieved February 27, 2011 from <http://mashable.com/2011/01/03/reddit-2010-growth/>
- PostgreSQL. (2011). [Computer Software]. Retrieved August 20, 2011 from <http://www.postgresql.org/>
- Pyke. (2011). [Computer Software]. Retrieved August 20, 2011 from <http://pyke.sourceforge.net/>
- Python. (2011). [Computer Software]. Retrieved August 20, 2011 from <http://www.python.org/>
- Rice, R., Grant, A., Schmitz, J. and Torobin, J. (1990). Individual and Network Influences on the Adoption and Perceived Outcomes of Electronic Messaging. *Social Networks*, 12(1), 27-55.
- Simon, N. (2010). Four Models for Active User Engagement. Retrieved February 26, 2011 from [http://beth.typepad.com/beths\\_blog/2010/05/the-science-of-participation-guest-post-by-nina-simon.html](http://beth.typepad.com/beths_blog/2010/05/the-science-of-participation-guest-post-by-nina-simon.html)
- StackExchange (2011). Retrieved February 27, 2011 from <http://stackexchange.com/sites>
- Taylor, C. (2011). LinkedIn's User Base Skyrockets. Profits, Not so Much. GigaOm News. Retrieved August 18, 2011 from <http://gigaom.com/2011/08/04/linkedins-user-base-skyrockets-profits-not-so-much/>
- van Zyl, A. (2009). The Impact of Social Networking 2.0 on Organisations. *The Electronic Library*, 27(6), 906-918.
- Wasserman, S., Faust, K. (1994). *Social network analysis: methods and applications*. Cambridge: Cambridge University Press.
- Wellman, B. (2001). Computer networks as social networks. *Science*, 293(5537), 2031-4. Retrieved February 26, 2011, from Research Library. (Document ID: 81976609).