

Exploring Web 2.0 as a Contract Monitoring Tool

By

Rudy Perales

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Faculty Approval:

Thomas Longoria, Ph.D.

George Weinberger, Ph.D.

Vanessa Owens, MPA

ABSTRACT

Purpose: The purpose of this research is to describe the barriers to the adoption of Web 2.0 applications for enhancing contract monitoring. Based on the literature, concepts of contract monitoring are described, and Web 2.0 applications are suggested to potentially enhance contract monitoring.

Methodology: Since contract monitoring is not a standardized process, direct feedback from professionals in the field would provide the most accurate depiction of the viability of using Web 2.0 applications for contract monitoring. Focused interviews were conducted with ten contract managers. These respondents were asked to discuss potential barriers that would prevent the adoption of Web 2.0 applications for enhancing contract management. All interviewees provided open-ended responses during their interviews.

Results: Responses from project managers showed that the main barriers to adoption are security and a lack of familiarity with the Web 2.0 applications. Overall, contract managers who are familiar with Web 2.0 applications view them as a viable method to enhance contract management. Project managers believe that the use of Web 2.0 applications could increase the efficiency and effectiveness of contract monitoring and help develop a long-term organizational memory.

ABOUT THE AUTHOR

Rudy Perales is a litigation support specialist and a high school lacrosse coach for St. Michael's Catholic Academy in Austin, Texas. Before entering the Masters of Public Administration program at Texas State University, Rudy received his Bachelor of Arts degree from the University of Texas at Austin, and then obtained a Bachelor of Science degree from Texas State University in Criminal Justice. In the future, Rudy hopes to work in the field of project management, and be a part of the implementation process of Web 2.0 applications in contract monitoring.

AUTHOR'S NOTE

The idea for this applied research project was taken from Government Information Systems (GIS) courses taken under Dr. Weinberger, and a course regarding Ethics in Public Administration under Dr. Garofalo at Texas State University. After learning the importance of increased transparency and accountability, I questioned why public administrators did not consider Web 2.0 applications for contract management, specifically contract monitoring. I learned that Web 2.0 can be applied to almost anything to increase efficiency, and organizations can potentially overlook more effective processes because of a lack of familiarity with newer technology. With the next evolution of Internet interactivity on the horizon, my goal was to gather direct feedback from contract managers and show Web 2.0 applications as a viable tool for enhancing contract monitoring. In the end, I hope that I am apart of the development of more efficient and effective processes to the contract monitoring process.

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Chapter 1

Introduction

From the first case of an alternative service provider emerging as a way for organizations to provide service and save on costs, governments have consistently used contracts to provide services in whole or in part (Shields, 1988, 70). As Shields (1988, 68-71) explains, “privatization is a tricky concept because it incorporates a host of possible service delivery systems, techniques, and financing modes” (1988, 68-71). Even though contracting has become common practice for government organizations to cut costs, the level of responsibility to monitor the quality of service provided by contractors remains a crucial factor (Rehfuss 1990, 45). Unfortunately, governments have not placed an emphasis on developing specific management imperatives necessary to manage the contracts successfully (Brown and Potoski 2003, 154).

In theory, contract management can be more effective using project management techniques because it provides more efficient communication and collaboration (Lientz and Rea 2001; Dow and Taylor 2008; Harris 2008). For example, the individualistic nature of contract administration in the General Services Administration (GSA) made the idea of an efficient method of communication and collaboration an unrealistic possibility (Harris 2008, 114). The Multiple Awards Schedule (MAS) division of the GSA used project management concepts to increase the effectiveness of contract management providing a more structured process to an ad hoc system of management (Harris 2008, 111). MAS staff used project management techniques for a more efficient process of balancing and managing the increased workload of contracts (Harris 2008, 111).

Unfortunately, project management techniques can fail due to a lack of resources and miscommunication (Dow and Taylor 2008). One tragic example of project failure has come from NASA's Challenger accident that occurred on Tuesday, January 28, 1986. The Challenger accident was directly attributed to defective O-rings, which caused a leak of hot gas that triggered the external fuel tank¹. However, the real problem was a result of miscommunication and misinterpretation of preliminary testing data that caused inadequate O-rings to be overlooked (Winsor 1988, 102-103). Miscommunication prevented accurate data from reaching the top level of administration. External communication within the two project engineering firms varied and NASA received less severe warnings than were communicated internally (Winsor 1988 104-105). Some of the important notes taken from the accident point to a necessary requirement to establish an open environment of communication from an organization in order for experts to feel free to report bad news as well as good (Winsor 1988, 107). More effective collaboration in the interpretation of the Challenger pre-launch data, and more importantly, a more effective method of communication, could have prevented such a disaster from occurring.

However, a lack of collaboration and miscommunication still occurs today in contract management (Krappé and Kallayil 2003). Survey results show that organizations from the private to the public sector are short on resources and fail to effectively manage contracts (Krappé and Kallayil 2003). One critical factor for successful project management is an effective method of communication (Hyväri 2006, 39). The following sections of this chapter discuss that lack of efficiency and effectiveness in public sector contract management, and the need for more effective contract monitoring.

¹ See Wikipedia (http://en.wikipedia.org/wiki/Space_Shuttle_Challenger_disaster).

Contract Management Communication: Administration Discretion

While contract managers are subjected to many rules, policies, and procedures, there is actually discretion as to how these contract managers communicate with contractors, staff personnel, executive administrators, and third-party consultants. Contract management includes contract creation, execution, and monitoring for the purpose of maximizing operational performance and minimizing risk (Prager 1994; Brown and Potoski 2003). Contract monitoring is a stage of contract management ensuring that performance outcome is meeting standards agreed upon for single contracts (Prager 1994). Contract managers use monitoring as a method to measure performance, comparing the quantity and quality of products or services delivered against contract specifications (Prager 1994, 179).

In general, there is no standardized process for contract monitoring. In other words, contract managers use their own discretion in deciding on an effective means of monitoring contracts (Hinton 2003, 4). To effectively monitor contracts, administrators need an efficient method of communication to effectively coordinate between multiple contracts, and track and evaluate the performance of contractors (Hinton 2003; Harris 2008; TxDOT Class Manual 2010).

Communication, in the context of contract administration, is more effective by using general project management techniques to outline a system of communication and collaboration with contractors for every single contract (Hinton 2003; TxDOT Class Manual 2010). Contract managers in essence become project managers. For each individual contract, a designated project is determined by the project scope with specific performance

measures that can vary depending on the type of contract agreement. For example, construction contracts require countless checks on progress and corresponding status reports to ensure the project is progressing while eliminating setbacks (Lientz and Rea 2001; Hinton 2003; TxDOT Class Manual 2010).

Current systems of communication and collaboration include elements such as email, telephone conferencing, face-to-face collaboration, or static and data-backed web pages (Wagner 2004, 267-268). However, “email is a one-to-one or one-to-many conversation tool without a central knowledge repository or knowledge organization facility” (Wagner 2004, 267). Static web pages are dependent on the level of collaboration with a separate IT department. This places reliance on a specific individual that is not necessarily a member of the project staff and can lead to issues of miscommunication. Since there is no standardized process for contract monitoring, project managers use what resources are available to them, thus using their own discretion in deciding on an effective means for communication and collaboration.

Contract Management Communication

Contract management communication focuses on managing single contracts. Single contracts are guided by a project scope that outlines all expectations that contractors are required to meet in order to successfully fulfill the contract agreement (Hinton 2003; TxDOT Class Manual 2010). These expectations include specific performance measures, benchmarks, and periodic reports to evaluate the project status that are exchanged between contractors and project managers. Effective project management requires an effective method of communication because every opportunity to communicate with a

contractor is an opportunity to monitor performance (Hinton 2003; TxDOT Class Manual 2010). Therefore communication is the cornerstone of project management (Dow and Taylor 2008; Harris 2008).

Miscommunication can result in a loss of money, time, or lead to a disastrous outcome as we witnessed in the NASA Challenger accident. One common problem is that project managers and team members assume they have communicated properly with each other, when in most cases they have not (Dow and Taylor 2008, 3). Today, this incorrect assumption can occur because project members assume information is being distributed to everyone and not being overlooked. Providing an open environment of communication increases the effectiveness of project management because it provides a separate location for everyone to view the distributed information rather than relying on everyone to either respond to an email or be readily available to discuss project status face-to-face (Dow and Taylor 2008).

Ineffective Communications

The most common communication tool used for project management is email (Wagner 2004; Bellotti et al. 2005). The asynchronous nature of email allows project managers to send information that can be conveniently read in-office or on a mobile device. However, the convenient nature of email increases the likelihood that it will be used frequently leading to email overload. Email overload is a term that is used to describe the use of email for functions that it was not designed for such as task management, personal archiving, and on-going discussions (Whittaker and Sidner 1996, 276). For on-going discussions, the context of the discussion can be difficult to find, causing tasks to be lost or

forgotten within “interleaved emails” (Whittaker and Sidner 1996; Bellotti et al. 2005, 90). Interleaving occurs when context is lost in a disorganized collection of emails (Whittaker and Sidner 1996; Bellotti et al. 2005). In other words, due to the high volume of emails that is received on a daily basis, interleaving can create an ineffective process in contract monitoring for project managers.

For example, multiple projects results in a higher volume of emails that project managers manage from multiple recipients. Email services do not provide automatic grouping of related messages causing users to manually filter through emails that correspond to a given project (Bellotti et al. 2005). Project managers can lose the context of a discussion, or lose track of a specific email causing the corresponding task to be forgotten or overlooked. Rather than enhancing the functionality of email services, this paper suggests that new and more interactive technologies might be more effective in enhancing current communication methods.

Knowledge Management

As noted above, communication is the cornerstone of project management, but in order to maintain an effective level of contract monitoring, project managers need to preserve knowledge (Lientz and Rea 2001). Knowledge management increases the effectiveness of project management because it develops and manages resources to use for future projects (Lientz and Rea 2001, 257-258). For example, effective contract monitoring produces progress reports that measure work performance, provide explanations for supplemental agreements, and collect specific experience learned from completed projects

(Hinton 2003; TxDOT Class Manual 2010). Therefore, project managers need an effective method of knowledge management.

Resources that increase knowledge are compiled of both explicit and tacit knowledge (Kusssmaul and Jack 2009, 148; Stone 2002, 164). Explicit knowledge is easily definable and is found in guidelines, procedures, and standardized documentation (Stone 2002, 164). Explicit knowledge is routinely coded in document-intensive systems that require expensive technological infrastructures that are cumbersome and difficult to use (Kusssmaul and Jack 2009). Tacit knowledge is knowledge that is found in the subconscious, used routinely due to experience, individual strategy, brainstorming, and typically transferred through personal interactions (Stone 2002, 164; Kusssmaul and Jack 2009, 151). Tacit knowledge is a valuable resource, but difficult to collect and store because of the ineffectiveness of email (Whittaker and Sidner 1996; Bellotti et al. 2005). To effectively capture explicit and tacit knowledge, organizations typically rely on costly knowledge management systems that often fail to meet expectations (Kusssmaul and Jack 2009, 149).

These issues are potentially addressed by effectively integrating new Information Technology (IT) solutions---specifically Web 2.0 applications.

Making a Case for Web 2.0 Contract Monitoring

As an alternative to enhancing email, or investing in an expensive knowledge management system, this paper suggests a more cost-effective solution to contract monitoring with Web 2.0 applications. Web 2.0 applications provide an on-demand resource of information that users can view through a browser window with a connection to a department network (Anderson 2007). Web 2.0 is not a new source of information but

rather a more effective way of sharing information across a broad spectrum (O'Reilly 2007, 36). Web 2.0 not only provides data in a new format, it improves the user interface by improving interactivity with end users (Bernal 2010). One key aspect of Web 2.0 is the speed at which content is created and disseminated. Through Web 2.0 applications, large groups of personnel can create and co-create content online and allow end users to view data quicker and in more dynamic ways (Briggs 2009, 48; Bernal 2010, 3-4).

Research Purpose

The purpose of this research is to describe the barriers to the adoption of Web 2.0 applications for enhancing contract monitoring. Based on a review of the literature, there are three areas where Web 2.0 applications can improve project management, which in turn enhances the contract monitoring process. First, blogs are outlined and provide a more efficient method of information dissemination. Second, wikis are used for the collection and storage of explicit knowledge to improve collaboration. The final category outlines the use of online forums to create an effective method of collecting and storing tacit knowledge that is more effective than email.

Chapter Summaries

The first chapter gives an introduction in the level to complexity that comes with contract management. In order for contract management to be successful, contract monitoring needs to be an efficient and effective process to ensure that contractors are meeting specific performance standards and that the project is progressing. Web 2.0 applications are applied to potentially increase the level of effectiveness in contract

monitoring providing project managers with a more open environment to disseminate information and collect and store project knowledge.

Chapter two identifies the key aspects of contract monitoring from the literature in a conceptual framework, found in Table 2.1. Specific Web 2.0 applications are suggested and applied to enhance the corresponding concept of contract monitoring. Examples are provided to show the potential benefits and results when Web 2.0 applications are applied to similar tasks of contract monitoring.

Chapter three discusses the method of research used, and design of the focused interviews that were used for feedback from professionals in contract and project management regarding the viability of Web 2.0 applications to enhance contract monitoring.

The results are collected and analyzed for discussion in chapter 4, the Results chapter. Table 4.1 identifies key responses that were received from respondents. Key responses suggest that Web 2.0 applications, as discussed in chapter 2, will provide a more effective method for contract monitoring.

The fifth and final chapter of the paper, the Conclusion chapter, draws conclusions from the key responses received from the focused interviews. The final conclusion and policy recommendations are provided.

Chapter 2

Literature Review

Chapter Purpose

The purpose of this chapter is to introduce a framework for concepts of contract monitoring. Based on a review of the literature, the nature of Web 2.0 applications could enhance three concepts of contract monitoring. The literature review suggests specific applications for each method of the contract monitoring process, and provides a description and successful examples of the Web 2.0 application's use in similar fields.

Web 2.0

Web 2.0 is not a new Internet, but an advanced method of collaboration that provides a technological foundation for delivering services to the user through the browser window (Anderson 2007, 4). Johnston et al. (2009, 3) describes the essence of Web 2.0 as participation, making it easier for people to find information and collaborate. Web 2.0 tools foster personal knowledge processes allowing people to be more effective, supporting knowledge sharing through virtual interaction with easy-to-use collaborative tools (Razmerita, Kirchner, and Sudzina 2009, 1022).

Blogs, wikis, and online forums are examples of the main tools of Web 2.0. Really Simple Syndication (RSS) feeds, that work with all Web 2.0 applications, provide indications that information has been added or changed to the corresponding application (Wagner and Bolloju 2005; Stauffer 2002; Sauers 2006). For example, anytime new information is posted to a blog, information is edited or submitted to a wiki page, or a question or answer is submitted to an online forum; an RSS feed sends an email message

relaying the updated information to all RSS subscribers. This means that project managers do not have to replace preferred methods of communication or collaboration, but can use Web 2.0 applications as a supplemental method to increase effectiveness and efficiency in monitoring. Web 2.0 applications complement each other because they are based on a network. In addition, blogs, wikis and online forums can be linked together expanding resources that can be used for a single project.

Blogs are essentially online journals that order information in chronological order (Ojala 2005; Stauffer 2002). Blogs provide information in a structured format which Wager and Bolloju (2005, iv) describe as an “anytime and anyplace information and knowledge site that is easily maintained” (2005, iv). Information that is added to a blog entry is called a “post” that can contain a quick summary of facts or an entire article of information. Blogs allow comments to be added to single posts in which viewers can comment or provide feedback to information that is presented in the blog post. Blogs posts would allow project managers the ability to present information and receive instant feedback with the use of comments from viewers attached to the blog post (Stauffer 2002; Sauers 2006; Ojala 2005). Blogs can be applied to multiple tasks providing visibility and increasing the effectiveness of communication (Ojala 2005, 272).

Wagner (2004, 268) describes a wiki as a “set of linked web pages created incrementally by a group of collaborating users” (2004, 268). Wikis allows multiple users to view a single page, in which they all can edit or update information, and create a supplemental document relevant to the original using a hyperlink (Wagner 2004). All changes and edits that are made to the corresponding wiki pages can be tracked, and identify the person that provided the change. Wikis provide real-time collaboration

creating a more effective method of developing documentation, tracking the progression of work, and developing a knowledge base (West and West 2009; Wagner 2006). This allows project managers to centralize required documentation in one location rather than using email to send documents to multiple recipients. Project managers can limit the use of attachments in email, which will reduce the chances of having multiple versions of the original attachment. For example, project managers can use a wiki to create a template of a progress report, which provides one central location that is accessible through a simple Internet connection, where contractors can fill in the required information. Because contract monitoring is a document-intensive process, wiki pages can centralize all relevant resources, track progression of contractors, and create an open platform to facilitate collaboration.

Online forums house a collection of threaded discussions that are organized according to topic, providing the context of multiple on-going discussions where email is ineffective (Whittaker and Sidner 1996; Bellotti et al. 2005). This provides an open environment for contractors to ask questions or search discussions from previous projects for possible solutions to problems they currently face. More importantly, project managers can use online forums to externalize tacit information collected from projects that is most commonly exchanged in conversation (Leblanc and Abel, 2007, 269). As previously discussed, tacit information is subconscious information that is used frequently but is not necessarily documented (Stone 2002, 164; Kussmaul and Jack 2009). For example, project managers can use online forums to encourage discussions of preferred methods used for specific projects, describe lessons that were learned during the project, and outline the scope of the project using the stored discussions as a reference for future use.

Specific Web 2.0 applications are ideal for specific tasks of contract monitoring. The most important benefit of Web 2.0 applications is the social nature of their design allowing further expansion by linking the applications together (Anderson 2007; Johnston et al. 2009). Blogs, wikis, and online forums use hyperlinks to connect multiple sources of information together. Ideally, project managers can link blogs, wikis, and online forums together to expand their capabilities and provide more resources across multiple projects. However, specific Web 2.0 applications are more ideal for specific areas of project management based on their capabilities. For the purpose of this paper, blogs and online forums are centered around the concept of communication, while a wiki is focused on the organization of explicit information. The following sections of this chapter summarize the key aspects of the suggested Web 2.0 applications that will increase the efficiency and effectiveness of contract monitoring.

Table 2.1: Conceptual Framework: Components Tied to Literature

Contract Monitoring	Source
<p>Information Dissemination</p> <ul style="list-style-type: none"> • Blogs <ul style="list-style-type: none"> ○ Posts create structured information 	<p>Ojala (2005); Sauers (2006); Holtz and Demopoulos (2006); Stocker and Tochtermann (2008); Stauffer (2002); Paquet (2006); Scoble and Israel (2006); Asllani, Etkin, and Somasundar (2008); Hinton (2003); Lynch (2007)</p>
<p>Collecting and Storing Explicit Knowledge</p> <ul style="list-style-type: none"> • Wikis <ul style="list-style-type: none"> ○ Topical pages centralize resources ○ Tracking edits and changes improves accountability ○ Open-platform facilitates collaboration 	<p>West and West (2009); Paquet (2006); O’Leary (2009); Kussmaul and Jack (2009); Whittaker and Sidner (1996); Bellotti et al. (2005); Wagner (2004); Wagner and Bolloju (2005); Wagner (2006); Elgort, Smith, and Toland (2008); Osimo (2008); Maitra (2007); Grace (2009); ZhouWei and Xuan (2010); Mader (2008)</p>
<p>Collecting and Storing Tacit Knowledge</p> <ul style="list-style-type: none"> • Online Forums <ul style="list-style-type: none"> ○ Visualization of context for on-going discussions ○ Pre-structured discussion threads focus information ○ Archived threads develop organizational memory 	<p>Desanctis et al. (2003); Leblanc and Abel (2007); Asllani, Etkin, and Somasundar (2008); Wagner (2004); Wagner (2005); Paquet (2006); Stone (2002); Whittaker and Sidner (1996); Bellotti (2005); Fiedler and Welp (2010); McNamara and Brown (2009); Kussmaul and Jack (2009); Karacapikidis, Loukis, and Dimopoulos (2005)</p>

Table 2.1 presents the conceptual framework table that summarizes the literature review in the next chapter. For each specific area of contract monitoring, specific Web 2.0 applications are suggested based on the characteristics of the application. The corresponding benefits of using the application are described in the following sections of this chapter.

Information Dissemination

One of the most important responsibilities of a project manager is to track and maintain a record of all communication exchanged with contractors (Hinton 2003; TxDOT Class Manual). Contract monitoring is a discretionary process and email is the tool of choice for most project managers (Wagner 2004; Bellotti et al. 2005). An increased number of projects can typically result in an email overload for project managers causing interleaving, which leads to the loss of context of on-going discussions or forgotten tasks due to a large volume of different subject emails in a single inbox (Whittaker and Sidner 1996; Bellotti et al. 2005). This paper does not suggest that the use of email should be replaced, but that the efficiency of information dissemination can be improved by using Web 2.0 applications; specifically the use of a blog. Blogs provide a separate on-demand center of communication that complements email and are open to view by all users who have access to the corresponding network.

Blogs

Blogs are defined as online journals administered by one or a small group of authors that orders information in chronological order (Ojala 2005; Sauers 2006). In other words, blogs are websites updated with items in a linear, time-based fashion (Stauffer 2002, 2-4). Blogs are made up of posts, which create a topic of information designed by the author, and have the ability to attach comments for additional commentary to a given blog post or can simply be used to confirm that the information has been received (Ojala 2005; Stauffer 2002, 325). To ensure accountability, a project manager is required to keep track of all communication that is exchanged between the department and the contractor (Hinton

2003; TxDOT Class Manual 2010). A blog can address this need by providing a visualization of communication that is exchanged between the department and the contractor (Stauffer 2002; Sauers 2006), which is dated and stored to view as a confirmation similar to the saving and storing of emails. Since the blog can be accessed through basic Internet or Intranet, a blog improves the efficiency of information dissemination.

RSS feeds allow project managers to integrate the use of blogs into normal email use. An RSS feed is a collection of metadata in raw form that includes various bits of information including author, publication source, and publishing date². RSS feeds are used within blogs as a “push-mechanism” for transferring the updated information to all subscribers of the blog (Holtz and Demopoulos 2006, 43). For example, a project manager can use a blog specific to a particular project, submit updated information and have a notification automatically sent to the contractors’ email addresses. Project managers no longer have to rely on email to send updated information, but can have contractors subscribe to the blog’s RSS feed and have the information automatically pushed to all subscribers’ inboxes. Blogs and RSS feeds increase the efficiency of disseminated information and decrease a project manager’s sole reliance on email (Lynch 2007).

Posts Create Structured Information

As it was previously discussed, email is the most common method of communication for project management (Wagner 2004; Bellotti et al. 2005). However, email is inefficient in task management and preserving the context of on-going discussion (Whittaker and Sidner 1996; Bellotti et al. 2005). This means that the cumbersome nature of email hampers the

² See Wikipedia (<http://en.wikipedia.org/wiki/RSS>).

ability of project managers to effectively follow the context of on-going discussions, which can result in lost or forgotten tasks.

Action folders that allow subject specific emails to be organized in separated folders require an extra cognitive step that is often forgotten because of the absence of visibility from the inbox (Whittaker and Sidner 1996; Bellotti et al. 2005). For effective communication, a project manager needs to create a visible platform of communication that makes it easier for contractors to view the latest updates of information and avoid the possibility of a lost or misplaced email. In contrast to the view of an inbox, a blog provides structure that would resemble a paper outline with information titled and chronologically ordered. This allows a project manager to present information in a context that may have previously been presented informally and inefficiently disseminated with standard email (Grudin 2006, 9).

Blog posts are the basic components of a blog and provide a structured outline of information that is time-stamped and chronologically ordered (Stauffer 2002; Sauers 2006; Ojala 2005). A blog post is a simple text box that allows project managers to submit, or “post”, specific information that would typically be sent through email or presented in an informative bulletin board. However, the information is dated and presented in a structured format that makes it easier to track project timelines (Stauffer 2002; Sauers 2006; Grudin 2006). To further continue the ideas or updated information that is posted, a blog provides an area to attach comments in response to posted information that can either provide extended commentary or be used as a tool to confirm the updated information has been received. RSS feeds automatically send email notifications when information has been posted, and can require a time limit for a response to a blog post (Lynch 2007). For

example, project managers can update the time and date of a scheduled site visit with a blog post and contractors can submit a comment in response to the post confirming the time change (Stauffer 2002, 325).

Blog posts not only contain information that is updated by the author, but can be used to provide links to additional resources. Providing links to other resources in a blog post is similar to the use of a normal hyperlink that would be found on a typical webpage or email. By providing links, a blog becomes a “resource shelf” (Ojala 2005, 272) of information that expands access to additional resources that correspond to the blog post. For example, public libraries have used blogs to enhance the visibility of information by linking articles, commentary, and other websites creating a collection of shared knowledge for specific topics of interest (Ojala 2005, 272). Corporate use of blogs have increased creating “project blogs”, which allow project managers to expand the use of resources, and provide a more visible and efficient structure to communication that email cannot provide (Ojala 2005; Grudin 2006). One example comes from Soar Technology Inc., which uses blogs to create project notebooks linking a collection of resources relevant to the corresponding project (Ojala 2005, 274).

Corporations have increased the use of blogs and research has shown blogs to be an effective method of information dissemination (Stocker and Tochtermann 2008; Asllani, Etkin, and Somasundar 2008). In order for blogs to be effective, a project manager must fully commit to a blog by consistently posting updated information and using links to expand resources. Consistently posting information shows a passion and commitment to the blog that transmits to other viewers (Scoble and Israel 2006, 175; Lynch 2007). Linking additional resources to the blog post creates a channel of information that makes viewing

the blog more valuable to the user (Stocker and Tochtermann 2008). Viewers that know that the blog is going to be a consistent hub for multiple resources, check the blog more often, and subscribe to the RSS feed for automatic updates (Stocker and Tochtermann 2008, 103).

In summary, blogs provide a separate open environment for viewing information that is more efficient than email (Grudin 2006; Lynch 2007; Stocker and Tochtermann 2008). Blogs effectively structure information in chronological order that also provides a transcript of communication between project managers and contactors (Stauffer 2002; Sauers 2006). Rather than distributing information to an email listserv, RSS feeds improve the effectiveness of blogs by allowing project managers to automatically forward notifications of new blog posts to a recipient's email (Stauffer 2002; Sauers 2006; Lynch 2007). In addition, project managers can provide links to additional resources, creating a "resource shelf" with on-demand access (Ojala 2005, 272).

As it was mentioned before, efficient communication is not the only the key to effective contract monitoring. Project managers need the ability to collect and store resources. To increase the effectiveness of contract monitoring, blogs can be linked to corresponding wiki pages and specific forum discussions, which expand resources across multiple projects. A blog will provide focused information, then provide additional resources through corresponding wikis and threaded discussions. The following section outlines the use of wikis to collect and store explicit knowledge found in project documentation.

Collecting and Storing Explicit Knowledge

In general, contract monitoring is a document-intensive process that includes explicit knowledge that is consistently used over and over. Explicit knowledge can be defined as clearly definable information that is typically found in instructions, guidelines, procedures, and other project documentation (Stone 2002). Explicit knowledge is a crucial resource that must be collected and stored for project management (Lientz and Rea 2001; Hinton 2003; TxDOT Class Manual 2010). For example, progress reports and evaluations are two types of project documentation that are generally used by a project manager that provide a check on a contractor's performance (Hinton 2003; TxDOT Class Manual 2010). If a contractor's progress needs to be monitored more closely, a progress report can be required more frequently (TxDOT Class Manual 2010). When explicit knowledge is collected and stored, it serves as a reusable resource that can improve the effectiveness of future contract monitoring (Lientz and Rea 2001; Dow and Taylor 2008).

The problem for a project manager in the public sector is that there is no efficient method for collecting and storing explicit knowledge (Hinton 2003; TxDOT Class Manual 2010). For example, the Texas Department of Transportation provides only recommendations for developing a filing system, but ultimately relies on the project manager to develop their own filing system (TxDOT Class Manual 2010). To address this issue, a document-management or knowledge management system would be an obvious suggestion to simplify a collection and retrieval process for explicit knowledge. However, a lack of available channels to transmit knowledge, delay in the amount of time that knowledge is available to others, and inaccurate information are common examples of the inefficiencies that are found in knowledge management systems (Wagner 2006, 72; Kussmaul and Jack 2009).

On top of that, knowledge management systems require an expensive infrastructure that is expensive and time-consuming to maintain. Because of this, email results in the most useful tool for project managers to exchange resources (Wagner 2004; Bellotti et al. 2005). However, as it was discussed earlier, email is an inefficient process of project management because inboxes become cluttered resulting in interleaving (Bellotti et al. 2005). For example, a report is sent as an attachment to multiple recipients for up-to-date information is put on hold while waiting for information to be received from all the recipients. Then, each response has its own updated attachment, which ultimately creates several new versions of the original attachment. A project manager would have to wait for responses from multiple recipients, all with their own attachments, and combine all of the updated information into one single document.

When faced with similar inefficiencies in the private sector, major enterprises have begun to abandon cumbersome knowledge management systems (Grace 2009, 64) in favor of more efficient innovations that are easier and more cost effective for locating explicit knowledge within an organization (Kussmaul and Jack 2009, 149). This paper suggests that a project manager should use a wiki to increase the efficiency of knowledge management.

A wiki is a website or network software that allows the creation and editing of any number of interlinked web pages³. This is important to a project manager because he or she can use a wiki to centralize resources and provide an open-platform to initiate collaboration. For example, a project manager can use a wiki to create document templates for required forms that are consistently used during contract monitoring. This would

³ See Wikipedia (<http://en.wikipedia.org/wiki/Wiki>).

provide a centralized location for resources to be accessed more efficiently, and help alleviate the document-intensive nature of contract monitoring.

Wiki

A wiki is defined as a “set of linked web pages created incrementally by a group of collaborating users” (Wagner 2004, 268). The basic hypertext markup language (HTML) design of wikis avoids compatibility issues, allowing multiple users to access and expand information with the most basic browser viewers (O’Leary 2009, 35). Pages are hyperlinked together expanding content of a particular topic by linking to either a blank wiki page, or to an existing page where information has already been created (West and West 2009, 14). Wikis allow users to create standard templates within a wiki page for a more efficient method of creating and updating pages with consistent content and layout (Kussmaul and Jack 2009, 152). Therefore, project managers can collect and store explicit knowledge more efficiently, and store and reuse that knowledge more effectively.

In addition, wikis provide an open workspace, or platform, that allows multiple users to access, update or edit, and create new information simultaneously (Wagner 2004; Paquet 2006; West and West 2009). This provides a Web-based knowledge management system, and allows users, who are granted access, to edit and update information simultaneously improving efficiency and collaboration (Wagner 2004; West and West 2009). Using a wiki, a project manager can centralize project resources on the department network, alleviating the amount of paperwork that is required in contract monitoring, and making them more accessible to use across multiple departments.

Topical Pages Centralize Resources

A wiki starts as a blank page to start an idea, then uses hyperlinks to new pages to answer, respond, or expand the idea (West and West 2009; Wagner 2004). Hyperlinks attach multiple wiki pages together regarding a specific topic. Wikis are ideal for an ad-hoc environment because they create structure out of decentralized resources (Wagner 2004, 275). This makes wikis more effective for standardizing document-intensive resources and building a knowledge repository (Elgort, Smith, and Toland 2008, 199). For a wiki to be effective, individual wiki pages need to be created according to topic (Leuf and Cunningham 2001; Wagner 2004). This starts an organic process of knowledge by expanding one resource and linking all relevant data (Leuf and Cunningham 2001; Wagner 2004).

The most prominent example of a wiki being used in the public sector comes from the creation of Intellipedia (Osimo 2008). Intellipedia is a government wiki, established by the Office of the Director of National Intelligence, enabling collaborative drafting of intelligence reports by analysts from different intelligence agencies across multiple countries (Osimo 2008, 27). Different agencies are able to cut through the barriers of structure that have hampered previous intelligence-sharing efforts (Maitra 2007, 9). Topical pages associate reports from different geographical locations, and expand evaluation of specific topics. Those agencies that have rights to view the wiki benefit from the open-source nature of the wiki because reports are more accurate (Maitra 2007; Osimo 2008). Increased channels of information decrease the acquisition bottleneck (Wagner 2006, 72), and provide a more efficient process of locating intelligence reports (Osimo 2008; Maitra 2007).

In public education, wikis were examined to measure their ability to increase collaboration and organization of course resources (ZhouWei and Xuan 2010; Elgort, Smith, and Toland 2008). For improving productivity, course work requires extensive organization for up-to-date information on all current assignments and responsibilities. Students' perceptions were measured and showed that wikis provided a more efficient method of organizing required coursework, specifically progress reports (ZhouWei and Xuan 2010, 698; Elgort, Smith, and Toland 2008, 208). Accountability and productivity were increased due to students' ability to visualize the progression of work within a given timeline, and access necessary resources in one location provided through the wiki (ZhouWei and Xuan 2010, 698). Simple functions of a wiki provided participants, who did not have any background in the use of wikis, the ability to locate and organize course resources increasing collaboration (Elgort, Smith, and Toland 2008, 208).

In the private sector, corporations use wikis to centralize resources (Paquet 2006, 112) because a wiki removes intermediaries providing a nonintrusive means of sharing resources (O'Leary 2009, 36). Michelin China uses a wiki to centralize all relevant resources for project teams that need access to the similar resources (Paquet 2006, 104). Wikis are used for sharing project information within the project team and personnel outside of the team. This provides a central location for accessing information and knowledge from multiple users across a wide geographical area (Paquet 2006, 104).

Tracking Edits and Changes Improves Accountability

Since email is typically the primary source of communication between contractors, it would be logical to assume that email is used as a collaboration tool (Wagner 2004).

Generally speaking, a project manager will use email to attach documents and send them to multiple recipients (Wagner 2004; Bellotti et al. 2005). However, this process is inefficient because a project manager would need to wait for every recipient to respond with the subsequent changes, and combine all updated information into the original document. Not only does this process slow the momentum of the project, but accountability is at risk because of the inefficient process of using email to collaborate on shared information (Wagner 2004; Bellotti et al. 2005).

A wiki allows a project manager to monitor changes of information increasing accountability of various tasks within a project timeline. A wiki stores previous versions allowing users to correct misinformation and track the origin of the change (West and West 2009, 3, Wagner and Bolloju 2005, v). For example, wikis have been implemented in higher education to provide a more efficient method of completing group projects. Results showed that a wiki was successful in allowing students to track changes and contributions, which improved accountability and productivity (Elgort, Smith, and Toland 2008; ZhouWei and Xuan 2010). More advanced wiki software provides a supplemental information bar that allows users to attach short commentary to their contributions (Wagner 2004, 274; West and West 2009, 13). Just as an individual would place a “post-it” note attached to a physical document to clarify the information given, a wiki provides a small text window to provide further explanation to the submitted information for a given page. (West and West 2009).

Educational use of wikis provides an example of a wiki being specifically used for collaboration that was shown to be an effective collaborative tool. Wikis that were implemented into higher education courses with attached commentary increased the effectiveness of individual contributions to the group project. Group members specified

their tasks within the wiki and identified completed tasks for which they were held accountable. This allowed all group members to track everyone's contribution. Participants provided feedback identifying the ability to track work that was completed or assigned increased the efficiency of the group process, and improved accountability for the person responsible for the completed task (Chu 2008, 749-751; ZhouWei and Xuan 2010, 698).

Open-Platform Facilitates Collaboration

One common example of inefficient collaboration, found in corporations, is shown by having multiple drafts that are delivered through email, but are incomplete until all corresponding parties have seen or presented their changes (Grace 2009, 70). Rather than combining multiple attachments delivered through email, a wiki is an open-source platform that provides one document in one location allowing multiple individuals to view and work simultaneously (Wagner 2006, 74; Mader 2008, 3). This also opens up information for organizations by not leaving specific information with just a few experts, but allows for everyone involved within the project to access up-to-date information. The wiki serves as a collaborative space designed for multiple authors where anyone can add and edit information (West and West 2009, 3-4). Project managers can use wikis to create an organized method of storing explicit knowledge that can be accessed by everyone from anywhere, while alleviating the dependency on email and facilitating collaboration.

The private sector provides examples of the use of wikis to expand resources and create a more efficient method of collaboration. Mapa, a UK-based market research consultancy company, utilized a wiki to create a database of explicit resources (Grace 2009). The wiki is used for centralizing all explicit knowledge, providing resources for

progress reports and evaluations of collaborative projects (Grace 2009, 66-67). Mapa management selected a wiki-based platform to work within their existing Intranet to increase collaborative efforts with clearly distinguished topical wikis for particular projects (Grace 2009, 67). Mapa's use of wikis is consistent with survey results found in an analysis of corporate use of wikis (Majchzak, Wagner, and Yates 2006). Survey results show continued growth of wikis in corporations because they improve knowledge reuse, work processes, and collaboration (Majchzak, Wagner, and Yates 2006, 101).

Using a wiki-based platform, project managers can effectively manage explicit knowledge and improve collaboration. Wikis are used as additional tools to attempt to bridge the gap between knowledge and discussion (Majchzak, Wagner, and Yates 2006, 102) but are insufficient in capturing tacit information found in personal interaction. The next section outlines the use of online forums as a more efficient method of collecting and storing tacit knowledge. Tacit knowledge is knowledge that can be composed of various forms of interpersonal information that serves as a resource for future use. Examples of tacit knowledge include preferred methods of action, information that is obtained from informal interpersonal interactions, or a set of lessons that were learned from previous experience that serve as a reference for future projects. Project managers that have the ability to effectively collect and store tacit knowledge create a resource base of information that can be used for and across multiple projects.

Collecting and Storing Tacit Knowledge

For effective contract monitoring, project managers must have the ability to collect and store knowledge from completed tasks, generally referred to as a "lessons learned"

database to use as a resource for future projects (Lientz and Rea 2001; TxDOT Class Manual 2010). This can be influenced by documentation, decisions made during the execution of project tasks, and the expertise obtained while working on them (Fiedler and Welppe 2010, 383). Project managers should encourage an expression of thoughts regarding more effective methods of completing specific project tasks, as well as an evaluation of the working relationship with the contractor. This knowledge becomes a resource-base that project managers can use to develop an organizational memory that can improve the effectiveness of contract monitoring.

An organizational memory can be described as any form of knowledge that was developed from previous experience that is collected and stored for future use (Fiedler and Welppe 2010, 383; Leblanc and Abel 2007, 267). One major influence on organizational memory is tacit knowledge (Stone 2002; Leblanc and Abel 2007). An organization's memory is dependent on its capacity to access tacit knowledge through personal feedback and preserve it (Leblanc and Abel 2007, 266). Tacit knowledge is ethereal knowledge framed within the context of human experience, which is difficult for people to articulate because it only manifests itself when it comes into use (Stone 2002, 164; Asllani, Ettkin, and Somasndar 2008, 218; Kussmaul and Jack 2009, 148). Individual knowledge of processes, experience, and project outcomes represent tacit knowledge that is found in project management transferred to others through personal interactions (Lientz and Rea 2001, 4).

To effectively develop an organizational memory in contract monitoring, project managers must develop a method of collecting and storing tacit knowledge during the timeline of the project (Lientz and Rea 2001, 4; Hinton 2003, 10). Ideally, email is the most

logical tool for developing a method for capturing tacit knowledge because email is the most common tool used for communication in contract monitoring (Wagner 2004; TxDOT Class Manual 2010). However, email has been shown to be an ineffective method of capturing tacit knowledge because of the inefficient nature of an overloaded inbox (Whittaker and Sidner 1996; Bellotti et al. 2005).

Generally speaking, a project manager is susceptible to email overload because of a higher volume of email, eventually resulting in “interleaving” (Bellotti et al. 2005). As it was previously discussed, interleaving occurs when the context of a conversation is lost, an email goes unread, or a task is lost due to the inefficient organizational process of email. In other words, interleaving occurs because of an overload in email results in a convoluted inbox too cumbersome to effectively manage. For example, a project manager could lose track of discussions, forget to answer specific questions, or possibly lose track of specific tasks either because the context of a discussion is lost, or the email is overlooked (Whittaker and Sidner 1996, 276-278).

In order to minimize these occurrences, email services should provide a function that allows the grouping of threaded discussions together in order to maintain the context of the conversation (Bellotti et al. 2005). A separate platform for project discussions should be created to prevent lost or forgotten tasks from interleaving; and provide a separate resource to consult for future projects. A project manager can encourage discussions and direct questions to a separate platform that allows any viewer with access to contribute to the discussion. A separate platform also provides an open environment for discussion that can increase positive relationships with contractors. Online forums provide that separate

environment, which categorizes threaded discussions and provides visual context to on-going discussions that are more efficient than email.

Online Forums

Online forums, which is another term for online discussion boards, are a more effective method of collecting and storing tacit knowledge because they capture the context of on-going discussions more efficiently than a collection of stored emails. Online forums use pre-structured threads that start with a comment or question and expand specific topics, which in turn can effectively collect and store tacit knowledge. A project manager can use online forums for discussions regarding trouble-shooting, recommendations for specific tasks, and lessons learned from a completed project (Lientz and Rea 2001; TxDOT Class Manual 2010). These discussions can now be stored, searched, and used as a future resource for either one department or expanded to provide a large resource-base for an entire organization.

An online forum is simple software that establishes a website on either the Internet or Intranet providing an open-source platform for establishing threaded discussions (Wagner and Bolloju 2005, iii). Visually, forums resemble the outline of a collection of emails that you would find in a typical email inbox. However, forums are an accessible website that anyone can access. Project managers can provide access for all parties, opening up the forum to questions from multiple sources on specific topics to develop in-depth dialogue for particular fields of discussion (Desanctis et al. 2003, 574). This makes online forums an effective alternative to using email for collecting and storing tacit knowledge.

Visualization of Context for On-Going Discussions

Organizations are utilizing Web 2.0 applications in an attempt to alleviate the use of email and decrease potential email overload (Paquet 2006, 105). Rather than solely relying on email for project management, a forum supplements the use of emails. Important discussions can be moved to forums providing a discussion for specific projects that maintain the context and open the discussion to other users for feedback.

Previous studies examined the use of expanding functions of email to include a visualization tool for on-going discussions that would link key words found in the subject line of messages and automatically group them together (Bellotti et al. 2005, 121). However, the tool was ineffective because it required consistent use of the same text in the email's subject line from multiple individuals (Bellotti 2005, 121). A forum provides multiple threaded discussions broken into several categories for corresponding topics providing a visualization of topical on-going discussions that email cannot produce (Whittaker and Sidner 1996; Bellotti et al. 2005).

Pre-structured Discussion Threads Focus Information

Unlike a wiki, forums begin with a structured channel of information that is determined by the topic of issue. A project manager identifies a discussion thread based on the characteristics of the project scope. Providing a clear purpose for the use of the threaded discussion limits confusion and helps initiate conversation (McNamara and Brown 2009, 415). Pre-structured threads organize comments and responses in a sequence of alternating messages and responses from users in chronological order that provides

topic-based indexing that is searchable (Wagner 2005, vi), and develops organizational memory (Leblanc and Abel 2007).

A review of the literature showed effective use of online forums in both education and in the corporate setting. Pre-structured discussion threads versus unstructured discussion threads were examined for the development and expansion of ideas in Graduate level courses (Brooks and Jeong 2008). A related study examined the use of forums in a corporate setting for information dissemination (Asllani, Etkin, and Somasundar 2008). Both studies found that pre-structured information threads were effective in delivering specific information because information was structured and found in topic-oriented locations that users needed (Brooks and Jeong 2008, 227-228; Asllani, Etkin, and Somasundar 2008, 228).

Archived Threads Develop Organizational Memory

Effective development of organizational memory is associated with an effective Government-to-Government (G2G) collaboration because both concepts require the collection and storage of tacit knowledge (Fiedler and Welppe 2010; Leblanc and Abel 2007). Effective G2G collaboration successfully develops organizational memory with the use of an open-source platform to structure conversations for evaluating alternatives to standard practices and the ability to efficiently retrieve that knowledge (Karacapikidis, Loukis, and Dimopoulos 2005, 609-610).

A forum provides independent records of threads that can be archived and searched for future use (Wagner 2005, iv). Procedural knowledge, experience in unique situations,

and trouble-shooting solutions are examples of information that constitute a “lessons learned” database typically addressed in closing meetings (Lientz and Rea 2001, 4). Forums are ideal for a “Question & Answer” (Q&A) database because it provides a quick reference search for key words saved within archived threads (Wagner 2005, vi; Desanctis et al. 2003, 574). To provide credibility to information that is provided, users establish a profile to describe their organizational experiences and procedural ideas on previously completed work (Desanctis et al. 2003, 574).

Chapter Summary

The purpose of this chapter was to identify Web 2.0 applications that would increase the efficiency and effectiveness in contract monitoring. Specific functions of blogs, wikis, and online forums provide more effective methods of communication and collaboration that can supplement current methods of contract monitoring.

Chapter 3

Methodology

Chapter Purpose

This chapter describes the method used to collect feedback regarding the barriers to the adoption of Web 2.0 applications for enhancing contract monitoring. Contract monitoring is not a standardized process (Hinton 2003), and therefore is difficult to measure. The conceptual framework developed interview questions that determine the project manager's assessment of the effectiveness of Web 2.0 applications to enhance contract monitoring. The method of analysis used is focused interviews because interviews enable in-depth analysis of responses from project managers from both state and local government departments that monitor the work performance of contractors. Responses from interviewees provide feedback to describe the possible barriers to implementing Web 2.0 applications. This chapter also identifies the operationalization table (Table 3.1, p. 40) that links the interview questions to the conceptual framework and the strengths and weaknesses of the research method.

Focused Interviews

Since the research seeks to describe the barriers to the implementation of the Web 2.0 applications in contract monitoring, which is not a standardized process, focused interviews will provide the qualitative data needed from experts in the field. Qualitative data is not easily received or reduced to numbers for a statistical analysis (Babbie 2001). Therefore, focused interviews are the most appropriate method of data collection because the process of contract monitoring is an internal organizational knowledge that is difficult

to measure. Interviews are flexible and inexpensive to conduct, and provide in-depth understanding of concepts that are generally unavailable to surveys (Babbie 2001, 299).

However, qualitative data can be unreliable because information received from the sample measured is not an accurate representation of the general population. Judgment is based on the biases and points of view of the researcher that must be sorted out. The results may not be characterized the same in a similar research (Babbie 2001, 299). In order to remove the bias, closed and open-ended questions are asked to gain the true perspective of the sample member.

From the interviews, my goal was to discover what the knowledge of Web 2.0 applications was, what the current use of Web 2.0 applications consisted of, and how often Web 2.0 applications would be used in contract monitoring. The interview will also provide in-depth understanding of potential barriers to adoption, and the viability of using Web 2.0 applications for contract monitoring. Because of the discretionary nature of contract monitoring, the most viable source of information must come from project managers that are specifically responsible for contract monitoring. Project managers who are aware of the necessary communication and collaboration methods will provide the most credible information regarding the viability of using Web 2.0 applications to enhance contract monitoring.

Sampling

A snowball sampling method was used to locate members of the targeted population. Snowball sampling involves locating a few members of the target population, then asking members of that target population for information in locating additional

members (Babbie 2001, 180). Since the purpose of this research is to describe the barriers to the adoption of Web 2.0 applications in contract monitoring, project managers that are specifically responsible for contract monitoring in the public sector is the target population; thus making a snowball sample the appropriate technique. To begin the snowball sample, the first project manager interviewed will be asked for additional contacts that are responsible for contract monitoring. There will be a total of 10 project managers that will be interviewed to complete the snowball sample.

Questions to be Presented

As shown in Table 3.1 (p. 40), each category uses a closed-ended question regarding the knowledge of the corresponding Web 2.0 application. Immediately following the closed-ended question, the project manager is asked on open-ended question to discover whether or not the project manager has considered using the Web 2.0 application for contract monitoring. In order to capture a more in-depth perception of the feasibility of using the Web 2.0 application for the corresponding category, the project manager is asked a prompt question about that category. For example, a project manager is asked a closed and open-ended question regarding whether or not they are familiar with blogs; and whether or not they have considered using a blog for contract monitoring. The following prompt question asks for additional information over specific topics that have been designated as key points of inefficiency and ineffectiveness for the current method of contract monitoring; such as the following example:

- Q. Are you familiar with blogs?
- Q. Have you ever considered using a blog for disseminating information in contract monitoring?
 - Q. What are some of the reasons why you have considered using a blog for disseminating information?

Q. Can you tell me more why you think that a blog would provide a better method of communication?

Project managers were asked similar questions for each of the other Web 2.0 applications. For example, a project manager is asked whether or not they are familiar with wikis and online forums. Next, the project manager is asked whether or not they have considered using wikis and online forums for the managing of explicit and tacit knowledge.

The following prompt questions are designated for seeking additional information regarding the feasibility of using the Web 2.0 application for the specific category of contract monitoring provided by the conceptual framework (see Table 2.1, p. 14). Prompt questions are used to grasp the depth of understanding, whether or not the Web 2.0 application is used, and finally, whether or not the application would be used frequently. Key responses were identified by their relevance to the suggested use of the Web 2.0 applications discussed in the Literature Review and collected in the Results Table, Table 4.1 at the end of the Results chapter.

Respondents

The ten experts interviewed were contacted via professional and personal networks. Professionals who possessed specific knowledge and experience in the process of both contract monitoring and project management provided all feedback. Interviewees were notified that the purpose of the research was to describe the potential barriers that would prevent the adoption of Web 2.0 applications to enhance contract monitoring. The experts represented local and state government organizations, and private consultants. The professionals who participated in this study were chosen using the snowball sampling method (Babbie 2001, 108).

The average time for the interviews was twenty-five minutes. The interviews took place from February-March 2011. Interviewees were informed what the intention of the research was and the purpose of the interview.

Limitations of the Research

This applied research project identifies key concepts that are used to monitor contracts and suggests the use of Web 2.0 application to enhance contract monitoring. Since contract monitoring is not a standardized process, it is important to note that the concepts discussed in this paper are supplemental suggestions to enhance the overall process of contract monitoring, and not to suggest an alternative method to the entire process. Current methods of contract monitoring are used at the discretion of individual project managers for both the public and private sector, and each organization should determine the standard requirements for the process of contract monitoring to ensure the protection of confidential information.

Human Subjects Protection

Prior to conducting any interviews, this research project was approved by the Institutional Review Board of Texas State University-San Marcos and found to be exempt from review. The Texas State University Internal Review Board exemption ID is EXP2011M3131. No confidential information was collected during the research process, and therefore disclosure of privacy practices was not warranted. Information related to the research was shared with interviewees in advance. The results of opinions and feedback by interviewees were not linked to particular individuals. No exchanges of monetary or

compensatory benefits were provided for participating in this research. No confidential data was released throughout the research process. The research advisor was:

Thomas Longoria, PhD
Texas State University in San Marcos
601 University Drive
San Marcos, Texas 78666

Chapter Summary

This chapter provided information about the focused interviews and basic information about the individuals interviewed for this project. The chapter discussed the process taken to ensure that the proper protections for human subjects were followed. In the following chapter, the feedback received from the research is disclosed.

Table 3.1: Operationalization Table

Contract Monitoring	Query	Questions Asked
<p>Information Dissemination</p> <ul style="list-style-type: none"> • Blogs <ul style="list-style-type: none"> ○ Posts create structured information 	<p>Focused Interview</p>	<ul style="list-style-type: none"> • Are you familiar with blogs? • Have you ever considered using a blog for information dissemination in projects? <ul style="list-style-type: none"> ○ Prompt Question (see text) • If you had a blog, how often would you use it? <ul style="list-style-type: none"> ○ Prompt Question (see text)
<p>Collecting and Storing Explicit Knowledge</p> <ul style="list-style-type: none"> • Wikis <ul style="list-style-type: none"> ○ Topical pages centralize resources ○ Tracking edits and changes improves accountability ○ Open-source platform facilitates collaboration 	<p>Focused Interview</p>	<ul style="list-style-type: none"> • Are you familiar with wikis? • Have you ever considered using a wiki for collecting and storing explicit knowledge? <ul style="list-style-type: none"> ○ Prompt Question (see text) • If you had a wiki, how often would you use it? <ul style="list-style-type: none"> ○ Prompt Question (see text)
<p>Collecting and Storing Tacit Knowledge</p> <ul style="list-style-type: none"> • Online Forums <ul style="list-style-type: none"> ○ Visualization of context for on-going discussions ○ Pre-structured discussion threads focus information ○ Archived threads develop organizational memory 	<p>Focused Interview</p>	<ul style="list-style-type: none"> • Are you familiar with online forums? • Have you considered using an online forum for collecting and storing tacit information? <ul style="list-style-type: none"> ○ Prompt Question (see text) • If you had an online forum, how often would you use it? <ul style="list-style-type: none"> ○ Prompt Question (see text)

Table 3.1 summarizes the conceptual framework and links the description of applying Web 2.0 applications to specific interview questions. The questions in Table 3.1 stimulate further discussion regarding the application and effectiveness of Web 2.0 applications to enhance contract monitoring.

Chapter 4

Results

Chapter Purpose

The purpose of this chapter is to discuss the feedback received from the focused interviews. Results from the focused interviews discuss the viability of using Web 2.0 applications, and the potential barriers that could prevent the adoption of Web 2.0 applications for enhancing contract monitoring.

For each of the concepts of contract monitoring that were discussed in the Conceptual Framework (Table 2.1, p. 14), respondents were asked whether or not they were familiar with the corresponding Web 2.0 application and if they had ever considered using the application. Next, if respondents were familiar with the Web 2.0 application, they were asked how often a project manager would use the application. As explained in the Methodology chapter, all closed-ended questions were followed by prompt questions to expand the discussion and identify key responses.

Key responses were identified by their relevance to the suggested use of the Web 2.0 applications discussed in the Literature Review, and collected in the Results Table (Table 4.1, p. 55-56). The conceptual framework, Table 2.1, identifies specific aspects of the suggested Web 2.0 applications that can enhance key areas of contract monitoring. Key responses show a direct correlation with the suggested use of the Web 2.0 applications in contract monitoring.

Information Dissemination

Respondents were asked their familiarity with a blog, and whether or not they have ever considered using a blog to enhance information dissemination in the context of contract monitoring. All respondents (10 of 10) were familiar with blogs but none had previously considered them as a method of information dissemination in contract management. However, perceptions of the viability of using a blog for different dimensions of enhancing information dissemination in the context of contract monitoring do vary among the respondents. Project managers, who believed blogs were viable, worked for larger organizations and are more likely to receive a higher volume of email. Specifically, these respondents believe blogs might be an effective method to alleviate email overload. These respondents agreed that any supplemental tool that could help decrease the dependency on email could be effective. For example, project manager 8 (state project manager) explained that email overload is such an epidemic, “anything that can improve the efficiency of communication is welcomed” (Project Manager 8).

The following section, discusses the results received from project managers regarding information dissemination in the context of contract monitoring. Project managers explain whether or not blogs are a viable method for enhancing contract monitoring.

Posts Create Structured Information

Seven respondents discussed the structured outline of a blog as a potential benefit, and highlighted the fact that blog entries could be saved and searched to increase accountability. Blog posts provide a structured outline of time-stamped information that is chronologically ordered (Stauffer 2002; Sauers 2006; Ojala 2005) and 7 of 10 project

managers are aware of this functionality based on their responses. For example, project manager 1 (state project manager) explained, “The structure of a blog can provide a journal of activity on a weekly basis” (Project Manager 1).

Four of the respondents (three state project managers and a private consultant) specifically identified a blog as a more efficient method of keeping a record of communication between all involved parties than existing (email and physically-based) practices. Project manager 8 explained that “Right now email is used to document communication, but it is not clear” (Project manager 8). As part of their responsibility to ensure task accountability, project managers must track and save a record of communication with contractors (Hinton 2003; TxDOT Class Manual 2010). These four respondents suggested that a blog provided a visualization of communication that can be viewed by all users (Stauffer 2002; Sauers 2006) and increase accountability. Project manager 2 explained that a blog can improve accountability because it structures information creating a clear record of communication that can be “viewed on a network by all department staff, consultants, and higher-level administrators” (Project Manager 2).

Three of the seven respondents (two state project managers, and one private consultant) agreed that a blog could serve as an effective alternative to locating information that would be needed on a daily basis. These respondents also suggested that additional information be provided with the corresponding blog post, suggesting that the blog could be used as an additional location for resources. Respondents did not use the same words designating a blog as a “resource shelf” (Ojala 2005, 272), but provided responses that identified the same concept discussed in chapter two.

The comparison of email to blogs was a main topic of discussion because email is the primary method of communication for all respondents. Three of the respondents (two state project managers and a private consultant) agreed that a blog would be more efficient than email because of the amount of email that is received on a regular basis. Project manager 8 (state project manager) commented, "It is not unusual for higher-level contract administrators to receive at least 300 emails on a daily basis" (Project manager 8). The three respondents referred to the issue of receiving too much email that can lead to overlooked messages. These respondents agreed that a blog could help alleviate a potential email overload by transferring communication efforts to a blog.

Respondents provided feedback that suggested that blogs were a viable Web 2.0 application, but three respondents (two city project managers and a private consultant) did not consider blogs as an effective means of information dissemination in the context of contract monitoring. Project manager 9 (a city project manager) commented that a blog "is a personal application, and cannot be used in a business context" (Project manager 9). Project manager 5 (private consultant) did discuss the structure of a blog as a potential benefit, but felt that managing the blog would only result in "another task that a project manager would have to balance into an already busy schedule" (Project manager 5).

Awareness and evaluation of blogs is different from adoption and use. The same seven respondents, who identified the benefits of the blog's structured information, explained that the use of a blog would be determined by the "nature of the project." Four respondents said that blogs would be used on a "daily basis" for all projects. Project manager 4 (state project manager) explained that construction contracts typically have multiple contractors involved on a single project, and information is exchanged frequently

between multiple parties (project staff and multiple contractors) throughout a single day; thus a “blog could be used several times a day to give project status, identify issues and trouble-shoot solutions” (Project manager 4).

When asked what the potential barriers to using a blog for contract monitoring would be, the most common response was “security.” All respondents agreed that security risks were too high and would be a major barrier to the implementation of a blog. However, one respondent commented, “security is the first concern for all new technology changes” (Project manager 1). Three respondents (state project managers) discussed the issue of familiarity. Project manager 8 suggested training to help the transition into using blogs, but security would be the main barrier “until more were familiar and comfortable using blogs” (Project manager 8).

In summary, 8 of 10 project managers found blogs as a viable tool for disseminating information. Based on the responses, most project managers are aware of the potential benefits of a blog, but a lack of familiarity increases security that creates a barrier to their adoption in contract monitoring.

Collecting and Storing Explicit Knowledge

Respondents were asked about their familiarity with wikis, and whether or not they have ever considered using wikis for managing explicit information in the context of contract monitoring. Out of ten respondents, only one (a state project manager) was familiar with wikis, but this respondent had not considered using wikis for contract monitoring. All respondents (10 of 10) explained that all explicit documentation is handled

by an organizational-wide and specific document-management system (DMS), so wikis have not been considered.

Respondents were prompted to stimulate further discussion regarding the effectiveness of their current method of collaboration by asking them to compare the DMS with key wikis aspects. For example, SharePoint is the current DMS for one respondent. Therefore, the respondent was asked whether or not SharePoint allowed multiple users to edit a single document simultaneously, which is a key aspect of a wiki. Respondents who found inefficiencies in SharePoint (DMS) discussed key aspects of wikis that could potentially enhance the collection and storage of explicit knowledge in the context of contract monitoring.

Examining the characteristics of the respondents, a correlation of responses developed between their preferred use of email and their opinion on the level of efficiency of the DMS. Respondents (4 of 10) who agreed that the current DMS was efficient also preferred email as their primary tool for collaboration. Those respondents, who believe that email is not an inefficient tool for collaboration, found the current DMS to be inefficient.

All respondents (10 of 10) explained that SharePoint is the organizational-wide system for managing explicit information. The following sections highlight key responses that showed whether or not the respondent agreed that SharePoint (DMS) was efficient, and whether or not they believed concepts, that are relevant to key aspects of wikis, would be viable for collecting and storing explicit knowledge.

Topical Pages Centralize Resources

Project manager 8 (state project manager) who is familiar with wikis, explained that a wiki could be effective because wikis can “centralize standardized forms rather than having to modify different versions with the same information” (Project manager 8). The respondent explained one common problem is that several departments have different versions of documents with the same information. As it was discussed in chapter 2, wikis are ideal for an ad-hoc environment because they create structure out of decentralized resources (Wagner 2004, 275) and are why the respondent agreed that centralizing all forms into wikis could be effective based on the response.

Accordingly, two respondents (state project managers) agreed that the lack of standardized forms was a problem and preferred a more effective method of storing explicit documentation. Specifically speaking, project manager 1 explained that all documentation is saved in SharePoint for everyone to access, but the titles of documents are inconsistent, hampering the searching process. Project manager 1 (state project manager) commented, “Searching in SharePoint is not user-friendly and is a last-resort option” (Project manager 1). A wiki allows users to create standard templates within a wiki page for a more efficient method of creating and updating pages with consistent content and layout that allows key words to be searched (Kussmaul and Jack 2009, 152; Wagner 2004). Based on the responses, the two respondents identified inefficiencies in SharePoint (DMS) that are potentially enhanced by wikis.

However, four respondents (three city project managers and a private consultant) found SharePoint (DMS) as an effective system for managing explicit information. Project manager 9 (city project manager) explained that SharePoint is also used to save received emails with attachments, describing SharePoint as “one place you can go for critical

information” (Project manager 9). Based on the responses, these respondents are not likely to consider a wiki for explicit information because they feel SharePoint is effective.

Tracking Edits and Changes Improves Accountability

All respondents (10 of 10) explained that users check documents out of SharePoint, which locks a document from others until the current user is finished and checks the document back into the system. Three respondents (city and state project manager, and a private consultant) preferred the locking ability of SharePoint because project managers were able to track when the change occurred and who was responsible for the updated information. Project manager 10 (city project manager) explained, “The document profile is updated every time the document is checked out showing who was responsible for the change in information” (Project manager 10).

In contrast, three separate respondents (state project managers) explained that this SharePoint (DMS) function actually causes setbacks because “other departments check-out documents for days and prevents other users from viewing up-to-date information” (Project manager 6). A wiki stores previous versions allowing users to correct misinformation, and track the origin of the change (West and West 2009, 3, Wagner and Bolloju 2005, v), thus improving accountability.

Open-Source Platform Facilitates Collaboration

Three respondents (two state project managers and a private consultant) specifically identified progress reports as examples of explicit information that are inefficiently created in the current process. Project manager 2 (private consultant)

explained that “One report is typically transferred to multiple parties through email, and one staff member is responsible for combining all received information into a single document” (Project manager 2). To prompt further discussion, respondents were asked if the ability to have multiple users access a single document would be effective.

Five respondents (four state project managers and a private consultant) did find simultaneous interaction with a single document as a “more efficient method” for collaboration. Project manager 1 (state project manager) commented, “It would be effective to allow multiple users to interact with a single document simultaneously because it would save time and prevent lost information while waiting to access the document” (Project manager 1). A wiki serves as a collaborative space designed for multiple authors where anyone can add and edit information (West and West 2009, 3-4), and allows multiple individuals to work within a document simultaneously (Wagner 2006; Mader 2008).

However, five respondents (three city project managers, state project manager, and a private consultant) did not find the ability to simultaneously interact with a single document effective. Project manager 5 (private consultant) explained, “Allowing multiple users to access a single document can cause a chaotic and inefficient situation for managing information” (Project manager 5). Specifically speaking, the respondents favored the ability to checkout and lock documents through SharePoint (DMS) because it offered more control.

In summary, standardizing forms and the ability to simultaneously interact with them were the main topics of discussion regarding management of explicit knowledge. Project managers were split on whether or not simultaneous use of documents could be

effective. Because project managers were not familiar with wikis, all key aspects of wikis were not acknowledged.

Collecting and Storing Tacit Knowledge

Respondents were asked if they were familiar with online forums, and whether or not they have considered using online forums to enhance the collection and storage of tacit knowledge in the context of contract monitoring. All respondents (10 of 10) were familiar with online forums, but none had considered them as a method for collecting and storing tacit knowledge.

Project manager 2 (private consultant) explained that unique information is always found in projects but is never effectively shared” (Project manager 2). Based on the responses, online forums were the most effective Web 2.0 application for enhancing contract monitoring. All respondents (10 of 10) discussed potential benefits provided by online forums, and described current inefficient processes that are potentially enhanced by key aspects of online forums. The following sections discuss the results received from project managers regarding the viability of online forums in the context of contract monitoring.

Visualization of Context for On-Going Discussions

Eight of the ten respondents found email to be an inefficient method for collecting and storing specific discussions. Project manager 3 explained “Saving old email conversations is difficult because you have to save a chain of emails and jump back and forth to follow the discussion” (Project manager 3). Project manager 1 (state project

manager) continued, explaining “Online forums would be more effective than email because email doesn’t provide a threaded discussion, and it is too difficult to search email for previous discussions” (Project manager 1). A forum provides multiple threaded discussions broken into several categories for corresponding topics providing a visualization of topical on-going discussions that email cannot produce (Whittaker and Sidner 1996; Bellotti et al. 2005).

The two remaining respondents (city project managers) did find email as a sufficient method for viewing on-going discussions. Project manager 7 explained that the individual’s level of organization in email determines whether or not it will be an efficient method for visualizing the context of an on-going discussion. This respondent explained, “All email is divided up and placed into inbox folders according to topic to refer back to at a later date” (Project manager 7). However, the two respondents did find online forums as an effective tool for enhancing discussion in an informal manner.

Pre-Structured Discussion Threads Focus Information

Five respondents found online forums as a more effective method for preserving the topic of discussion than email. Project manager 8 (state project manager) explained, “Email loses focus because responses begin to include irrelevant topics” (Project manager 8). In addition, project manager 1 (state project manager) explained “Searching through older emails is too time-consuming because it was too hard to find the topic of discussion” (Project manager 1). Pre-structured threads organize comments and responses in a sequence of alternating messages in chronological order that is searchable (Wagner 2005, vi). Based on the responses, 8 of 10 project managers are aware of the potential benefits in

using threaded discussions and five respondents (state project managers) specifically discussed the ability to “search for key words” to find specific discussions.

Two respondents (city project managers) discussed the benefits of online forums, but pointed out that the impact of the application is determined by the size of the organization. Project manager 7 (city project manager) explained, “An online forum would be very effective for an organization that is not very centralized” (Project manager 7). Project manager 3 (state project manager), who worked for a larger organization, specifically discussed the use of an online forum as a “resource to search and find unique information across the entire organization” (Project manager 3).

Archived Threads Develop Organizational Memory

Developing an organizational memory, or knowledge, was discussed by seven of the ten respondents. In regards to the development of an organizational knowledge, three respondents (two city project managers and a private consultant) acknowledged that it is essential to develop an effective “lessons learned database”. Procedural knowledge, experience in unique situations, and trouble-shooting solutions are examples of information that constitute a “lessons learned” database typically addressed in closing meetings (Lientz and Rea 2001, 4). Project manager 1 (state project manager) explained that an online forum would potentially be the “first option for finding quick solutions to potential project setbacks” (Project manager 1). Forums are ideal for a “Question & Answer” (Q&A) database because they provide a quick reference search for key words saved within archived threads (Wagner 2005, vi; Desanctis et al. 2003, 574). Based on the

responses, all respondents found an online forum as an effective method for developing a “lessons learned” database.

In addition to developing an organizational memory, respondents discussed the value of having a resource for new personnel. Three respondents (two city project managers and a state project manager) discussed the benefit of using an online forum as a resource for new personnel. Project manager 9 (city project manager) explained that it is a “definite advantage to be able to have new personnel become self-sufficient” (Project manager 9). An online forum provides a method for evaluating alternatives to standard practices, and the ability to efficiently retrieve tacit knowledge (Karacapikidis, Loukis, and Dimopoulos 2005).

Based on the responses, online forums would likely be implemented to effectively collect and store tacit knowledge in the context of contract monitoring. Tacit knowledge is a valuable resource that all (10 of 10) project managers agree, should be preserved. Project manager 2 (private consultant) explained that requiring closing-discussions on completed projects in an online forum would be an effective measure to prevent the loss of tacit knowledge. Tacit knowledge is difficult for people to articulate because it only manifests itself when it comes into use (Stone 2002), and project managers are aware of the potential benefits of using online forums.

Chapter Summary

The experts interviewed for this applied research project provided feedback that described the potential barriers to the adoption of Web 2.0 applications, and insights into the viability of using Web 2.0 applications to enhance contract monitoring. The most

common barrier discussed was “security.” However, based on the responses, a lack of familiarity with Web 2.0 applications was the primary cause for the security concern. One respondent explained that Web 2.0 is an unfamiliar technology, and any new technology will always entail a “security” concern. Respondents who worked for larger organizations and were more susceptible to email overload tended to find Web 2.0 applications as viable tools, because key aspects of Web 2.0 applications were more efficient and effective than current methods used by project managers.

The final chapter summarizes the information discussed in the results chapter, and discusses the viability of using Web 2.0 applications for enhancing contract monitoring.

Table 4.1: Results Table

Interviewee	Information Dissemination – Key Responses	Collecting and Storing Explicit Knowledge – Key Responses	Collecting and Storing Tacit Knowledge – Key Responses
Project Manager 1 (State PM)	<ul style="list-style-type: none"> • Structured information • Record for comm. • More efficient than email • Security issue • Lack of familiarity issue • Daily use 	<ul style="list-style-type: none"> • No standardized format for forms • Prefers simultaneous use of a single document • Email is inefficient for collaboration • Need better method of tracking changes 	<ul style="list-style-type: none"> • Unique information is not effectively shared • More efficient than email • Prefer threaded discussions • Difficult to follow old emails • Develop an organizational knowledge • Used frequently
Project Manager 2 (Private Consultant)	<ul style="list-style-type: none"> • Structured information • Record of comm. • Visual of comm. on a network • More efficient than email • Frequent use • Security issue 	<ul style="list-style-type: none"> • Prefer single document in one location • Prefers simultaneous use of a single document • Email is inefficient for collaboration 	<ul style="list-style-type: none"> • More effective than email • Prefer threaded discussions • Used frequently • Use as a resource for future projects
Project Manager 3 (State PM)	<ul style="list-style-type: none"> • Structured information • Alleviate email overload • Use as a resource base • Security issue 	<ul style="list-style-type: none"> • SharePoint is not user-friendly • Prefers simultaneous use of a single document • Email is inefficient for collaboration 	<ul style="list-style-type: none"> • Prefer threaded discussions • Difficult to follow old emails • More effective than email • More effective to have an open environment for discussion
Project Manager 4 (State PM)	<ul style="list-style-type: none"> • Efficient for less formal information • Alleviate email overload • Use to link more resources • Frequent use 	<ul style="list-style-type: none"> • Prefers simultaneous use of a shared document • Email is inefficient for collaboration • Cannot track changes/edits 	<ul style="list-style-type: none"> • Prefer threaded discussions • Difficult to follow old emails • Used frequently • Use to develop an organizational memory
Project Manager 5 (Private Consultant)	<ul style="list-style-type: none"> • Structured information • Provide up-to-date information • Too time consuming for a PM 	<ul style="list-style-type: none"> • Does not prefer simultaneous use of a single document • Cannot track changes/edits 	<ul style="list-style-type: none"> • Prefer threaded discussions • More effective than email • Develops a “lessons learned” database • Develops organizational memory
Project Manager 6 (State PM)	<ul style="list-style-type: none"> • Structured information • Record of comm. 	<ul style="list-style-type: none"> • No standardized format for forms • Prefers simultaneous 	<ul style="list-style-type: none"> • Prefer threaded discussions • Categorized different

	<ul style="list-style-type: none"> • Alleviate email overload • More efficient than email • Use as a resource base • Security issue • Lack of familiarity issue 	<ul style="list-style-type: none"> • use of a single document • Email is inefficient for collaboration 	<ul style="list-style-type: none"> • threaded discussions • More effective than email • Difficult to follow old emails • Can be searched and used for future projects • Used to develop an organizational memory • Used frequently • Security issue
Project Manager 7 (City PM)	<ul style="list-style-type: none"> • Too time consuming for a PM • Security issue • Lack of familiarity issue 	<ul style="list-style-type: none"> • Cannot track changes/edits • Does not prefer simultaneous use of a single document 	<ul style="list-style-type: none"> • Develops a “lessons learned” database • More effective than email depending on the individual • More effective for a more decentralized organization
Project Manager 8 (State PM)	<ul style="list-style-type: none"> • Structured information • Record of comm. • Alleviate email overload • More efficient than email • Use as a resource base • Security issue • Lack of familiarity issue 	<ul style="list-style-type: none"> • Does not prefer simultaneous use of a single document • Can centralize documentation • More efficient than email for collaboration • Loose information issue 	<ul style="list-style-type: none"> • Prefers threaded discussions • More effective than email • Difficult to follow old emails • Provide open platform of discussion for entire department/organization • Develops organizational knowledge • Provides a resource to new personnel • Used frequently
Project Manager 9 (City PM)	<ul style="list-style-type: none"> • Prefers email • Does not view a blog as a business tool • Security issue • Lack of familiarity issue 	<ul style="list-style-type: none"> • Does not prefer simultaneous use of a single document • Need to track changes/edits 	<ul style="list-style-type: none"> • Provides a resource to new personnel • Prefers face-to-face comm. • Lack of familiarity issue
Project Manager 10 (City PM)	<ul style="list-style-type: none"> • Structured Information • Record of comm. • Alleviate email overload • Security issue • Lack of familiarity issue 	<ul style="list-style-type: none"> • Does not prefer simultaneous use of a single document • Need to track changes/edits • Security issue • Lack of familiarity issue 	<ul style="list-style-type: none"> • Develops a “lessons learned” database • Prefers threaded discussions • More effective than email • Provides a resource to new personnel

Table 4.1 summarizes key responses identified by their relevance to the suggested use of the Web 2.0 applications discussed in the Literature Review.

Chapter 5

Conclusion

Chapter Purpose

The purpose of this chapter is to summarize the results received from the focused interviews, and discuss the viability of using Web 2.0 applications to enhance contract monitoring. Because contract monitoring does not have a standard process, contract managers use their own discretion deciding on an effective means of monitoring contracts. Therefore, the most viable source of feedback must come from contract managers, or project managers, that are specifically responsible for contract monitoring. Project managers that provided feedback from the focused interviews represented local and state government organizations, and private consultants. This applied research project discussed three concepts of contract monitoring and asked project managers what the potential barriers were to the adoption, and if Web 2.0 applications could enhance current methods.

Overall, “security” was the main barrier identified by respondents that would prevent the adoption of Web 2.0 applications. However, based on the responses, the lack of familiarity with the Web 2.0 applications appeared to be the primary cause for the security concern. Respondents who were familiar with Web 2.0 applications discussed the potential benefits to using them in corresponding areas of contract monitoring. Blogs and online forums were the most familiar applications with all respondents (10 of 10) possessing some knowledge of the applications. Only one respondent was familiar with wikis, therefore questions focused on potential inefficiencies of SharePoint, the current organizational-wide DMS for all (10 of 10) respondents.

The following sections highlight findings from the Results chapter for each concept of contract monitoring, and discuss the viability of using Web 2.0 applications to enhance contract monitoring.

Information Dissemination

Eight respondents (8 of 10) discussed the potential benefits of blogs as a method for enhancing information dissemination in the context of contract monitoring. Respondents agreed that blogs are effective for structuring information, alleviating email overload, and linking additional resources in addition to providing a record of communication. Based on the responses, respondents from larger organizations tended to favor blogs because of the high volume of emails that are received on a daily basis. Blogs were found to be a more effective method for disseminating information while providing additional resources.

Three respondents, from larger organizations, specifically explained that email overload is a concern and information can be lost or overlooked. Project manager 8 (state project manager) explained, “It is not unusual for higher-level contract administrators to receive at least 300 emails on a daily basis” (Project manager 8) proving that email overload is a realistic epidemic. Respondents agreed that a blog’s structure not only provides a structured timeline of information, but also provides a clear record of communication that can be saved and searched. To supplement information, three respondents suggested blogs link additional resources creating a “resource-shelf” (Ojala 2005), and making information more dynamic.

Respondents, who found blogs effective, explained that the “nature of the project” would determine the frequency of the blog’s use. More complicated projects that involved

multiple contractors would increase the blog's use to several times a day, opposed to smaller projects that would be limited to daily use.

When asked what the potential barriers to using a blog for contract monitoring would be, the most common response was "security." However, project manager 1 (state project manager) explained, "Security is always going to be the first concern for all new technology changes" (Project manager 1), suggesting that the more familiar personnel were with blogs, the less the security concern. The two respondents who did not consider blogs as an effective application, showed a lack of familiarity with blogs, and viewed blogs only as a personal application for communication, such as Facebook. Project manager 9 (city project manager) commented that blogs are a personal communication application, and "cannot be used in a business context" (Project manager 9). However, corporations have led the way in the use of blogs within a business context (Ojala 2005; Grudin 2006); thus showing that project manager 9 was not fully aware of key aspects of blogs.

Eight of the ten respondents agreed that blogs are a viable Web 2.0 application, and are more likely to discuss the adoption of blogs if personnel become more familiar with the technology. Specifically speaking, respondents found blogs to be an effective concept to supplement email and potentially prevent email overload.

In addition to email, respondents discussed an organization's DMS as an effective tool for managing explicit knowledge. The next section, evaluates responses received from respondents compared to key aspects of wikis for management of explicit knowledge and collaboration.

Collecting and Storing Explicit Knowledge

Only one respondent was familiar with wikis, therefore to prompt further discussion, respondents were asked to discuss the level of efficiency and effectiveness of their current DMS. All respondents (10 of 10) identified SharePoint as the organizational-wide DMS, and the primary method for collecting and storing explicit knowledge. Key responses identified inefficiencies in SharePoint (DMS), and email that are potentially enhanced by key aspects of wikis.

Three respondents agreed that SharePoint (DMS) is ineffective for collaboration because documents in use are locked. Users check documents out of SharePoint, which locks a document from others until the current user is finished and checks the document back into the system. The respondents (state project managers) specifically explained that this SharePoint function actually causes setbacks because different departments have access to documents, locking the document for days, and preventing other users from viewing up-to-date information.

In addition to SharePoint, respondents identified email as a method used for modification of progress reports. Three respondents (two state project managers and a private consultant) specifically identified progress reports as examples of explicit information that are inefficiently created in the current process. The respondents explained that typically one staff member collects updated information from emails and combines it into a single document. However, with multiple parties responding to a single progress report, respondents explained that information could be overlooked due to an already high volume of emails. Wikis provide more effective collaboration because explicit information is found in one location for everyone to access and update simultaneously that is tracked (Wagner 2004; West and West 2009). Because this process is inefficient, five respondents

(four state project managers, and a private consultant) preferred a more interactive function from SharePoint that allows users to simultaneously work within a single document, indicating that wikis are a potential enhancement for explicit information in contract monitoring.

Based on the responses, a lack of familiarity is the primary reason why wikis have not been considered as a viable tool for contract monitoring. The one respondent familiar with wikis explained that the latest media attention associated with wikis does not provide a “positive image,” and could hamper discussions considering wikis for explicit information. However, after prompting, respondents discussed inefficiencies in SharePoint (DMS) that could be enhanced by wikis. More training and information regarding key aspects of wikis could increase awareness and open discussion for wikis as a viable alternative to an organization’s DMS.

The final section discusses online forums, which respondents were familiar with, and did find them as a viable Web 2.0 application that could enhance the management of tacit knowledge.

Collecting and Storing Tacit Knowledge

Respondents discussed unique information from projects that is not commonly shared among departments. Respondents agreed that online forums are a viable application for sharing this unique information, which represented tacit knowledge. All respondents (10 of 10) agreed that online forums are an effective method of collecting and storing tacit knowledge.

Email was the most common resource typically used for storing tacit knowledge. Respondents explained that email discussions typically, as a personal preference, are saved in filing folders found in the email inbox. SharePoint (DMS) was also identified as another method for saving important discussions that occurred through email. However, respondents (8 of 10) did not find email or SharePoint (DMS) effective because it is difficult to search and follow the context of the discussion. Online forums provide threaded discussions that provide a visualization of on-going discussions that can be archived and searched for future use more effectively than email or SharePoint (DMS), and 8 of the 10 respondents discussed this potential benefit.

When comparing responses, respondents from smaller organizations tended to see less of an impact from online forums than a larger organization would experience. One respondent (city project manager) believed an online forum would be ideal for a more decentralized organization that has multiple divisions spread apart. Based on responses, respondents from larger organizations agreed, specifically identifying a more effective process of contract monitoring for the smaller divisions of their organization because it provides a “resource to search and find unique solutions to project issues that have occurred throughout the entire organization that are relevant to a division’s current situation” (Project manager 3). As a result, seven respondents agreed that online forums are effective method for developing an organizational memory, or knowledge.

Three respondents (two city project managers and state project manager) were more specific, explaining that online forums are an effective resource for new personnel. Respondents agreed that online forums provided new personnel with a resource to find potential answers without having to ask for assistance. Project manager 9 (city project

manager) explained that the ability for new personnel with less experience to become “self-sufficient is a definite advantage to the organization” (Project manager 9).

Based on the responses, online forums are more likely to be considered for enhancing contract monitoring because all ten respondents found them effective for managing tacit knowledge. Respondents explained that tacit knowledge is lost due to email’s inability to effectively be searched, and the inability to provide a clear visualization of the context of the discussion. As a result, 10 of 10 respondents agreed that online forums are a viable and effective Web 2.0 application to enhance contract monitoring.

Policy Recommendations

This study is a generalized view of the potential enhancement of contract monitoring with the use of Web 2.0 applications. The implementation of Web 2.0 applications must be determined on a case-by-case basis. However, the advantages of this study is provided by the direct feedback from professional project managers in the field of contract monitoring regarding the viability of using Web 2.0 applications for enhancing the contract monitoring process.

The most viable Web 2.0 application for contract monitoring is an online forum. Based on the responses, all project managers (10 of 10) agreed that online forums were an effective method for collecting and storing tacit knowledge. Compared to blogs and wikis, project managers were more familiar with online forums lessening the barrier of a lack of information and familiarity. Because they were more familiar perhaps they were also less concerned with security.

Wikis were the least familiar Web 2.0 application. However, after prompting, project managers identified inefficiencies in SharePoint (DMS) that could be enhanced by key aspects of wikis. Project managers, once made aware of key aspects of wikis, became more enthusiastic about its potential usage because SharePoint did not provide more interactive opportunities for multiple users. Increased awareness provided by more training and information could increase familiarity with wikis, highlighting all key aspects that could increase effectiveness and efficiency of explicit knowledge.

As noted above, security is a major barrier to adoption of Web 2.0 tools. The issue of security was mentioned by 8 of 10 respondents as a reason why they would not use blogs. However, according to the literature, and linking the advantages of blogs to the tasks of project managers, blogs are more likely to work as an effective supplemental tool to email. Training over all aspects of blogs could increase familiarity and decrease the security concern. In return, blogs could prevent interleaving caused by email overload decreasing the risks of miscommunication, and provide a more effective record of communication.

In today's economy, increasing infrastructures to implement more advanced software, or a more advanced DMS is no longer a cost-effective solution. Web 2.0 applications provided more efficient and effective methods to contract monitoring, that do not require a change in an organization's IT infrastructure. For the most part, project managers agreed that Web 2.0 applications are a viable method for enhancing contract monitoring. To potentially address a possible transition into the use of Web 2.0 applications, organizations would have to consider training to increase the level of familiarity. Increasing personnel's familiarity with Web 2.0 applications could decrease the security concern, and increase the likelihood of adoption to enhance contract monitoring.

References

- Anderson, Paul. 2007. What is Web 2.0? Ideas, technologies and implications for education. *JISC Technology and Standards Watch*, February. <http://www.jisc.ac.uk/>.
- Asllani, Arben, Lawrence P. Etkin, and Ashvini Somasundar. 2008. Sharing Knowledge with Conversational Technologies: Web logs versus Discussion Forums. *International Journal of Information Technology and Management* 7(2): 217-229.
- Babbie, Earl. *The Practice of Social Research*, 9th Ed. Belmont, CA: Wadsworth Publishing/Thomson Learning, Inc., 2001.
- Bellotti, Victoria, Nicolas Ducheneaut, Mark Howard, Ian Smith, and Rebecca E. Grinter. 2005. *Human-Computer Interaction* 20: 89-138.
- Bernal, Joey. *Web 2.0 and Social Networking for the Enterprise: Guidelines and Examples for Implementation and Management within Your Organization*, Upper Saddle River, NJ: IBM Press, 2010.
- Briggs, Christian. "Web 2.0 Business Models as Decentralized Value Creation Systems." In *Web 2.0: The Business Model*, edited by Miltiadis D. Lytras, Ernesto Damiani, and Patricia Ordóñez de Pablos, 37-52. New York: Springer US, 2009.
- Brooks, Darren C. and Allan Jeong. 2006. Effects of Pre-structuring Discussion Threads on Group Interaction and Group Performance in Computer-supportive Collaborative Argumentation. *Distance Education* 27(3): 371-390.
- Brown, Trevor L. and Matthew Potoski. 2003. Contract-Management Capacity in Municipal and County Governments. *Public Administration Review* 63(2): 153-164.

- Chu, Samuel Kai-Wah. 2008. TWiki for Knowledge Building and Management. *Online Information Review* 32(6): 745-758.
- Desanctis, Geradine, Anne-Laure Fayard, Michael Roach, and Lu Jiang. 2003. Learning in Online Forums. *European Management Journal* 21(5): 565-577.
- Dovalina, Jessica, "Assessing the Ethical Issues Found in the Contracting Out Process" (2006). *Applied Research Projects, Texas State University-San Marcos*. Paper 108. <http://ecommons.txstate.edu/arp/108>
- Dow, William and Bruce Taylor. 2008. *Project Management Communications Bible*. Hoboken, NJ: Wiley Publishing, 2008.
- Elgort, Irina, Alastair G. Smith, and Janet Toland. 2008. Is Wiki an Effective Platform for Group Course Work?. *Australasian Journal of Educational Technology* 24(2): 195-210.
- Fiedler, Marina and Isabell Welp. 2010. How Do Organizations Remember? The Influence of Organizational Structure on Organizational Memory. *Organization Studies* 31(4): 381-407.
- Gilliam, Krystal. 2010. A Model Cultural Competency Handbook for Health Care Professionals: Creating an Ideal Handbook to Reduce Disparities. *Applied Research Projects, Texas State University*. Paper 323. <http://ecommons.txstate.edu/arp/323>
- Harris, Tiffani. 2008. Project Management: A Strategic Tool to Improve Contract Administration and Management of GSA Multiple Award Scheduled Contracts. *Journal of Contract Management* 111-117.

- Hyväri, Irja. 2006. Success of Projects in Different Organizational Conditions. *Project Management Journal* 37(4): 31-40.
- Holz, Shel and Ted Demopoulos. *Blogging for Business: Everything You Need to Know and Why You Should Care*. Chicago: Kaplan Publishing, 2006.
- Johnston, Paul, Russell Craig, Martin Stewart-Weeks, and Joan McCalla. "Realizing the Potential of the Connected Republic: Web 2.0 Opportunities in the Public Sector." *Cisco Internet Business Solutions Group (IBSG)*, March 2009. Accessed November 7, 2010.
http://www.cisco.com/web/AT/assets/docs/presse/Government20_pjv2_031209_FINAL.pdf
- Karacapilidis, Nikos, Euripides, and Stavros Dimopoulos. 2005. Computer-supported G2G Collaboration for Public Policy and Decision-making. *The Journal of Enterprise Information Management* 18(5): 602-624.
- Kern, Bill. 2001. Relief from Out-of-Control Projects. *Contract Management* 41(9): 32-37.
- Khan, Asadullah. 2006. Project Scope Management. *Cost Engineering* 48(6): 12-16.
- Krappé, Kirk and Gopi Kallayil. 2003. Contract Management is More Out of Control Than You Think. *Journal of Contract Management*, 1, 3-8 (<http://www.ncmahq.org/>).
- Kussmaul, Clif and Roger Jack. "Wikis for Knowledge Management: Business Cases, Best Practices, Promises and Pitfalls." In *Web 2.0: The Business Model*, edited by Miltiadis D. Lytras, Ernesto Damiani, and Patricia Ordóñez de Pablos, 147-165. New York: Springer US, 2009.

- Leblanc, A., Abel, M.-H. 2007. "Using Organizational Memory and Forum in an Organizational Learning Context." In *Proceedings of IEEE/ACM ICDIM '07, The Second International Conference on Digital Information Management, 2007*, 266-271.
- Leuf, Bo and Ward Cunningham. *The Wiki Way: Quick Collaboration on the Web*. Boston, MA: Addison-Wesley, 2001.
- Lientz, Bennet P. and Kathryn P. Rea. *Breakthrough Technology Project Management*. San Diego, CA: Academic Press, 2001.
- Mader, Stewart. *Wikipatterns: A Practical Guide to Improving Productivity and Collaboration in your Organization*. Indianapolis, IN: Wiley Publishing, Inc., 2008.
- McNamara, Judith and Catherine Brown. 2009. Assessment of Online Discussion in Work-integrated Learning. *Campus-Wide Information Systems* 26(5): 413-423.
- Maitra, Susan. 2007. Intellipedia: 21st – Century Intelligence-Sharing?. *Foreign Service Journal*. January 2007: 9.
- O'Leary, Daniel E. 2008. Wikis: 'From Each According to His Knowledge'. *Computer* 41(2): 34-41.
- O'Reilly, Tim. 2007. What is Web 2.0: Design Patterns and Business Models for the Next Generation of Software. *Communications & Strategies* 65(1st quarter): 17-37.
- Ojala, Marydee. 2005. Blogging. *Business Information Review* 22(4): 269-276.
- Osimo, David. 2008. Web 2.0 in Government: Why and How?. *JRC Scientific and Technical Reports*, <http://ftp.jrc.es/EURdoc/JRC45269.pdf>.

- Paquet, Sébastien. "Wikis in Business." In *Wikis: Tools for Information Work and Collaboration*, edited by Jane Klobas, 99-117. Oxford England: Chandos Publishing, 2006.
- Prager, Jonas. 1994. Contracting Out Government Services: Lessons from the Private Sector. *Public Administration Review* 54(2): 176-184.
- Razmerita, Liana, Kathrin Kirchner, and Frantisek Sudzina. 2009. Personal Knowledge Management: The Role of Web 2.0 Tools for Managing Knowledge at Individual and Organizational Levels. *Online Information Review* 33(6): 1021-1039.
- Rehfuss, John. 1990. Contracting Out and Accountability in State and Local Governments: The Importance of Contract Monitoring. *State and Local Government Review* 22(1): 44-48.
- Sauers, Michael P. *Bloggging and RSS: a librarian's guide*. Medford, N.J: Information Today, 2006.
- Scoble, Robert and Shel Israel. *Naked Conversations: How Blogs are Changing the Way Businesses Talk with Customers*. Hoboken, N.J: John Wiley & Sons, Inc., 2006.
- Shields, Patricia. 1988. Less is Less: Fiscal Issues in Human Services. *Public Administration Quarterly* 12(1): 61-91.
- State of Georgia Performance Audit Operations Division. 2003. *Components of an Effective Contract Monitoring System*. Atlanta, GA: Russell W. Hinton.
- Stauffer, Todd. *Blog on: The Essential Guide to Building Dynamic Weblogs*. Berkeley, CA: McGraw-Hill/Osborne, 2002.

- Stocker, Alexander and Klaus Tochtermann. 2008. "Investigating Weblogs in Small and Medium Enterprises: An Exploratory Case Study." In *11th Conference on Business Information Systems: Social Aspects of the Web (SAW 2008)*, 2008, 95-107.
- Stone, Biz. *Blogging: genius strategies for instant Web content*. Indianapolis, Ind.: New Riders Publishing, 2002.
- Texas Department of Transportation. 2010. *Consultant Management and Administration Class Manual (DES615) August 2010*.
- Wagner, Christian. 2004. Wiki: A Technology for Conversational Knowledge Management and Group Collaboration. *Communications of the Association for Information Systems* 13: 265-289.
- Wagner, Christian and Narasimha Bolloju. 2005. Supporting Knowledge Management in Organizations with Conversational Technologies: Discussion Forums, Weblogs, and Wikis. *Journal of Database Management* 16(2): i-viii.
- Wagner, Christian. 2006. Breaking the Knowledge Acquisition Bottleneck Through Conversational Knowledge Management. *Information Resources Management Journal* 19(1): 70-83.
- West, James A. and Margaret L. West. *Usring Wikis for Online Collaboration: The Power of the Read-Write Web*. San Francisco, CA: Jossey-Bass, 2009.
- Whittaker, S. & Sidner, C. 1996. "E-mail overload: exploring personal information management of e-mail." In *Proceedings of the ACM SIGCHI conference on Human factors in computing systems, 1996*, 276-283.

Winsor, D.A. 1988. Communication Failures Contributing to the Challenger Accident: An Example for Technical Communicators. *IEEE Transactions on Professional Communication* 31(3): 101-107.

ZhouWei, Lv Jiake and Wang Xuan. 2010. "Design and Evaluation of a Wiki-based Collaborative Learning Environment for Colleges Computers Compulsory Education." In *5th International Conference on Computer Science & Education, 2010*, 695-699.