TOWARDS E-GOVERNMENT 2.0: AN ASSESSMENT OF WHERE E-GOVERNMENT 2.0 IS AND WHERE IT IS HEADED

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ABSTRACT

The aim of electronic government (e-government) is to increase the convenience and accessibility of government services and information. E-government's past emphasized the automation of routine government operations. Modern e-government centers on Web-based delivery of information and services. As the Internet moves away from version 1.0, the author examines the literature for evidence and best practices on the adoption and use to date of Web 2.0 technologies in government. Despite evidence that Web 2.0 technologies have the potential to enhance knowledge management and citizen engagement, there remains a weak body of evidence on its adoption and usage. The essay explores the early evidence and suggests a path towards realization of the promise that e-government 2.0 holds. The path involves support and collaboration from a diverse set of stakeholders to study the impact of, as well as develop best practices for, using Web 2.0 technologies to improve government services and public administration.

Keywords

Electronic Government, Public Administration, Web 2.0, Social Media, Weblog, Wiki, Knowledge Management, Citizen Engagement, Electronic Democracy

INTRODUCTION

Electronic government (e-government) aims to increase the convenience and accessibility of government services and information to citizens, businesses, and governmental units (Carter and Belanger, 2005). This is generally achieved through the use of information and communications technologies (ICT), a broad class of technologies including computers, automation equipment, the Internet, and mobile devices. Examples of e-government range across all levels of government and include: optical recognition software to read United State Postal Service addresses on letters when sorting them into bins; public health agency dissemination of timely information on emergent health care issues (Cassa et al., 2008), including the recent H1N1 virus (Indiana University, 2009); the Obama Administration's open government directive, including www.data.gov where public data sets and tools can be downloaded by anyone; and a national, integrated Kenyan government information system to automate payroll, promotions, recruitment, and other personnel functions (Gichoya, 2005; Ogega 2007). Many modern e-government strategies focus primarily on Internet-based ICT and applications (UN and ASPA, 2001; Wood et al., 2008).

The previous examples suggest that e-government is pervasive in the public sector. They further suggest that to date e-government has largely been focused on the automation of mainly administrative functions (Sinclair, 2007). The growth in government automation demonstrates progress, yet adoption of ICT for routine functions represents primarily a modernization of traditional government, including social and cultural divides (United Nations, 2005). For e-government to be the transformative force many believe it can be, e-government must challenge traditional structures and enhance government decision-making.

In the dawn of a new decade, there is an opportunity to reflect on e-government's progress, examine current innovations, and suggest a course for the future. The past emphasized automation and modernization of routine government functions. With that advent of the Internet, e-government initiatives have shifted towards Web-enabled government, which have largely replaced or augmented traditional brick-and-mortar transactions. On the horizon is a path towards e-government 2.0, where government operations will be transformed and enhanced using a variety of currently nascent technologies referred to collectively as the Web 2.0. This paper begins with a review of e-government's past and current state. Then the paper summarizes the findings from a comprehensive review of the literature concerning early e-government experiences with Web 2.0 technologies. The future of e-government may be leaning towards 2.0, but the path forward is anything but clear.

BACKGROUND

Although discussed in the scholarly and popular literature, e-government is not well understood (Moon, 2002). E-government is often associated with solely Internet-based transactions (UN and ASPA, 2001; Wood et al., 2008). However, the roots of e-government can be traced back long before the Internet. Arguably, the first instantiation of e-government dates back to 1889. The Hollerith machine, an electric punch-card system for analyzing statistics, was selected that year by the American Census Bureau for the 1890 census (Ifrah, 2001). The machine was utilized a second time for the 1900 census. Between censuses, Hollerith created the Tabular Machine Company and began producing additional machines. Hollerith's company later became International Business Machines (IBM), which developed a number of historically important e-government devices in the twentieth century (Ifrah, 2001).

Modern e-government involves a wide range of ICT applications in the public sector. However, using such a broad definition doesn't work particularly well when examining e-government as a phenomenon in public administration (PA). Therefore a variety of frameworks have been created to focus implementation and research efforts (Grant and Chau, 2002; Guijarro, 2007; Gupta and Jana, 2003; Moon, 2002). These frameworks emphasize information system content and the usage of information rather than focus on classifying or describing the various ICT "systems" implemented, adopted, or utilized. The framework used for this analysis of e-government (see Figure-1) comes from Moon (2002), who adopted it from Hiller and Belanger (2001). Moon's framework provides a broad and an easily understood mental model that emphasizes evolution. Rapid, exponential evolution embodied in Moore's Law, has characterized technological innovation, consumer expectations, and ICT policy over the past 45 years (Schaller, 1997). Therefore Moon's framework seems most appropriate when exploring e-government's past, present, and future.

Moon's framework allows for the categorization and description of e-government systems and innovations along a continuum. This continuum evolves from simple, one-way communication channels, where information is broadly disseminated to nebulous, anonymous citizens (or information consumers), towards integrated, two-way exchange of information between governments, private sector organizations, and citizens. The continuum further shows e-government progress from administrative functions of government towards political functions. Each "stage" along the continuum is given a number (1 through 5) and describes an evolutionary stage of ICT system functionality. The framework enables e-government implementers to classify the various ICT systems in use by the agency or department, and it allows scholars to track the overall level of adoption in each stage amongst a set of governments, agencies, or departments.

Measuring adoption in this way enables snapshots of e-government evolution within a unit or set of public agencies to inform policy and track progress.

Stage 1 of the framework describes ICT applications that catalogue and disseminate information (one-way communication). An example would be a local government council Web site for posting election dates, licensure regulations, or the government's holiday schedule. In stage 2, two-way communication is supported through ICT applications that support requests and responses. E-mail, for example, might be used to answer queries submitted from citizens or businesses. Data may also be exchanged between two government agencies. In stage 3, service and financial transactions are conducted online. Citizens file taxes via the Internet. Social welfare benefits are electronically transferred from government checking accounts to citizens' individual accounts. Stage 4 integrates horizontal and vertical services. All U.S. Government grants, for example, are offered through a single Web site, www.grants.gov. Citizens can register for local, state, and national elections on one website. Finally, in stage 5, political participation is enhanced. Citizens, for example, may vote online or virtually attend public hearings and meetings.

In Figure-1, Moon's framework is summarized and contextualized with examples in e-government's recent past and present state. Early use of the Web in government centered on establishing a presence of public agencies on the Internet. Simple informational Web sites were created that, at best, provided information on the agencies' activities and contact numbers. Current government Web sites are more sophisticated. The sites contain a much richer set of content, including access to most published government documents and reports. Many e-government Web sites further include the capability to conduct transactions, such as online license renewal.

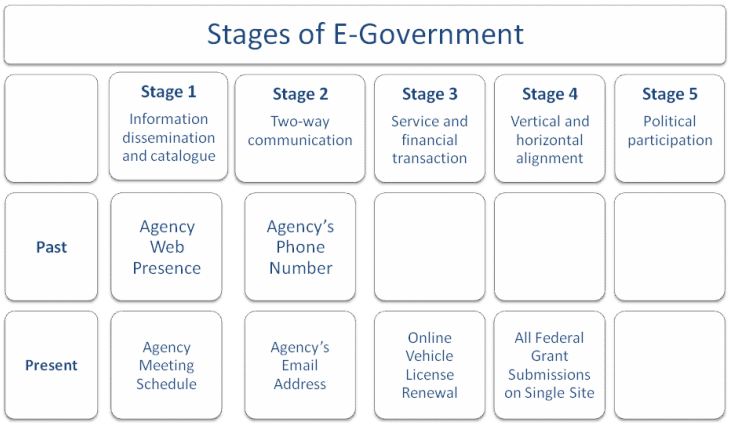

Figure-1
Stages of e-government, from Moon (2002).

Although modern e-government Web sites provide a wealth of functionality, few public sector uses of the Web approach realization of Moon's last two stages. This may change with advent of the Web 2.0. The Web 2.0 includes a wide array of ICT artifacts such as Weblogs (blogs) where users diary or write short entries with personal thoughts on everything from politics to favorite foods; wikis (e.g., Wikipedia) where communities of individuals author and edit content in an organized, often hierarchical, structure; social networking Web sites (e.g., MySpace) where individuals create profiles and share information about their identity, ideas, and knowledge; and social bookmarking applications (e.g., del.icio.us) where individuals tag Web pages, news stories, or blog entries and share their organized lists of "favorites" with others. The term Web 2.0 further includes ICT applications such as microblogs (e.g., Twitter), social bookmarking, folksonomies, podcasts, instant messaging, mashups, and multimedia sharing services (Abbott, 2010). A recent review by Warr (2008) offers a more complete list of Web 2.0 applications and uses across multiple industries.

The use of Web 2.0 ICT in government is growing, especially within developed nations such as

the United States and England (Jackson J., 2006). These currently nascent, rapidly developing technologies have the potential to be powerful tools for e-government and public administration. To understand the use within and the impact of Web 2.0 ICT on PA, the author systematically reviewed the e-government, public administration (PA), and ICT literatures. By surveying early experiences, the author hopes to inform PA researchers and practitioners about current adoption and use as well as explore critical areas for future research and development. Next the paper describes the methods used to survey the literature. Then the results of the review are presented, and the author outlines remaining challenges and the path forward towards greater adoption, use, and evaluation of e-government 2.0 within public administration.

METHODS

To better understand the level of current adoption of e-government 2.0 and synthesize best practices in using e-government 2.0 technologies, the author performed a comprehensive review of the literature. Three searches were performed in June 2007, September 2007, and February 2008, of the English-language literature indexed in Public Affairs Information Service (PAIS) International, Library and Information Science Abstracts (LISA), JSTOR, and Academic Search Premier (EBSCO) using a broad set of keywords and key phrases to maximize sensitivity. Technology terms included Web 2.0, blog, wiki, and social networking. The technology terminology was combined with PA terminology in order to narrow results to relevant articles that focused on how Web 2.0 technologies have been used to date in government. The primary PA term used was government. Other terms included electronic government, public administration, public affairs, and public sector. The author further performed queries in specific journals not indexed by the electronic databases, including the

Information Systems Journal, the *European Journal of Information Systems*, the *Journal of E-Government*, and *Electronic Government an International Journal*, as well as the search engine Google Scholar (Mountain View, CA).

The author manually reviewed the results (titles and abstracts) of the electronic database queries for articles that focused on the implementation, adoption, and use of e-government 2.0 applications by any level of government. Articles that evaluated the adoption and use of e-government 2.0, as well as those that reported best practices in implementing or using e-government 2.0 applications, were of primary interest. Articles were excluded if a) the article failed to mention any Web 2.0 ICT artifact; b) the article simply mentioned the potential use of Web 2.0 technologies in the Discussion section; c) the article was technical in nature, describing a new algorithm, programming language, or development methodology (even if used in an e-government ICT system); or d) the article was principally theoretical in nature.

Articles meeting the inclusion criteria, or which failed to meet the exclusion criteria, were set aside for in-depth analysis. Analysis involved the author classifying each article using Moon's framework, identifying the relevant Web 2.0 ICT artifacts described in the article, and extracting best practices and lessons learned from the article. This was an iterative process which involved making notes on each article and refining those notes over time while grouping and organizing the notes into various categories. The technique is comparable to grounded theory and analytic memoing approaches utilized by qualitative researchers (Patton, 2005; Charmaz, 2004), and it was informed by numerous projects in the health care IT field in which the author principally works (Dixon, Hook & McGowan, 2008; Dixon and Samarth, 2009).

Initially the author intended to only select peer-reviewed articles. However, non-refereed publications, government Web sites, and news articles were

eventually included due to limited results from querying just the peer-reviewed literature.

RESULTS

Searching the literature using the general terms "government" and "information technology" resulted in the identification of several thousand articles. When these terms were combined with e-government terminology, the list narrowed dramatically. The full text of the e-government articles were then searched for the mention of Web 2.0 technologies, keywords, and phrases. This resulted in a final list of 149 peer-reviewed articles. Of these, all but 14 were rejected by the author following manual review of article titles, abstracts, and contents. Public administration, government, and e-government often appeared only in the Discussion section as a potential user of the technology under examination. Furthermore, many articles, especially those queried from the IT literature, were technical in nature, focusing on Web 2.0 development frameworks such as AJAX (Asynchronous JavaScript and XML) or J2EE (Java 2 Platform, Enterprise Edition). These articles did not discuss how Web 2.0 technologies were being adopted or used in the provision or management of government information, communications, or services. Therefore the author added six trade publications and online documents from an expanded search using Google to the result set. These articles were identified using the same techniques as those applied to the peer-reviewed literature. Figure-2 summarizes the keywords and search strategies utilized to narrow the literature.

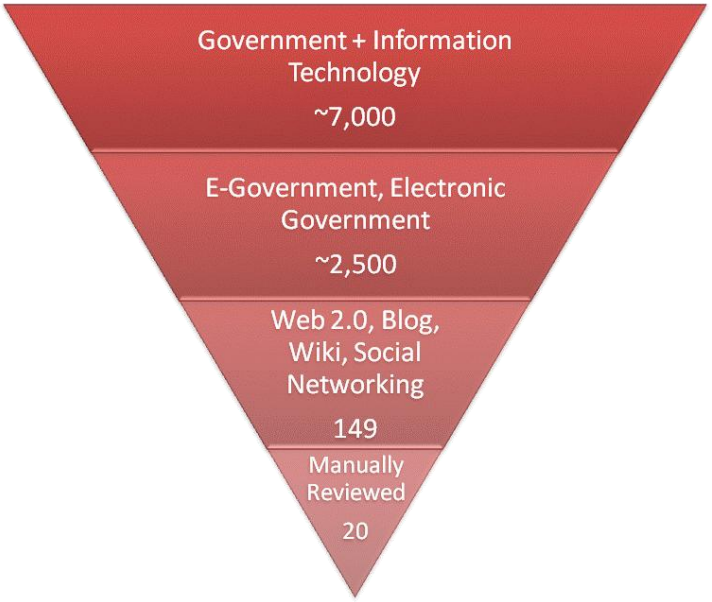

Figure-2
Keywords and search refinements used to carefully identify e-government 2.0 articles

The selected articles addressed the following types of primary Web 2.0 applications: Weblogs (N=14), wikis (N=3), social networking Web sites (N=2), really simple syndication (N=1), and the Semantic Web (N=1). The federal government (N=14) was the host or consumer of Web 2.0 technology in most of the articles. State and local governments (N=2) and non-profit organizations (N=4) were mentioned less frequently as actors in e-government 2.0 activities.

Articles were further categorized into the Moon (2002) stages of e-government as represented in Table-1. Although examples mapped to all but one stage, Web 2.0 technologies tended to cluster in stages four and five. Two articles describe new approaches to intra- and inter-government communication and dissemination. Five articles centered on the use of Web 2.0 technologies to vertically or horizontally integrate government information, services, or units. Fourteen articles focused on the promise Web 2.0 technologies

show towards achieving e-democracy, or the active participation of citizens via the Internet (Komito, 2005).

Moon's Stage of E-Government	Identified Articles	Web 2.0 ICT Classification
Stage 1 Information: dissemination and catalogue	Jackson, J. (2006)	RSS
Stage 2 Two-way communication	Rutzick (2007)	Social Networking
Stage 3 Service and financial transaction		
Stage 4 Vertical and horizontal integration	ACM (2007) Brown and McVay (2005) Jackson (2007) Thompson (2006) Wagner et al. (2006)	Wiki Blog Wiki Wiki Semantic Web
Stage 5 Political participation	Bloom and Kerbel (2005) Carter and Belanger (2005) Griffiths (2004) Jost and Hiplolt (2006) Komito (2005) Kulikova and Perlmutter (2007) Lytle (2007) Neal (2005) Shoop (2006) Stelter (2007) Vest (2006) Wagner, Cheung, Ip, and Böttcher (2006) Williams, Trammell, Postelnicu, Landreville, and Martin (2005) Wyld (2007)	Blog Blog Blog Blog Blog Blog Blog Blog Blog Social networking Blog Blog Blog Blog

Table-1
Classification of identified articles using Moon's (2002) Stages of E-Government

Enhancing Knowledge Management

Modern government requires appropriate distribution and management of disparate systems and the information and knowledge captured, stored, and communicated by those systems (Metaxiotis and Psarras, 2005). This necessitates organizational processes and systematic approaches. The processes and approaches by which an organization captures, shares, applies, and creates information and knowledge are commonly referred to as knowledge management (Liebowitz, 2004). Scholars from a variety of disciplines have suggested that knowledge management has the potential to transform public administration through the distribution and use of information and knowledge supported by ICT (Gorry, 2008; Henry, 1974; Metaxiotis and Psarras, 2005).

Web 2.0 technologies have grown out of the need for better methods of organizing, storing, and sharing information and knowledge via the Internet (Boulos and Wheeler, 2007). The primary goal for the literature review was to find evidence that Web 2.0 technologies were being used in the public sector. The review identified several articles that demonstrated government experience with a variety of Web 2.0 technologies: RSS feeds, Wikis, and Blogs. The technologies were used to disseminate information and knowledge as well as horizontally or vertically integrate systems to enhance knowledge management practices within public sector organizations. A description of the articles, technologies, and best practices follows.

Really simple syndication (RSS) is used to rapidly share information and knowledge. Think of RSS like a newer, more robust email distribution mechanism. Instead of a government agency creating and maintaining a list of people over time, individuals subscribe and remove themselves from the RSS "feed." Subscribers receive notification when new information is published by the government agency via the RSS feed. Because RSS is structured, the information can be easily republished on a subscriber's Web site or blog.

This re-publication feature allows Web sites, blogs, and other ICT to easily and efficiently aggregate feeds, integrating individual artifacts for further redistribution and consumption by an intelligent system or end user.

RSS feed usage on a number of government sites can be observed (HHS, 2009; Jackson J., 2006; White House, 2009). Their general use on the Internet is quite large, especially in the media (Flitter, 2005). Unfortunately the articles identified in the review do not provide best practices or evidence on the use and impact of RSS on government or PA. An example from the author's personal experience in the health care IT sector, however, does demonstrate how RSS can be used to enhance information and knowledge dissemination across a network of organizations.

Local public health departments struggle with timely communication to the media, citizens, and medical providers during emergent outbreaks of disease. Guidelines from the federal U.S. Centers for Disease Control and Prevention (CDC) are often updated rapidly during a public health crisis, such as the H1N1 pandemic of 2009. This information is filtered down to state health departments, which re-distribute the information to local health departments at the city or county level. Many times local health officials sift through dozens of updates and revised guidelines which are disseminated through a variety of channels: facsimile, email, and Health Alert Network messages.

RSS feeds could help streamline the flow of updated information through the various levels of public health jurisdictions. The CDC could push updated information out to state health departments, which might then re-broadcast the information to local health departments with little to no manual intervention necessary. Local health department officials could subscribe to an aggregate feed of public health information, and items of an urgent or important nature could be immediately re-broadcast to local media and provider organizations which subscribe to the local health feed. Individual citizens and organizations could

also subscribe to the local feed to receive important updates on health in their community. Streamlining information flow with RSS would reduce redundant channels of information while supporting more efficient communication between levels of government. It may also improve transparency in government communication (Fairbanks, Plowman and Rawlins, 2007). Furthermore, all of this could be achieved with widely available and low cost technical infrastructure components. RSS applications are often available for free and they operate effectively on inexpensive servers.

A second example of knowledge management improvements using Web 2.0 in government is Intellipedia, a covert version of the popular online encyclopedia Wikipedia created by the U.S. Intelligence community (Jackson, 2007). The wiki is composed of multiple, hierarchical wiki sites that are secure from the eye of the public. More than a dozen U.S. intelligence agencies contribute knowledge to the wiki, and most of that information is available to anyone with access to Intellipedia (ACM, 2007). For example, users in various agencies can augment notes, documents, and other files associated with a suspicious individual. With updates available immediately, the wiki enables surveillance in real-time using human and computer analysis. It also enables agents to add their individual perspectives on intelligence data with a goal of consensus, not the creation of a neutral point of view (Thompson, 2006). Intelligence officials have gone on the record, reporting that the benefit of integrating and sharing the knowledge outweighs the potential risk of leaks to the media (Jackson, 2007). Believing that the wiki can improve the fight on terror, the U.S. community intends to open some of the nested wikis up to partners in Canada and other counties (ACM, 2007).

A third example is the Department of Defense Rapid Acquisition Incentives-New Centricity (RAI-NC) Pilot program, managed by the Department of Navy e-business Operations Office and the Naval Undersea Warfare Center. In their article, Brown and McVay

(2005) describe how the pilot program employed and evaluated the use of blogs for a low-cost alternative to traditional communications hubs. The goals of the pilot study were to evaluate whether blogs could allow every acquisition activity to integrate and exchange data throughout its life cycle in a secure, digital environment. The study's authors concluded that blog technology was successful in allowing program managers to more efficiently track acquisition activities and results. These activities generated decision-making knowledge and created feedback loops for continuous improvement of the process. One case example in Brown and McVay (2005) described how blogs were successfully used following a terror alert to identify, test, and deliver new counter-terrorism equipment to New York City police in time for the 2004 Republican National Convention. The managers involved in the project concluded that blogs should be further used to improve internal communications and knowledge management.

A fourth example involves the use of social networking applications to improve public sector resource management practice. To respond to the challenge of recruitment and retention in the public sector (Lavigna, 2007), public managers and scholars have suggested that antiquated human resource management practices be modernized for the twenty-first century (Soni, 2004). Although USAJOBS.gov and other current e-government initiatives have been successful in helping to streamline processes for receiving, reviewing, and making decisions on federal job candidate applications, successfully recruiting top talent to federal jobs remains a challenge. This is due, in part, to the perceptions of public sector jobs as boring and underpaid. Such perceptions are powerful influences when top tier talent thinks about where to work (Lavigna, 2006).

An article from Rutzick (2007) describes the popularity of social networking sites and the creation of YoungFeds.org. Sites like YoungFeds.org and

GovLoop.com allow college students and young professionals to organize into like-minded groups and discuss ideas in ways similar to face-to-face encounters. The article from Rutzick (2007) suggests that such sites might be useful for dispelling poor perceptions of public jobs and recruiting top talent to the public sector. For example, YoungFeds.org, GovLoop.com, and LinkedIn.com could be utilized for organized campaigns by groups such as the Partnership for Public Service to dispel the poor perception of public sector careers. Videos, photos, and testimonials from current, young professionals would provide engaging, yet accurate, portrayals of careers and roles in government and non-profit organizations. The sites could also provide young talent with efficient pathways, likely in the form of Web links, to information on available jobs in the public sector. Such action is the kind which has been advocated by PA professional societies, including ASPA (2007).

In addition to dispelling perceptions, Web 2.0 technologies may also enhance human resource processes within public organizations. Although they use the Internet to process and track job applications, human resources (HR) professionals primarily rely on personal contacts and networking to find top talent (Society for Human Resource Management, 2002). Social networking sites might be useful tools for HR professionals in the public sector to expand their networks, reach top tier talent in other sectors, and screen public sector job applicants. For example, the site LinkedIn.com is used in the private sector to build professional networks, often for the purpose of finding a job or recruiting new talent. Those in the public sector making hiring decisions should consider creating or expanding their online social networks to include talent across agencies and sectors. This can be useful when posting job announcements or asking for advice when hiring for a certain role. Furthermore, a recent survey indicates that some hiring managers have favorable attitudes towards using social networking sites to screen

job candidates (Dixon, 2010). Online profiles on social networking sites provide detailed information on a candidate's background and experience, and some sites allow for other users to recommend or comment on a person's knowledge and skills. A majority of hiring managers in the survey felt that social networking profiles add value beyond traditional resumes and curriculum vitas (Dixon, 2010). Rutzick (2007) points out that, despite the promise of Web 2.0 technologies, there are no government-wide guidelines for the use of social networking sites, and the Office of Personnel Management has used all of its online energy and resources on the development and maintenance of USAJOBS.gov. Public managers should consider augmenting internal portals and systems like USAJOBS.gov with online social networks to enhance recruitment and candidate screening processes.

Finally, the Semantic Web was discussed in one article (Wagner et al., 2006) as a potentially improved method for organizing knowledge for access by government employees and citizens. This technology involves robust methods for organizing and applying meaning to an otherwise large collection of unrelated objects, such as documents, sound files, and movie files (Wikipedia, 2007). Information scientists believe that improving the organization of objects and adding meaning will allow Internet users to access information and knowledge more efficiently and quickly. While the potential is there to improve the management and delivery of information and knowledge held in large repositories, a Semantic Web is more theory than reality. Wagner et al. (2006) note several challenges for developing a Semantic Web for use in e-government. The fact that the Semantic Web has not yet successfully materialized leads some to consider it part of the next generation of Web technology or Web 3.0 (Markoff, 2006).

Enhancing Citizen Engagement in Politics and Policy

Blogs and social networking sites have been demonstrated to be powerful tools for political

candidate fact finding, spreading political gossip, and communicating with a constituency or advocacy group quickly and efficiently (Jost and Hiplolt, 2006). These Web 2.0 technologies have the potential to increase citizen participation in political and public sector processes, including elections, policy development, and policy implementation. Although this vision for Web 2.0 is not quite a reality, there are signs that online participation in politics and government – often referred to as e-democracy (Kakabadse, Kakabadse, and Kouzmin, 2003) – is on the rise. E-democracy is similar in concept to Moon's last stage, political participation. The review identified several articles that demonstrate the potential for Web 2.0 to achieve e-democracy. Summarization and discussion of these articles follows.

Many bloggers, those who host a blog site and publish blog entries on a regular basis, view themselves as an alternative to the traditional media as gatekeepers of information and news (Jackson N., 2006). There are several examples involving bloggers breaking major political news in the past decade. In 2001 when Strom Thurmond turned 100 years of age, Senate majority leader Trent Lott appeared to make comments supporting Thurmond's segregationist platform in the 1948 presidential election. Bloggers created the first storm of protest with the traditional media picking up the story later (Jackson N., 2006; Jost and Hiplolt, 2006). Another example is Rathergate, where CBS News reported that President Bush had evaded the draft and used influence to join the Texas Air National Guard based on forged documents from an unnamed source (Cornfield et al., 2005; Eberhart, 2005).

New media journalists can influence more than the mainstream media's coverage of the daily news. Proponents of e-government, such as Sinclair (2007), argue that whereas most IT innovations have revolutionized routine administrative tasks, Web 2.0 technologies hold the promise of increasing community engagement and public participation in politics and

policy. Shoop (2006) notes that bloggers were instrumental in pushing forward the Federal Funding Accountability and Transparency Act when it was stalled by a few key members of the Senate. In Kyrgyzstan, a former Soviet republic of Central Asia, blogs posted on Akaevu.net spurred a series of public protests that resulted in the ousting of President Askar Akayev (Kulikova and Perlmutter, 2007). Finally, Griffiths (2004) discusses how the "Bagdad blogger" impacted citizen literacies, including pro- and anti-war attitudes, regarding the U.S. war in Iraq.

Stronger evidence that Web 2.0 technologies can support the move towards e-democracy can be found in the 2004 and 2008 U.S. presidential elections. In 2004, candidates used blogs to diffuse information to internal audiences, strengthen the local volunteer base, and set the agenda of the mainstream media (Bloom and Kerbel, 2005). Howard Dean arguably had the most successful blog of the 2004 election (Adamic and Glance, 2005), although popularity online did not translate into success at the polls. Further, blogs proved to be less effective at fundraising than traditional Web sites (Williams et al., 2005). In 2007, Facebook – one of the popular social networking sites – partnered with ABC News to allow its users to follow ABC coverage of U.S. politics (Stelter, 2007). The partnership included participation in the nationally televised New Hampshire debates on January 5, 2008 where Facebook users were able to join Facebook discussion groups and register to vote with a few simple clicks (Callahan, 2008).

Some elected officials, or their advisors, recognize the potential power of citizen engagement via e-government 2.0. These early e-democracy adopters have created blogs to keep their constituents, public employees, and the media informed about policy, government operations, and public meetings – chiefly from the elected official's perspective. Wyld (2007) published an entire monograph on the subject of blogging amongst corporate and government leaders.

The document chronicles a short history on blogging and the recent growth in the number of elected officials who use blogs to communicate with their staff, the media, and their constituents. While many of the blogs are used by members of Congress and state governors, Wyld catalogues several blogs by mayors and town managers. Overall adoption of blogging is currently low (only 17 of 435 (3.9%) U.S. Representatives, only 2 of 100 (2%) U.S. Senators) amongst public executives, but Wyld's report suggests that as adoption and use continue to grow additional research will be necessary to measure the impact of blogging on policy, communication, and executive leadership.

The use of blogs, Twitter, and other Web 2.0 technologies by public employees, especially active military personnel, has initiated active discussion in the PA community on policies concerning the limitations that can be placed on the use of these technologies to communicate information on public policies, elected officials, and military actions. After a review of case law surrounding the general, albeit limited, rights of free speech afforded to military personnel, Lytle (2007) describes personal blogging stories from military personnel serving in Iraq and Afghanistan. She highlights that while journalists have traditionally provided the most immediate first-hand depictions of war, blogs have enabled soldiers to share their stories, photos, and personal messages with loved ones, friends, and the public. Although communication with the outside world is permitted, Lytle points out that this communication is often restricted. Some soldiers have had their blogs shut down by their commanding officers, and some have been prosecuted for statements made on their blog site. At issue is why the military has shut down some blogs and not others. Was it due to the disclosure of sensitive information, or because the blog's author disagreed with certain strategies, tactics, or the war itself? Vest (2006) describes that while some military blogs have been silenced, the U.S. Army Reserve is encouraging other service members to share

their personal stories via blogs to highlight that maintenance of a civilian life while serving the nation is possible and honorable. The Government believes that sharing these stories may help to attract and retain soldiers. These articles suggest that Web 2.0 technologies are illuminating new dimensions to established issues involving the delicate balance between national security, free speech, and transparency.

Such issues are not limited, however, to national defense. Consider a scenario involving a mid-level public employee in an agency who blogs about that agency's decision-making processes. In the evening, from his or her home, the employee blogs about the workday and comments on colleagues ideas and actions. Should the employee's manager ask or demand the employee refrain from describing, for example, the discussions occurring within the agency as the staff draft a notice of proposed rule-making? Can such action lead to the dismissal of the employee if he or she will not stop when asked by the manager? Also consider the growing use of smart phones and the Internet during internal and public meetings. What measures, if any, can public managers take to prevent staff from tweeting comments made by other public employees or elected officials during a meeting? Should tweeting during internal meetings be handled separately from tweets sent during a public meeting? Blogs, tweets, and other Web 2.0 technologies do make it easier for elected officials and public employees to disseminate official communications messages, but they also increase the risk of disseminating internal ideas and comments not meant for public consumption. Balancing the rights of public employees with the needs of the agency to maintain control over communication of policy and decisions may be a challenge in the future. Public managers will further need to consider how best to monitor such behavior of public employees without infringing on their privacy rights.

DISCUSSION

Modern government has been described as an "age of Web-based e-government" (Wood et al., 2008). However, e-government to date has largely focused on the automation of routine government operations. Proponents of the Web 2.0 claim that future e-government ICT will move beyond automation towards knowledge agencies and e-democracy. To examine early evidence of the impact of Web 2.0 on e-government and identify a path forward, the author conducted a comprehensive review of the PA, IT, and e-government literatures. The author identified several preliminary reports that reveal how e-government 2.0 is currently being used and its potential impact in transforming public administration.

The identified articles demonstrate sparse but varied use of e-government 2.0, primarily in Moon's stages 4 and 5 (see Table-1). Figure-3 revisits Moon's framework, mapping innovative e-government 2.0 technologies into Moon's stages using the preliminary evidence found in the literature review. RSS feeds are improving the speed at which citizens and the media receive up-to-date policy and public affairs news. Blogs and wikis are being adopted by government agencies and PA organizations to enhance knowledge capture, sharing, and application. Elected officials are increasingly adopting and use blogs to share knowledge with the PA workforce, the media, and citizens. Together, e-government 2.0 technologies provide a path towards the creation of knowledge-sharing public organizations (Kim and Lee, 2006) and e-democracy (Griffiths, 2004). The path, however, holds several challenges.

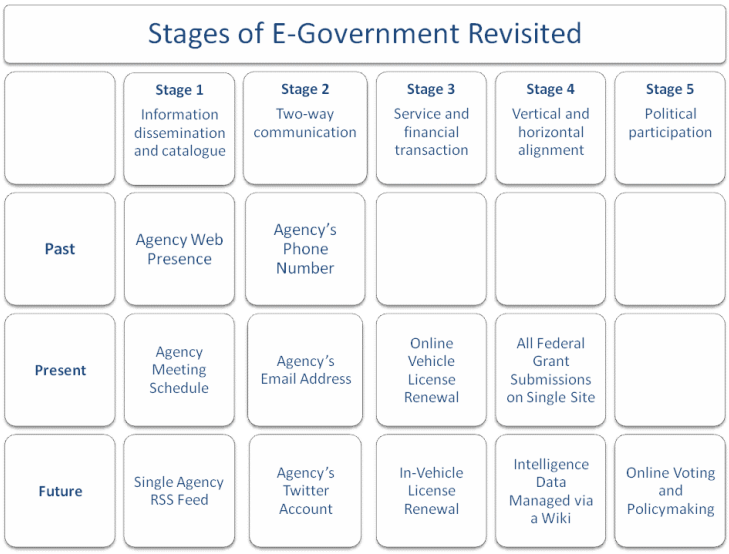

Figure 3
Stages of e-government revisited to include Web 2.0 examples.

E-government 2.0 remains an unclear, evolving target. Despite evidence that e-government 2.0 adoption and usage is increasing, the use of Web 2.0 in government remains in its infancy. Mergel (2010) estimates that nearly every Federal agency has at least one organizational Facebook page and one official Twitter account. This literature review revealed several concrete examples where e-government 2.0 was currently in use. Although exciting, these examples do not constitute a clear, robust set of best practices for the use of e-government 2.0 in federal, state, and local governments. President Obama's Open Government memo on January 21, 2009, calls for expanded use of new technologies. Without best practices and lessons learned from early adopters, public sector projects that heed the President's call and seek to identify, adopt, implement, and use e-government 2.0 technologies may wind up a) reinventing the wheel or b) failing to achieve their goals. Given that nearly one in five public sector IT projects fail (Goldfinch, 2007), stewardship of a

repository for "what works in government" might lead to better outcomes.

The goal of the literature review was to identify best practices amongst the early adopters of e-government 2.0, yet only a handful of examples could be found. These findings support other empirical research examining the overall adoption and deployment of e-government (Norris and Moon, 2005). A larger set of best practices should be identified, catalogued, and disseminated to serve the needs of PA and e-government professionals who are or will be employing Web 2.0 technologies to enhance government services. In the past, the federal government has funded several national resources centers which organized the creation, dissemination, and maintenance of best practices for various professions. The U.S. Agency for Healthcare Research and Quality (2008) has a resource center designed to support primary care research networks; the U.S. Health Resources & Services Administration (2008) funds several centers to support rural health care providers; the U.S. Substance Abuse & Mental Health Services Administration (2008) supports knowledge transfer within the housing and homelessness communities; the U.S. Fire Administration (2006) provides a learning resource center to serve the emergency management community; and the U.S. Department of Education provides a central and trusted source of scientific evidence on what works in education to educators, policy makers, researchers, and the public (Boruch and Herman, 2007). A similar resource center could be established by the federal government for use by local, state, and federal e-government professionals. This center might also be established by one of the professional associations which support e-government activities in the U.S., including, but not limited to, the Association for Federal Information Resources Management (AFFIRM), the National Association of State Chief Information Officers (NASCIO), and the Public Technology Institute. Resource center activities

might include educational sessions to share ideas, whitepaper on the uses of a given technology to achieve a certain aim of PA practice, and the development of a public online repository through which PA and government professionals could access shared resources, lessons learned, and best practices.

Additional research and evaluation is required to drive the development and maintenance of a resource center and/or shared repository of best practices. An e-government 2.0 research agenda would explore implementation, use, and impact of Web 2.0 on government services and target outcomes (e.g., political participation). Formative evaluation methods are suggested given their ability to incrementally capture and report on evolving technological innovations deployed in practice (McGowan et al., 2008). The results of formative evaluations can measure, for example, attitudes towards new technologies and processes for PA practice. Formative evaluations can also measure success factors for the adoption and use of specific e-government 2.0 technologies in specific contexts, and they can reveal technical and financial barriers that may prevent certain departments, agencies, or levels of government from achieving similar results when introducing 2.0 applications.

Furthermore, the e-government 2.0 research agenda will have to be aligned with traditional PA areas of interest. Given their ability to quickly disseminate information to broad constituencies, Web 2.0 deployment and usage can be informed by public relations and communications professionals within the PA community. However, their role and purpose can be much greater as described in the framework and hinted in the limited set of evidence summarized in this article. Therefore other areas of traditional PA study should be involved in studying their use and impact on PA practice. Legal and ethical questions, such as censorship of government employee speech (Lytle, 2007), arise with greater use of e-government 2.0. This necessitates the involvement of law, ethics, and public

policy scholars. There are also questions about whether or how PA managers should track employees' 2.0 activities. For example, a government employee Tweet (a short message sent using the social networking application Twitter) might imply policy and demand a review process prior to posting. These issues will require input from human resource management scholars and professionals. The growing use of Web 2.0 amongst elected officials and those seeking elected office will require involvement of political science scholars and practitioners. Finally, alignment of research across the e-government 2.0 framework will require contributions from existing e-government, information technology, and information science researchers. The field of informatics may provide a good model for engaging multidisciplinary researchers in addressing broad research challenges (Kling, Rosenbaum, and Hert, 1998) across the framework and PA practice.

In addition to more empirical research on its usage, the e-government community requires a more complete set of methods and tools for evaluating e-government 2.0. Existing frameworks and evaluation methods may not be sufficient to appropriately measure the impact of e-government 2.0 on public sector knowledge management and e-democracy. How does one measure the impact of a public blog or wiki on knowledge sharing? How might one measure the impact of video podcast council meetings on citizen engagement? Complicating matters further may be privacy laws that protect online citizens. For example, regulations in the U.S. often make it difficult for government agencies to capture data from users who browse e-government content (Dixon et al., 2009; Wood et al., 2008). Thoughtful approaches from a broad research community are needed to support both PA research and practice.

Finally, e-government 2.0 best practices and research agendas must span across all levels of government. From the results presented in this

literature review, the value proposition of e-government 2.0 remains unclear for smaller units of government. There were very few articles in the review that address the costs and benefits of e-government 2.0 services at non-federal levels. More research and collaboration are needed to examine the necessary infrastructures, policies, and resources of regional, state, or local government for the development, implementation, and use of e-government 2.0 technologies. For example, could e-government 2.0 better engage citizens in American county government or county-run elections? Could wikis and other Web-based communications improve networking between American state and local governments? Is it possible for social networking technologies to improve public-private collaboration? Can e-government 2.0 improve local government services beyond communication with the public? There are synergies between these research questions and the research agendas and challenges put forth by Streib et al. (2007 and 2001), Moon (2002), and Norris and Moon (2005).

CONCLUSION

E-government has evolved since the days of the Hollerith machine. E-government to date has emphasized automation using a variety of technologies. This has created efficiencies in public administration practice, but the achievements have yet to fulfill the promise of better knowledge management and e-democracy. The advent of the Web 2.0 provides an opportunity for e-government to move away from automation towards integration and participation.

The author systematically searched the literature to identify evidence of e-government 2.0 adoption, usage, and best practices. There is currently little evidence to support claims that e-government 2.0 has radically changed government. The evidence that does exist suggests a future in which e-government 2.0 will more effectively integrate knowledge to support

government services and lead to more active citizen engagement in government. Greater adoption, use, and evaluation are necessary to effectively support the path towards e-government 2.0. Financial resources, collaboration, and research are necessary to guide the public sector down this path.

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