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Millennials and the adoption of new technologies in libraries through the diffusion of innovations process

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Abstract

Purpose – Literature on the features of new technology in libraries of every type and size is readily available, but looking at the factors playing a part in the process (relative advantage, compatibility, complexity, trialability and observability) will bring an understanding of how Millennials integrate technology into libraries. This paper seeks to discuss some of the issues involved.

Design/methodology/approach – This research focuses on Millennials and their adoption of new technologies in libraries through the process of diffusion and the stages of adoption as outlined by Everett Rogers: communication through certain channels; over time; and among members of a social system. Among these sections, Millennials as innovators and early adopters are explored, as well as the five stages of the innovation decision process.

Findings – Libraries have increasingly seen technology become a quick candidate as a solution to nearly every problem existing in the field. Though rapidly suggested as an alternative, the new technology is not adopted as quickly as in other sectors. However, Millennials act as change agents and bring technology-driven attitudes to work, using specific communication channels to change employee attitudes towards adoption of the new tools.

Originality/value – Although applied to different fields, few studies have been conducted using the theory of diffusion in library science with a focus on innovation; rather the focus has been on technology adoption. The paper highlights how looking at the overarching trend, instead of focusing on the specifics of one single technology tool, will help researchers, administrators and practitioners understand the paradigm shift in the rapid adoption of such tools overall.

Keywords – Technology, Attitudes, Communication, Technological change, Organizational change, Libraries, Change management

Paper type – General review

Introduction

Since its creation in 1962, many different disciplines have used the theory of diffusion of innovations, it being tested and refined primarily through studies in communications, sociology, marketing and organizational science, according to Russell and Hoag (2004). Although applied to different fields, few studies have been conducted using the theory in library science with a focus on innovation; rather the focus has been on technology adoption (Russell and Hoag, 2004). This paper will focus on Millennials, and their adoption of new technologies in libraries through the process of diffusion and the stages of adoption as outlined by Everett Rogers. First, a brief overview of Millennials will be given followed by the stages of diffusion, including:

- communication through certain channels;
- over time; and
- among members of a social system.

Among these sections, Millennials as innovators and early adopters will be discussed, as well as the five stages of the innovation decision process.

Libraries have increasingly seen technology become a quick candidate as a solution to nearly every problem existing in the field. Though rapidly suggested as an alternative, the new technology is not adopted as quickly as in other sectors. “It is difficult to change libraries as quickly as other technology-based information providers because library systems and services constructed around them have been in place (and deeply ingrained) for centuries. Libraries also must serve various constituencies with differing information-seeking habits and needs” (Connaway et al., 2008, p. 124). However, a new generation of librarians is entering the workforce and bringing with them a technologically based lifestyle unlike any others before them. Not only are they becoming librarians, but they provide services that match the information-seeking habits of a new generation, the Millennials, who “. . . think and process information fundamentally differently from their predecessors” (Prensky, 2001a), while also serving one of their largest populations – the Baby Boomers (Connaway et al., 2008, p. 124). Millennials are bringing technology from their personal lives and using it as solutions to their workplace needs. For example, virtual reference software (such as IM reference) now provides for the needs of students who demand faster electronic service than e-mail and the convenience of online resources (Lukasiewicz, 2007, p. 822). “Exploring the role of digital academic libraries: changing student needs demands innovative service approaches” by Adiranna Lukasiewicz (2007) discusses the importance of libraries embracing digital change to reach Millennials through such technologies as instant messaging (IM), podcasting and blogging. In addition to these tools, librarians are reaching out with other cutting edge techniques to the growing number of students who feel more comfortable in an online environment. Her study on the effectiveness of IM as a communication tool for reference found students were more willing to see the importance of the library as a research tool when it adopted this technology for reference questions. This newest generation of students clearly thrives on these tools and social networks and wikis are also enhancing library experiences (Lukasiewicz, 2007, p. 824).

Librarians are simultaneously the first and last to consider implementing new technologies into their programs. Johnson and Magusin (2005) note librarians were early adopters of computers yet libraries are often the last place to update technology once adopted by the organization. From interactive Web 2.0 applications to basic web technologies, public libraries are predominately the

slowest organizations to adopt such technologies, according to a study conducted by Zeth Liezau (2009a, b) in “US public libraries and the use of web technologies”. Just 82 percent of public libraries have a web presence and only 56 percent offered online account access to their patrons (Lietzau, 2009a, p. iii). Even today, the most basic public library services, such as an online catalog and online access to the library patron’s account are only available in half the public libraries in America. In another study done by Lietzau (2009b), the new 2.0 technologies were only available in one third of public libraries and truly innovated technologies that encouraged patron participation were virtually non-existent (p. 8).

The application of Rogers’ (2003) diffusion theory can be used on libraries to better understand how technology is being implemented, not through a top-down approach, but bottom-to-top through employees known as Millennials, who slowly yet surely are integrating change.

Millennials

According to their study entitled “Sense-making and synchronicity: information-seeking behaviors of Millennials and baby boomers”, Connaway et al. (2008) estimate there are approximately 76 million Millennials and their defining characteristic is they are “digital natives,” having grown up immersed in technologies that have always been around during their lifetimes (p. 125). Baby Boomers and Millennials’ different characteristics and habits were examined in focus group interviews and the results reflect a wide gap in how the generations operate in their everyday lives. According to Connaway, 20 percent of Millennials began using computers between the ages of five and eight, an age when previous generations were still building with blocks and drawing with crayons. Of this population 72 percent checks e-mail at least once a day, and 78 percent browse the web for fun, activities unheard of for Boomers and Generation Y workers (Connaway et al., 2008, p. 125). These findings are paralleled in Prensky’s (2001b) article “Digital natives, digital immigrants”, which found even before they even leave college, on average, over 200,000 e-mails and instant messages have been sent and received by each Millennial student.

These habits have given Millennials (and therefore Millennial librarians) unique characteristics, such as broader “attention ranges” for diverse inputs, preferences to active learning and discovery, greater critical thinking skills, and an intolerance for delays (Rushkoff, 1996, pp. 50-1; Oblinger and Hawkins, 2005; Tapscott, 1998; Sweeney, 2006). Web 2.0 tools have played a major part in making Millennials the generation they are, and these trends are not only adopted in their everyday lives, but, almost naturally brought along to provide solutions to workplace problems in the library. But why do these 2.0 tools have such an effect on these young librarians?

A term coined by Tim O’Reilly of O’Reilly Media, Web 2.0 describes “the changing trends in the use of World Wide web technology and web design that aim to enhance creativity, communications, secure information sharing, collaboration and functionality of the web”. The essence of Web 2.0, or the read/write web, is participation in creating information dynamically, whereas the earlier phase of the web, or the read/only web, primarily focused on presenting information statically (O’Reilly, 2005; Gillmor, 2007).

Web 2.0 enables Millennial librarians to improve their lives through such exercises as blogging about their favorite hobbies, updating public wikis, following news stories on RSS feeds and keeping in touch with friends and family on social networks. This generation would be lost if this access was suddenly taken away because few remember a world where such capabilities did not exist.

Innovation

Most Millennials are comfortable with using new technologies at home, but how do they implement them into their workspaces? Everett Rogers (2003) defines an innovation as “. . . an idea, practice or object that is perceived as new by an individual or other unit of adoption” (p. 12). The innovation may be new to the library as an organization or to a department but does not have to be new to the Millennial. He or she may learn of a new technology, before the need is suggested by the library, and then the product itself has created the need (Kangis and Rankin, 1996, p. 47). Technology is defined by Rogers as “. . . a design for instrumental action that reduces the uncertainty in the cause-effect relationships involved in achieving a desired outcome. A technological innovation usually has at least some degree of benefit for its potential adopters, but this advantage is not always clear-cut to those intended adopters” (Rogers, 2003, p. 14). In this instance, Millennials can act as change agents and bring these technology-driven (instead of market-led) advances to libraries (Kangis and Rankin, 1996, p. 44). “The role of the library in a wired society” by Patrick Sommers (2005) offers valuable insight into the strategic steps libraries should take to stay competitive through innovation:

We must combine the ingenuity of leading libraries with powerful technologies and expertise to mine the great opportunities for the future. With a proactive vision, we can harness the power of today’s leading technologies and maximize the value of content available today to achieve great success – namely, taking library services to new heights and expanding the role of your library in the community. By embracing change and taking the proactive approach, we can evolve together (Sommers, 2005, p. 160).

Of course, the perceived features of the new technology or innovation will ultimately persuade or dissuade the library from implementing it. Rogers outlines five attributes in the diffusion of innovations; relative advantage, compatibility, complexity, trialability and observability (Rogers, 2003, p. 15).

Relative advantage is “the degree to which an innovation is perceived as better than the idea it supersedes. The degree of relative advantage may be measured in economic terms, but social prestige, convenience and satisfaction are also important factors. The greater the perceived relative advantage of an innovation, the more rapid its rate of adoption by users”.

Compatibility is “the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters. An idea that is incompatible with the values and norms of a social system will not be adopted as rapidly as a compatible innovation”.

Complexity is “the degree to which an innovation is perceived as difficult to understand and use. Complex innovations will cause potential adopters to be wary of trying the innovation”.

Trialability is “the degree to which an innovation may be experimented with on a limited basis. New suggestions tried in installments will generally be adopted more quickly than innovations that are not divisible.”

Observability is “the degree to which the results of an innovation are visible to others. People are more likely to adopt the innovation if it is easy to see the results of the action. Such visibility stimulates peer discussion of a new design, as the friends and neighbors of an adopter often request innovation evaluation information about it”.

Despite the features of any innovation, ultimately it is the users’ perceptions, not the Millennials’, director’s or other authority figure’s perceptions, which will impress on employees whether the technology is worth implementing. However, communication channels can be used to influence those perceptions. In their article, “People and information technology in the supply chain”, Russell and Hoag (2004) used the diffusion of innovation to analyze two cases where technology was implemented successfully at two aerospace firms. In their study, they found such social and organizational elements as the firm’s culture, types of communication channels used to diffuse knowledge about the innovation and various leadership factors all played a part in the technology’s implementation (Russell and Hoag, 2004). It required formal and informal communication from the administration and employees in order for the technology to be adopted by both firms, proving both types of communication channels played key roles successful diffusion.

2. Communicated through certain channels

Unlike other theories, diffusion views adoption as “. . . the outcome of a communication process”, not a psychological process. In the diffusion of knowledge about an innovation, communication channels are used to convey the new technology to targeted potential adopters (Russell and Hoag, 2004). Mass media channels are the most well-known and efficient means of informing an audience of potential adopters about the experience of an innovation. They are defined by Rogers (2003) as “. . . all those means of transmitting messages that involve a mass medium, such as radio, television, newspapers, and so on, which enable one or more individuals to reach an audience of many” (p. 18). Millennials now receive most of their mass media communications via the internet as well, through streaming radio, online newspapers, RSS feeds, and blogs. The line between mass media channels and interpersonal channels has significantly blurred since Rogers’ definition now that such media channels offer Twitter updates, links to Facebook and other personalized widgets as part of their media campaigns. However, his predictions on the importance of interpersonal channels as the most effective method of communication are more relevant than ever because of the invention of Twitter, Skype, social networking, and viral videos that instantly link two friends or colleagues in a digital world, despite the lack of physical face-to-face contact.

. . . interpersonal channels are more effective in persuading an individual to accept a new idea, especially if the interpersonal channel links two or more individuals who are similar in socioeconomic status, education, or other important ways. Interpersonal channels involve a face-to-face exchange between two or more individuals. In addition to mass media and interpersonal

communication channels, interactive communication via the internet has become more important for the diffusion of certain innovations in recent decades (Rogers, 2003, p. 18).

Insights to how information channels of communication (i.e. “water cooler” interaction and its online equivalents; listservs, discussion boards and e-mail) affect adoption are less clear. By their nature, informal communication channels are difficult to observe and measure, yet they can be very influential. Informal communication could positively or negatively influence adoption. Imagine how harmful gossip about an e-book vendor may spell doom for its implementation into a library down the road, but how favorable “buzz” could motivate early potential adopters.

3. Over time

Innovation-decision process

Once Millennials have gathered information on the newest technology, through either formal or informal channels, they will feel comfortable making a decision to adopt or reject it. The innovation decision process is “. . . essentially an information-seeking and information-processing activity in which a person is motivated to reduce uncertainty about the advantages and disadvantages of the innovation” (Rogers, 2003, p. 14). According to Rogers, this process involves a series of five steps occurring in a lineated sequence:

1. Knowledge.
2. Persuasion.
3. Decision.
4. Implementation.
5. Confirmation (p. 21).

Knowledge

Aggarwal et al. (1998) discuss how “inaccessibility or lack of information may cause the provider of a really-new product to miss a large segment of potential adopters” in their article “Barriers to the adoption of really-new products and the role of surrogate buyers”. Because really new products define or extensively modify existing product categories, distributors of such products should make an extra effort to educate potential adopter populations about the features and advantages of their offerings. Except for early adopters, lack of knowledge and inability to understand the advantages of a new product may cause many consumers to not actively seek information on the product itself. The authors argue because of the fast-paced release time of new technologies, many people have come to rely on an expert who can advise them on the best product to fit their needs, someone who already has a solid understanding of the situation (Aggarwal et al., 1998, p. 367). As previously stated, Millennials are active learners and appreciate being able to handle the product and find out all they can about it from a variety of sources. If the information is unavailable (especially on the internet), it can prove to be difficult reducing the uncertainty about the product and its benefits to the consumer as a potential solution. They also need to evaluate the information’s usefulness and credibility, versus the costs in time and effort to find and access it (Connaway et al., 2008, p. 126). Product demonstrations, discussions on the benefits or drawbacks to using the product, coupons, manuals, catalogs and

customer support must be available online or Millennials will take their business elsewhere. They are used to having such information available 24/7 for their convenience and a lack of such tools will help persuade them the product is not one of value.

Persuasion

In “Innovation diffusion: a stakeholder and social network view”, Troshani and Doolin (2007) explored how stakeholders could be responsible for the diffusion of innovations (if they were able to overcome such difficulties as mobilization and instrumental strategies) by coordinating their attempts to adequately influence the information supply chain to adopt the new technology after being persuaded themselves. Although the Millennial librarians may have access to information about the product in their preferred medium, they will still need to be persuaded. They must be shown this product will be a good solution for their needs, despite setbacks such lack of expertise (especially for really-new products, such as the iPad), limited funds (library technology budgets are notoriously small) and hesitation about product performance (an unestablished track record with a new vendor) (Troshani and Doolin, 2007, p. 191; Aggarwal et al., 1998, p. 368).

The motivation for the diffusion of such new products can come from the pursuit of social rewards for early adopter behavior. According to Fisher and Price’s (1992) “An investigation into the social context of early adoption behavior”, those in higher social positions seek out new products as a means of establishing and communicating social differentiation (p. 477). Their study on the visibility and influence of a superordinate group showed perceived visibility of consumption of a product and the group’s influence has a direct influence on consumers’ expectations of consumption and early adoption. Millennials thrive on individualism, even as part of an organization. Being the first library to use a blog, IM chat or RSS feed has its merits and Millennials will use such tools to help differentiate their library from others in the city, region, or state. Fisher and Price (1992) state, “Early adoption behavior has social or communicational value to the extent it is visible and associated with a superordinate group. First, social visibility is necessary so referents are aware of the behavior and have the opportunity to decode its meaning. Second, the initial adoption by those in superordinate groups establishes the social desirability” (p. 477). Those libraries, which first successfully adopt a technology, then become the superordinate group and the librarians will receive the social benefits. Likewise, normative influence can cause other libraries to copy what the referent library has done to achieve the same social objective (i.e. remain cutting edge, useful to patrons) and not necessarily because the library believes in the content (i.e. that they need to offer IM or maintain a library blog) (Fisher and Price, 1992, p. 479). However, as other libraries begin to adopt these tools, innovative libraries will maintain their social distance through additional innovations, such as Twitter, 24/7 online help and wikis. The process is constantly changing and Millennials must persuade their libraries to make the decision to stay ahead of the curve or risk falling back into the norm.

Decision

Although the library may make the overall decision to adopt the technology, the employees (Millennials and others) must ultimately use it. The organization may decide to invest in and put

to use the newest tools, but the workers are the ones who will assess the amount of effort they will put into the implementation of them. In fact, individuals often settle for what can be completed within pre-determined parameters, often settling for “good enough” and “satisficing” instead of pursuing the optimal solution, so a decision can be made (Connaway et al., 2008, p. 126).

Implementation

Once Millennials have gathered information, persuaded their library to try a new tool and the decision is made, implementation of the new technology takes place. IT implementation is often the most difficult, not only because of varying technological skills, but because each librarian may not have fully been made aware of the changes. These changes can swiftly falter because of a lack of user awareness, project management, and industry or firm culture (Russell and Hoag, 2004). If there is no buy-in from the librarians during the decision process, owing to lack of communication of the advantages of the adoption, disappointment is eminent. “. . . implementation failure, rather than innovation failure, is attributed to be the cause of organizations’ inability to accomplish intended benefits from the adopted innovations” (McAdam, 2005; Klein and Sorra, 1996). However, strong communication throughout the adoption process can lead to a smooth transition to using the new technology, especially with plenty of hands-on learning and continuing education after the initial adoption.

Confirmation

The most often forgotten or ill-timed step is confirmation of the adoption. Libraries often speak of assessment through numbers, such as patron count, IM statistics and programming attendance. But technology can be difficult to assess if it is so new no other libraries exist to easily benchmark success against. Since really new products transform existing product categories, libraries often face difficulties when adopting these products in finding ways to evaluate them. Often, really new products possess new and complex features, which do not communicate obvious credible advantages over existing products (Aggarwal et al., 1998, p. 365). It may take months or years to see significant benefits from the technology, despite the ease and use of the product on an everyday basis, purely because the assessment period must be drawn out to get a valid sample.

Adopter categories

Rogers created five adopter categories, the classification of members of a social system on the basis of innovativeness, which include:

1. Innovators.
2. Early adopters.
3. Early majority.
4. Late majority.
5. Laggards (Rogers, 2003, p. 22).

For the purposes of this paper, only innovators and early adopters will be discussed, as those are the two general categories that Millennials typically fall into in Rogers' classification system.

Innovators

A small minority of Millennials can be classified as true innovators; active information seekers about new ideas. They have high degrees of mass media exposure, and their interpersonal networks extend over a wide area, reaching outside their local system (Rogers, 2003, p. 22). Millennial innovators tune into what is on the cutting edge, whether it is technology, patron trends or new methodologies. They have a strong online presence and follow trends online constantly through Twitter, RSS feeds, and social networks and often use these media to disperse their own information about issues they have come across. According to "Interactive services: how to identify and target new markets" by Kangis and Rankin (1996), certain groups are predisposed to use interactive services and adopt technologically based goods and services sooner than the general public. The authors classify true innovators as those who are better educated, earn larger incomes, have a more cosmopolitan outlook and have increased involvement in issues outside their own communities. They depend less on group norms and tend to have greater self-confidence (Kangis and Rankin, 1996, p. 49). Many Millennial librarians hold not only MLS or MLIS degrees but also degrees in such areas as computer science, digital media, or business. They are actively champion for patrons' intellectual freedoms and lobby for libraries from local and national sources, as well as for other causes such as education, healthcare, the environment and animal welfare. They may not belong to a large homogeneous group in their own community, but when gathered together, represent a sizable voice.

Innovators in libraries can also be classified as surrogate buyers in the context of libraries adopting new technologies. As part of the superordinate group (Fisher and Price, 1992) their recommendation may itself act as a form of product endorsement (Aggarwal et al., 1998, p. 366). They are more likely to actively gauge the level of interest and product knowledge of the potential adopters (whether the entire library, a department or individuals) and then provide appropriate information to encourage further enthusiasm (Aggarwal et al., 1998, p. 365). If the product is in their realm of expertise, not only can they help determine if the potential adopter(s) can make the required behavioral changes, they can also prepare them for the changes if the decision to adopt the technology goes forth. For example, if the surrogate sees the potential adopters have the skills and optimistic attitudes required for IM reference to be successful, she or he recommends the adoption of the technology, and helps train the adopters for the transition to online reference services. However, in circumstances in which consumers rely extensively on recommendations of surrogate buyers, the adoption process becomes two-staged. In the first stage, surrogates must "adopt" the really-new product; in the second, members of the user population adopt the product based on the recommendation of the surrogate (Aggarwal et al., 1998, p. 367). For Millennials, they may have already adopted a technology, such as slide sharing, for their own private use, and can then recommend the technology be adopted in the library and start using the tool for professional work as well.

Early adopters

The vast majority of Millennials can be classified as early adopters, when compared to Generation Y and Baby Boomers. Early adopters implement near the beginning of the product lifecycle but not as quickly as innovators. They are sensitive to group norms and values and they may have more of a local perspective, but are likely to be opinion leaders with an affect on others as a result of their membership in identifiable social groups (Kangis and Rankin, 1996, p. 49). Millennial librarians are connected to other librarians in ways never before dreamed of thanks in large part to social networks. In smaller organizations, social networks and online discussion boards now allow solo librarians to connect with hundreds of librarians across the globe to discuss information literacy, public access issues and a myriad of other topics from the comfort of their own library while bringing these new trends to their own communities. Early adopters look to these innovators to let them know what the current trends are and what the benefits of adopting them could be through innovator endorsements. The use or adoption of a new product by a superordinate group is a form of a product endorsement that is expected to influence perceived visibility, expectations of social approval, and evaluations of product performance. First, superordinate group endorsements increase consumers' perceptions of the visibility of early adoption behavior. Second, superordinate group pressure is likely to increase the social approval expected from consumption. The closer the association between a new product and a superordinate group, the clearer the potential for early adoption to create a favorable social linkage (Fisher and Price, 1992, p. 479). Favorable social status for a library can result in an elevated status through increased patron usage and affirmative reinforcement through word-of-mouth.

One large barrier Millennials face in early adoption is the cost incurred in implementing new technologies, despite their initial low or no cost. Unfortunately, hardly any libraries are willing to invest time, as well as money, in technologies that are new if the initial start up expenses cannot be calculated accurately. How much time learning to use digital editing software or negotiating with e-book vendors takes is difficult to calculate, and these activities could cost the library more than expected if not handled properly. As a result, the commitment of significant resources is required and the adoption barriers, costs and risks, are likely to increase for early adopters (Troshani and Doolin, 2007, p. 191). However, the expenditures for adopting new technologies in libraries, especially public libraries, need to grow in the future or libraries will not meet patron needs.

Early adopting libraries used blogs to initiate contact with their patrons, wikis to collect information, and social networking sites to connect with each other and their communities. The trend was strong enough that in 2006 ALA Tech-Source published a Library Technology Report titled "Web 2.0 and libraries: best practices for social software" and followed that Libraries "2.0" is just the beginning – public libraries will continue to evolve in an effort to give their patrons the best service possible (Lietzau, 2009b, p. 7).

Like most traditional organizations, libraries are not prone to risky ventures, and investing time and money (two things librarians rarely have in large quantities) in technology may seem like a waste of time because it seems like a never-ending task to keep up with the latest gadgets and applications. But, despite nation-wide library budget and staff shortages, early adopter libraries were better funded and staffed than other libraries, and even surpassed their peers by considerable margins on nearly every statistical measure in a study conducted by Lietzau in 2008. These libraries had more visits, circulation, reference transactions, and programming use,

as well as more audio and visual materials (Lietzau, 2009a, p. iii). Such statistics prove making the leap into the adoption process pays off in the long run for libraries.

4. Among the members of a social system

System norms

An organization's culture and structure plays a key role in whether the diffusion process will flow smoothly or not. While each library may have similar departments or staff, the organization as a unit will have structural characteristics exclusive to its setting. This structure "gives regularity and stability to human behavior in a system; it allows one to predict behavior with some degree of accuracy" (Rogers, 2003, p. 24). Each library will have a different acceptable code of ethics for patrons and staff, and a different way of cataloging and processing materials but the patterns of behavior will still be predictable from library to library based on society's norms. Norms are established behavior patterns for the members of a social system. Norms "define a range of tolerable behavior and serve as a guide or standard for the behavior of a social system" (Rogers, 2003, p. 26). If open communication is a socially accepted norm in the potential adopter library, the likelihood of a successful adoption is greater. The active presence of management and enthusiastic team members at all levels and across functions is the key to adoption (Russell and Hoag, 2004). Adoption of new technology will require new behaviors and these behaviors must fall in the category of socially accepted behaviors within the organization. Although a really new product offers significant relative advantages over existing products, if librarians are not willing to make the required behavioral changes the adoption entails, the product has a slim chance of success. It is also possible for consumers to fail to realize behavioral changes required at the time of adoption (Aggarwal et al., 1998, p. 366). For example, if Baby Boomer librarians are unwilling to adopt the behavior of checking their e-mail regularly, like their Millennial counterparts, then the adoption of paperless organizational notices will not succeed.

There is a dichotomy of direction: we must simultaneously think strategically and pursue our vision, do new and exciting things while providing access to everyone (while keeping the lights on and toilets working), being open and responsive to new ideas, while working within our budgets and still find time to make sense of the morass of conflicting information washing over us. Indeed we share the need to attract great talent while competing with new and better-funded alternatives, invest in leading technologies while ensuring integration with older, legacy systems, protect children while protecting freedom of access to information, be responsive to users while remaining focused and substantive, and continue to invest in the physical library while providing the latest in electronic access to information (Sommers, 2005, p. 159).

The adoption of the new technology must not conflict with the overall philosophy of the library, for although new patrons may be retained, older patrons may be lost because of too much change, as reflected on by Sommers.

Opinion leaders/change agents

Opinion leadership is the degree to which a person is able to sway others' attitudes or overt behavior informally in a desired way with relative frequency. It is earned and maintained by the individual's technical competence, social accessibility, and conformity to the system's norms (Rogers, 2003, p. 27). Millennials may not always be the innovators or early adoptors for their

libraries, but when it comes to technology, they can be change agents because of their natural technical competence and social accessibility to other change agents. They may not have the authority to make decisions for the entire library but they can help persuade those around them regarding the use of the technology because of their familiarity with it. The most striking characteristic of opinion leaders is their distinctive and influential positions in their system's communication structures: they are at the center of interpersonal communication networks. An opinion leader's interpersonal networks allow him or her to serve as a social model whose innovative behavior is imitated by many other members of the system (Rogers, 2003, p. 27). Whether the system is one lone department, a set of library branches or an entire regional system, Millennials can be counted on to be thoroughly embedded in communication networks as an extension of their social networking skills. With network innovations, institutional networks have to be established to ensure innovations are diffused successfully in the community of the adopters. Successful diffusion may require specific institutional actors, such as opinion leaders and change agents, to initiate and complete interdisciplinary undertakings involving different stakeholders (Troshani and Doolin, 2007, p. 181).

Along similar lines, these librarians may also be thought of as technology stewards, a term Nancy White (2007) coined in "The accidental technology steward", for people with ". . . experience of the workings of a community to understand its technology needs, and enough interest in (and experience with) technology to become a leader in addressing those needs." She shares how technology stewards can bridge learning and technology between various community groups by inviting them to join their efforts (White, 2007, p. 33). Although Millennials may not have worked within libraries extensively (due to their age), as a group, they do have the required amount of interest in and experience with the technology that they may suggest as a possible solution for meeting their library's needs.

Beyond the Millennial change agents within an organization, the size of the library is also an issue in whether the library itself is an agent of change. In Zeth Lietzau's (2009b) "US public libraries and Web 2.0", a study was conducted which served several purposes:

- identify the number of public libraries in the US who adopted a specific set of web technology;
- determine how these libraries differed from their peers; and
- determine whether early adoption could help drive library successes.

Lietzau (2009a) found larger public libraries in the US have almost universally adopted basic web technologies and most Web 2.0 technologies as well, and the larger the community served by the library, the greater likelihood of adopting various technologies, even if they were not as active as some might believe. The smallest libraries tend to lack the resources of their larger peers and, not surprisingly, were the least likely group to have ventured into any of the web technologies that were studied.

Types of innovation-decisions

Libraries make three types of innovation decisions according to Roger's (2003) theory; optimal, collective and authority (p. 28). Optional innovation-decisions are choices to adopt or reject an

innovation made by a person independent of the decisions of the other members of the system. Millennials may choose to use Twitter or Facebook for professional purposes, even if the rest of the library staff chooses not to use the technology. Collective innovation-decisions are choices to adopt or reject an innovation made by consensus among the members of a system. If the staff or department is small, a library may agree as a group to have a library page on Facebook or to move all appointments to an online group-share calendar. Authority innovation-decisions are choices to adopt or reject an innovation made by the few in a system who possess power, status or technical expertise. A new e-mail program may be chosen by the systems administrator or a committee may decide which courier software will be used for the entire library system.

5. Consequences of innovations

The consequences for innovations can be both positive and negative for the adopting library. By Roger's definition (2003), consequences are the changes that occur to an individual or to a social system as a result of the adoption or rejection of an innovation. There can be desirable or undesirable consequences, depending on whether the effects of an innovation in a social system are functional or dysfunctional (Rogers, 2003, p. 31). In his study, Lietzau (2009a) found "libraries involved with new technologies were better funded, receiving an average of \$36.24 per capita annually in local income, compared with an average of \$23.72 for the other libraries" in the study. Obviously, better funding and additional staff makes it easier to implement technology within a library (Lietzau, 2009b, p. 10). The cycle is repetitive; the more technology a library adopts, the happier the patrons become and the library's funding increases, which it can put back into the cycle with technology updates. In these circumstances, the consequences for adopting new technologies are positive.

However, consequences for adopting technology can also be negative because of the risks involved with the product, such as performance or financial risk. Performance risk is the possibility the product will malfunction or not deliver the desired benefits. These risks are always high with new technology that has not been tested and modified for any problems. It may not live up to the library's or users' expectations and will be avoided because of an easier alternative solution that meets user needs. Financial risk refers to the "potential monetary outlay associated with the initial purchase price as well as the subsequent maintenance costs of the product" (Rogers, 2003, p. 146). New technologies are typically introduced in the market at high prices, especially hardware components such as iPads or scanners. Thus, ". . . at introduction, the initial financial amount required for library adoption will in all likelihood be high" (Aggarwal et al., 1998, p. 360). Libraries may pour money into a technology that is eventually discarded due to maintenance or user failures. If there is no patron demand for the product, and libraries do not communicate how to use it, it will have been a wasted attempt if the technology sits unused. For example, if 80 percent of the user population comes to the library to use computers, it is unlikely a Twitter reference feature will be popular if few of the patrons have personal computers. Likewise, it may cost more to maintain the new technology than previously expected if staff training hours, time spent with customer service and time spent training patrons on how to use the technology were not taken into consideration.

Other risks for libraries include product-category risk and product-specific risk. Product-category risk is the risk "inherent in purchasing any particular product in a specific product category"

while product-specific risk is the risk associated with the “particular product being considered in the product class” (Dowling and Staelin, 1994, p. 120). With product-category risk, a library may adopt new laptops for the library patrons, but if they choose Macs over PCs and patrons do not understand how to use PCs, the laptop program will be unsuccessful. Similarly, for product-specific risk, if the library chooses to purchase netbooks over iPads but none of the librarians know how to use Linux software, then the plan of having individual computing tools for each librarian will fold. All these risks can lead to harmful consequences for librarians adopting the technology if they are not addressed during the communication stage of the decision process.

6. Conclusion

In conclusion, Millennial librarians are the innovators and early adopters through which technology is diffused into libraries and this paper has applied the lens of diffusion of innovations and the stages of adoption as outlined by Roger Everett to these actions. Through their unique technology-driven characteristics and personality traits, these librarians are more likely to become change agents or surrogate buyers for their libraries as part of the innovation process. They can bring about the adoption of new technology in their respective organizations through the stages of diffusion, including:

- communication through certain channels;
- over time; and
- among members of a social system.

They are able to provide the organization with knowledge about the product to persuade their constituents to decide on a new technology, implement it, and assess its benefits. By focusing on social norms, they are able to understand what organizational behaviors are well suited to the new technology and what behaviors would require change in order for the negative consequences of adoption to be minimal. Overall, Millennials can be expected to persevere in bringing forth great change through this diffusion process to meet the technological needs of both patrons and staff in the future.

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Further reading

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