Addressing the challenges of e-Government: learning from the IT industry

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Abstract
Purpose – This study aims to identify the challenges in current government organizations while providing services that require a collaborative effort. It also identifies the ways through which government organizations can address the collaboration challenges in ways such as those adopted by leading information technology organizations. Finally, this research also aims to identify the obstacles in government organizations, which could prevent them from successfully adopting new technologies.

Design/methodology/approach – The research was conducted in three phases. In the first phase, a case study was conducted on a government organization identifying the challenges in delivering services that require collaboration among different stakeholders. In the second phase, multiple case studies were performed on three leading organizations who have successfully implemented the Web 2.0 technologies to address collaboration challenges while providing efficient service deliveries. In the third phase of the research, a case study was conducted on a government organization to identify the obstacles faced while implementing the identified solution(s).

Findings – Identification of existing problems while providing efficient service deliveries was possible using a case study approach. This research also finds that Web 2.0-based knowledge management tools can be very effective in addressing the existing challenges in the current state of e-Government. Finally, the research also finds that realization by the upper management, technology adoption cost, adoption of new work paradigm and time to create an effective repository are some of the major obstacles faced by the government organization while trying to adopt the proposed solution.

Originality/value – To the best of the authors’ knowledge, this research is the first to conduct rigorous case studies on three different leading information technology organizations simultaneously to address a challenge in the current state of e-Government. This research also provides implications for practitioners as, based on the findings, they can implement the Web 2.0 technologies to address challenges in government organizations while providing efficient service deliveries. Furthermore, the research provides implications for further research to analyze the performance of the government organizations after they adopt these technologies.

Keywords E-Government, Efficient service delivery, Web 2.0 collaboration

Paper type Research paper

Introduction
The concept of e-Government evolved from the domain of e-business where organizations have to collaborate electronically through internet and related technologies with customers, suppliers and other partner organizations for effective delivery of services. The implementation of e-Government could imply different objectives and different levels of transformation. Most countries frequently adopt and implement e-Government worldwide to improve service delivery to their citizens...
Regardless of the primary goal, the effective delivery of e-services requires integration of process and information systems (IS) and coordination of processes between disparate organizations and stakeholders. Historically, bureaucracies associated within government organizations prevented them from delivering effective services (Haitham, 2014; Wilson, 1989). Even after the emergence of e-Government, most bureaucratic processes still involve significant manual work and have redundant checkpoints (Nath and Kanjilal, 2014). When the stakeholders in a process work as separate entities, each managing or dealing with disconnected silos of knowledge and information, it becomes difficult to render efficient delivery of services. Hence, the first step toward efficient delivery of services is to facilitate a transparent networked environment where governments can truly partner with other government organizations, businesses, citizens and additional stakeholders (Husin et al., 2016; Haitham, 2014; Fan, 2013; GAO (USA General Accounting Office), 2003). However, because of political, organizational and technical reasons, there exist challenges in creating such a transparent, collaborative environment in a government organization. In our research, we intend to identify such challenges. Consequently, our first research question is:

**RQ1.** What are the challenges in the current government organizations in providing services, which require collaborative effort?

Collaborative, transparent environment is a challenge for business organizations as well (Nath et al., 2009). Information technology (IT) industry leaders have successfully implemented different collaborative technology such as Web 2.0-based tools to address these challenges (Nath, 2012). While Web 2.0 has gained widespread popularity at the consumer level, it is still not well-understood how Web 2.0 can be effectively used for knowledge management (KM) by enterprises. Innovation diffusion theory (Rogers, 1995) suggests identifying and understanding the uses by “early adopter” of a new technology can help “late majority”, organizations to adopt that technology efficiently. Relying on the innovation diffusion theory, we believe that the late majority government organizations can learn from the early adopters leading IT organizations the best ways to effectively adopt and use Web 2.0 for KM to make their collaboration efforts more effective and deliver better e-services to the citizens.

However, in the existing literature, there is lack of clear understanding of how to effectively use Web 2.0 for KM. To address the shortcoming of understanding of Web 2.0 for KM at organizational level, we propose our second research question:

**RQ2.** How are the leading IT organizations using Web 2.0 tools for effective collaboration within the organization?

Because of the presence of internal obstacles in mostly bureaucratic government organizations, adopting a new technology and/or tool in a government organization is not easy (Janita and Chong, 2013; Robey et al., 2013). In our research, we intend to identify these obstacles. This leads us to our third research question:

**RQ3.** What are the obstacles of adopting new technology tool for collaboration in e-Government?

Our research, guided by the three research questions, essentially has three major phases. In the first phase, we identify the existing challenges faced by current government organizations while providing services that require collaborative effort. Consequently, we conduct a case study on a government organization and a service that they provide. On the
basis of a preliminary conversation with the Chief Information Officer (CIO) of the City of
Winston–Salem, we chose to examine a government service-development approval. This is a
typical e-Government process in which different stakeholders (builders/developers,
gineers, approval agencies, etc.) are involved. Using a case study approach, we identify
the existing problems in the Development Permitting and Approval Process (DPAP)—a
popular government service where a transparent collaboration between different
stakeholders is necessary.

In DPAP, depending on the project and its scope, a developer has to interact with the
different government organizations in the different phases of the planning process (Ohio
State Development and Approval Process Report). These interactions and their
implications are almost always not mutually exclusive. Hence, a particular plan has to go
back and forth between different levels and departments of the government more than
once before it gets approved by all and finally returned to the developer. However, even
with all the suggested modifications, the approved plan is often not a feasible one for the
developer. In such a scenario, the entire plan approval process needs to be redone. A
transparent collaborative process that can facilitate active simultaneous access of all the
stakeholders to the current state of the proposed plan can significantly enhance the
effectiveness of an e-Government’s service such as DPAP. Web 2.0-based collaboration
tools such as the Wiki are used by the IT industry leaders to facilitate transparent
collaboration (Nath, 2012).

In the second phase of our research, we conduct exploratory case study on three leading
IT organizations to identify and understand the uses of Web 2.0 for KM at different levels in
those organizations.

In the third and final phase of our research, we conduct another case study on the
government organization we studied during the first phase. In this phase of the research, we
study the organization to identify obstacles in the implementation of collaboration tool(s),
which we had identified in phase 2.

Figure 1 presents an overview of our research approach.

Despite the increasing popularity of the e-Government services, many challenges and
bottlenecks still exist, which prevent e-Government to be as effective as possible. In our
research, we identify these obstacles as well as possible solutions. We believe our research is
the first to conduct case studies on leading IT organizations to address a challenge in
current state of e-Government. We believe the findings of our research add an interesting
layer in the current e-Government literature through its unique approach of addressing
e-Government challenges using industry-based solutions. We believe that our findings will

![Research approach diagram]

Figure 1. Research approach
help government organizations to address the existing challenges and implement new tool(s) and/or technology(s) successfully.

Literature review
In the current net-enabled world, citizens and stakeholders expect governments to deliver services more efficiently and effectively. However, the public services form the governmental backbone often take a conservative approach while adopting the latest internet-based technologies and to accelerate the delivery of government services (Stephen, 2004). These government organizations collect, manage and store large volumes of data on different areas such as health records, traffic records and crime statistics. If managed properly, the information stored in numerous systems, can provide a powerful tool for decision-makers (Weerakkody et al., 2006). However, internal fragmentation that exists currently between institutional levels, agencies, departments, often referred to as the silo effect, can reduce the efficiency and effectiveness of government actions. In recent years, disasters such as 9-11 and the Katrina Hurricane exposed how lack of collaboration between separate government agencies can make the government less effective. Hence, promoting more collaboration across agencies has been one of the key objectives of government modernization (Osimo and Centeno, 2007).

Shrage (1990) defines collaboration as “the process of shared creation: two or more individuals with complementary skills interacting to create a shared understanding that none had previously possessed or could have come to on their own”. The practitioners’ literature has been consistently highlighting the importance of improved collaboration in e-Government services (Sivarajah et al., 2014; Andrulis and Hirning, 2002; Stephen, 2004), and the same is true for the academic literature (Haitham, 2014; Weerakkody et al., 2006; Chen, 2003). Most of the practitioners’ literature promoted a particular set of technology to improve collaboration in the e-Government agencies. For example, Levy et al. (2014) studied how a small town in Pennsylvania used Web 2.0-based technology such as Facebook and Twitter to remain connected with the city residents as well as their different departments. This city under study is using Web 2.0 mostly for notification purposes. Haitham (2014) suggested using the electronic document management system (EDMS) to provide effective services to the citizens. Khan et al. (2014) studied the impact of using “Twitter” to connect their citizens and found that the use of Twitter is more effective at Government-to-Government (G2G) level in comparison to the Government-to-citizen (G2C) level. Sivarajah et al. (2014) identified the opportunities of using Web 2.0-based tools in government organizations and their potential implications. Husin et al. (2016) studied the use of Web 2.0 among the government organization in Australia. Ivanus and Iovan (2014) proposed cloud-based service delivery, also known as G Cloud. The concept of G Cloud has already been introduced in European countries. Andrulis and Hirning (2002) have suggested adopting Web 2.0 technology to improve collaboration among the government and citizens. Academic literature identifies the importance of improved collaboration between e-Government agency and citizens as well as between different e-Government agencies without relying on any particular technology. For example, Weerakkody et al. (2006) have identified the importance of collaboration at different levels in an e-Government service – Student Loan Application Process. In general, the existing literature suggests that while many of the current e-Government services can be streamlined using proper IT, the effort is largely limited by the available resources (Gant and Gant, 2001) and existing work practice of the involved parties (Madzova et al., 2013; Fan, 2013; Heeks, 2000).
Phase 1: identifying the existing challenges of service delivery in government organizations

Research approach and data collection

Qualitative data were collected for our case study, and the principal method of our data collection was semi-structured interview.

In a case study, case selection is a critical aspect for generalizing the findings (Eisenhardt, 1989). As per the recommendations by Yin (2003), our case selection is based on two factors – theoretical background and feasibility.

The first factor includes theoretical relevance. In the first phase, we wanted to study the existing challenges of service delivery in government organizations that requires collaboration among different departments in a government organization. Hence, we selected a government organization that delivers service(s) to the citizens that requires inter-department collaboration. Within that organization, we specifically chose a service, the Development Permitting and Approval Process (DPAP), which fulfills our requirements so that we can study the existing obstacles.

The second factor, feasibility, depends on an organization’s willingness to participate in the study and to provide the required information. In our research, the government organization we selected had to be willing to provide us the necessary information and share their experience.

However, in the selection process of the interviewees, we depended on the chief executives officer of the organization. He selected the representatives from different departments based on who he thought would be the most knowledge about the selected service.

In focus group interviews, representatives from the following departments of Winston-Salem City office were present:

- planning;
- inspection;
- information systems;
- engineering;
- utility; and
- small business liaison.

The CIO of the city office also participated in the focus group interview. There were two sessions. The first one is to get an overall picture of the process with more open-ended questions. This session was about an hour-and-half long. The second session was with more specific questions based on our findings of the first session of interviews. This session lasted for two hours. In each session, one representative from each department participated.

We have also used the internal documents related to DPAP of these departments as our secondary data source. A couple of previous research efforts on DPAP also served as our secondary data source. To ensure consistency and reliability, a structured interview guide was used for all the interviews. The interview guide included several open format questions. These questions were distributed among the participants of the focus group interview at least 24 h before the interview session. This ensured that the participants had enough time to prepare for the interview. The interviews were combined with observation and a review of council documentation, which allowed the researchers to verify and validate the findings through triangulation (Yin, 2003).

A salient feature of our study is the overlap of data analysis and data collection. We accomplish this desired overlap through field notes. Field notes are an ongoing
stream-of-consciousness commentary about what is happening in the research, involving both observation and analysis – preferably separated from one another (Van Maanen, 1988). As interviewers, we transcribed the impressions we gathered during the interview. As it is difficult to determine what will be useful in the future, we took notes on everything that seemed to be important at the time of the interview. We then used these notes and ideas for cross-case comparisons, intuition about relationships, anecdotes and informal observations. Overlapping data analysis with data collection was important because it gave us the ability to have an early start on analysis (Harris and Sutton, 1986). This overlap also allowed us to take advantage of a flexible data collection method. In general, this flexibility provides researchers with the freedom to make adjustments during the data collection process. For example, we made adjustments in the form of adding cases to investigate a particular interesting aspect, modification of data collection instruments, such as the addition of questions to an interview protocol or questions to a questionnaire.

Overall, we followed the guidelines provided by Lee (1989), Yin (2003) and Sarker and Lee (2002) to achieve rigor in our case study. Table I presents the study.

Table I. Steps followed to achieve rigor of the study as per qualitative case-research criteria

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<td>Construct validity</td>
<td>Use of multiple sources of evidence</td>
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<td>Internal validity</td>
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construction within the city of Winston–Salem and Forsyth County excluding the town of Kernersville.

- **Engineering:** The Engineering Division designs and constructs water and sewer projects, streets and sidewalks, buildings and other capital improvements. Reviews and inspects privately constructed street and utility projects to ensure compliance with city standards and provide information and guidance to private developers.

- **Utilities:** The Winston–Salem/Forsyth County Utilities Division’s primary responsibility is to collect, treat and distribute water, waste water and solid waste.

**Overview of the development permitting and approval process.** The majority of property developers, most architects and a significant number of private home owners apply for municipal approval of development proposals. This can be in the form of a simple building plan, application or via the more delicate procedure of changing land use rights by means of consent or rezoning to facilitate the redevelopment of a parcel of land. In our case study, we found that rezoning is one of the most complicated processes and involves the participation of majority of the departments. Most of the other DPAPs are subtasks of the rezoning process; hence, they are less complicated. Therefore, we chose rezoning as the representative of a DPAP.

In cases where the use of a proposed building development differs from that which is permitted on a particular piece of land in terms of the applicable town planning scheme, an application has to be made to the local authority for a change in the uses applicable to the stand. Hence, the popular term “rezoning”. The correct term for “rezoning” is an “amendment scheme” because the applicable town planning scheme is amended to permit a different set of uses and conditions on the specific terms in question. This can be a lengthy process involving advertising of the intention to rezone, an opportunity for objections to be submitted to the local authority by interested and affected parties, the circulation of the application by the local authority to a number of other departments and government bodies for comment, the preparation of an environmental impact assessment report in accordance with environmental legislation and the calculation of development contributions.

A rezoning application is also required in cases where, although the use of the property remains the same, a change in conditions such as the height restriction, the coverage allowed, the density zoning or the permitted floor area ratio are necessitated by the proposed new building development. Rezoning applications are subject to a formal hearing when there are objections by interested parties, and the final decision can be subject to an appeal to a higher authority (such as the Townships Board).

A research effort by a team from the University of North Carolina at Chappell Hill has drawn an upper level representation of the rezoning part of DPAP. This is represented in Figure 2.

However, it has been drawn from such a high level that it fails to capture the complexity of the overall process. Hence, we have developed another diagram based on the collected data that has more details of the rezoning part of DPAP. This is presented in Figure 3.

Once we had an understanding of the existing DPAP through our case study, we identified the existing problems in the current process as answers to RQ1. They are as follows:

**Unwarranted amount of tacit knowledge within each department.** One of the major problems in the DPAP is that there are many conditions based on which a decision is taken around what process a particular application has to go through. An overwhelming number of parties are involved in a DPAP and their involvement (or not involvement), and the respective role is decided based on different conditions of each application. Therefore, if
someone asks a simple question such as, “What do I need to do to get this approval”, most times, the answer is “It depends”. There is a huge amount of tacit knowledge within each department and the overall organization. For example, a representative at the city office mentioned regarding the flow of the application processing:

It depends where an application will go – say if it is business and you are just rezoning then it would not come to utilities. And it also depends on what level it is.

But clearly, there is a lack of understanding of the overall process among all the involved departments and the people working in different aspects of the approval process, let alone that among the citizens who are applying for approval.

*Inter departmental non-transparency.* In the DPAP, several departments are involved, including but not limited to planning, inspection, utility and engineering. The involvement of the department(s) is decided depending upon the location of the piece of land, the type of

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**Figure 2.**
Upper level view of rezoning DPAP

**Figure 3.**
Rezoning DPAP with more details

**Source:** IOG Benchmarking Report (2008)
construction and other factors. A development plan has to be approved by all the involved parties to get the final approval for a development plan. Therefore, whenever an application for approval is submitted, multiple copies of the applications are made or provided by the applicant. These copies are distributed to the different departments, in some cases multiple copies to the same department as multiple persons within the same department are involved in the approval process. The problem arises from the fact that all these departments and people working on the approval process work in silos. These people and departments hardly ever exchange any information till the time of the designated meeting. As a result, a situation can and does arise where the modifications suggested by one department does not comply with the requirements of another department(s). Therefore, all the suggested modifications need to be revised again till a consensus is reached. However, such consensus becomes hard to attain because of the lack of collaboration and transparency among different departments. As described by a representative from the Inspection department:

There is a comment sheet that is sent electronically to the various departments, or reviewers. They put their reviews on the sheet and email it back. A person in the planning department then compiles everything into a master sheet and followed by a meeting after 2-3 weeks. The representative from each department and the applicant attend the meeting and they sit around the table. Each discusses the problem they have with the plan and how the plan needs to be changed. The petitioner gets the information, changes the plan and resubmits it.

Lack of transparency between citizens and city office. Lack of transparency that exists within the organization extends to the citizens as well. Owing to the aforementioned “It depends” and “transparency” problem, it becomes very difficult for an applicant to know what he actually needs to do and/or submit for his application. There are some basic guidelines and requirements that are available for the applicants in a checklist format. However, there are many exceptional cases and submission requirements that are not covered in the checklist provided by the city office. Surprisingly, the city office depends on the fact that the applicant is a professional developer and that he will be knowledgeable about the additional requirements from previous experience. Because of the lack of collaboration and transparency embedded in the whole process, it becomes difficult for both the city officials and the applicants to estimate the length of time for completion of a particular approval process.

Redundancy and inconsistency in the e-Government process and required information. DPAP is made up of different departments in the city office, and sometimes, more than one party from the same department is involved in the process. Therefore, it requires the application (including the plan) submitted by the applicant to be distributed among all the involved entities. All the involved departments work in such silos that the same set of data on an application is entered in several systems. Thus, the departments and the reviewers work on the data on their legacy systems instead of using any single standardized system, where it is visible to all the involved parties. There are situations when the same data on a single project have been entered in as many as 16 different systems. As described by a representative from the planning department, the process is as “non-electric” as it can be and “There are multiple points of data entry”. Table II presents the identified challenges.

Phase 2: looking for possible solution in leading information technology organizations
In this phase of the research, we study IT organizations that are early adopters of Web 2.0 for KM, and address several issues related to effective collaboration.
Selection of cases

Case selection is a critical aspect of conducting a case study. Not only does the population define the set of entities from which the research sample is to be drawn, the selection of an appropriate population also controls extraneous variation and helps define the limits for generalizing the findings (Eisenhardt, 1989). According to the recommendations by Glaser and Strauss (1967), Yin (2003), George and McKeown (1985) and Eisenhardt (1989), we based the case selection for our study on two factors – theoretical background and feasibility.

The first factor includes theoretical relevance, purpose, similarities and differences across data sources with regard to the data sources’ appropriateness for the study. In our case, we want to study uses and effects of Web 2.0-based KM at individual, project, group and organization levels. Hence, we selected three organizations that have been using Web 2.0 for KM at different levels for a sufficient length of time (in this case more than four years) to identify and understand the effects of Web 2.0-based KM. All three organizations are leading firms in their respective fields in the IT industry, and have branches and/or offices in many countries. However, they are different in terms of the type of business they conduct within the IT industry. Organization I is mainly involved with IT services, Organization B manufactures and sells computer hardware and software with a focus on the latter and Organization C concentrates on networking and communications technology and services. For groups, we selected different functional units such as research, design and testing groups. Similarly, for projects, we selected projects that have different goals and team
formation. For example, in our selected project teams, we have teams that only consist of people working in that organization as well as teams whose members are from different organizations (e.g. offshore vendor).

The second factor, feasibility, was largely determined by each organization’s willingness to participate in the study and to provide the required information. In our research, the organizations we selected had to be willing to provide us the necessary information and share their experience so that we could study the uses and effects of Web 2.0 for KM.

**Brief description of the selected organizations**

Organization I is an IT services company headquartered in India. It is one of the largest IT companies in India with more than 100,000 professionals. The company has offices in 22 countries and development centers in India, China, Australia, UK, Canada and Japan. In 2009, Organization I was identified as one of the best performing and most innovative companies in the software and services sector in the world by Forbes and Business Week. Organization I has a strong focus on KM and has won several prestigious awards for its organization-wide KM efforts. It has been using Web 2.0 for KM for approximately five years.

Organization B is a multinational computer, technology and IT consulting corporation. Organization B is one of the Fortune 100 companies. The company is one of the few IT companies with a continuous history of being recognized as a leading IT company, dating back to the 19th century. Organization B manufactures and sells computer hardware and software, and offers infrastructure, hosting and consulting services in areas ranging from mainframe computers to nanotechnology. The company has more than 400,000 employees worldwide, with sales exceeding 100 billion US dollars. The employees are scientists, engineers, consultants and sales professionals in over 170 countries. Organization B has been using Web 2.0 for KM since 2003-2004.

Organization C is an American multinational corporation that designs and sells consumer electronics, and networking and communications technology and services. Organization C has been identified as one of the Fortune 100 companies. Organization C has more than 70,000 employees and annual revenue of more than $36bn. It has more than 190 branches worldwide and has been using Web 2.0 for KM for approximately five years.

**Data collection and analysis**

Our principal data collection method was semi-structured interviews. We interviewed six managerial level professionals from the selected organizations. All interviewees had experiences using Web 2.0 for KM at different levels. Therefore, they were in a position to describe how Web 2.0 is used for KM at group, project and individual levels in their respective organizations and their experience using it at these levels. Each interview had an average duration of 45 to 60 min. We interviewed one person from Organization C twice as he had a significant amount of information to share and it was not possible to gather all the information in one interview. Later on, we also conducted several short interviews with these interviewees to clarify some aspects of their responses during the first round of interview. We recorded all of these interviews whenever possible and transcribed all sessions before starting the data analysis. To enhance the validity of the answers, whenever possible, we verified summaries of the major findings with the interviewee after the interview session. Furthermore, to ensure consistency and reliability, we used a structured interview guide for all the interviews. The interview guide includes several open format questions based on our research framework and the identified effects of KM at different levels from the existing literature. However, to allow the participants flexibility in their
responses, we used open-ended questions. We also included questions on organizational and interviewee demographics to obtain a more complete understanding of the firms and individuals interviewed.

As a second data source, wherever possible, we also investigated the Web 2.0 technologies (e.g. blogs, Wikis and social networking platforms) that the organizations use for KM. Existing literature suggests that it is preferable to have multiple investigators in such case studies. Hence, wherever possible, we made sure that at least two researchers were present for the interviews.

Like the first phase, a significant characteristic of our exploratory research is the overlap of data analysis and collection and we achieve this through field notes. Overall, we followed the same guidelines we followed in Phase 1, which was provided by Lee (1989), Yin (2003) and Sarker and Lee (2002) to achieve rigor in our case study.

Possible Web 2.0-based solution identified in leading information technology organizations

On the basis of the case study conducted on three organizations that have been using Web 2.0 technology successfully, we have identified three Web 2.0 technology in particular (Wiki, blog and RSS feeds), which can be used in DPAP to resolve the problems identified in the current approach.

Wiki. A Wiki is a server program that allows users to collaboratively develop content based on the principle of collaborative trust and contribution. Using Wikis, a user, with sufficient privilege, can use a regular Web browser to edit the content of the site including other users’ contributions. Visitors can also create new content and change the organization of existing content. The simplest Wiki programs allow editing of text and hyperlinks only, while more advanced Wikis facilitate adding or changing images, tables and other interactive components. In addition, Wikis provide a history function that allows previous versions to be examined, and a rollback function to restore the content to previous versions (Anderson, 2007).

A Wiki provides a decentralized approach to managing information where all involved parties can view, add, edit or comment on the information on the Wiki pages asynchronously as well as simultaneously. Key capabilities of a Wiki include the ease with which multiple users can collaboratively create and update content. When compared to alternative collaborative technologies, a Wiki provides greater efficiencies in cost, maintenance and training. By leveraging these capabilities, an organization can improve both internal and external collaborative business processes and build knowledge bases with relative ease. For example, multiple engineers working collaboratively on a project can use a project Wiki to collaborate on design development and project documentation. All stakeholders including engineers, project managers, designers and test teams can view, comment on, edit, as well as add more documents as and when needed. This allows for easier collaboration with instantaneous access to an easy to use platform for sharing ideas and information. Such rich collaborative interaction is critical for the success of collaborative processes, where the efficacy of the exchange of ideas and information impacts the quality of the result. Similarly, a sales team may use a Wiki to set up a request for proposals knowledge base or the support team could use a Wiki to coordinate customer support activities and take advantage of the collaborative nature of the tool to enhance the information sharing in a collaborative process. By introducing Wiki for project documentation maintenance, essentially a traditional linear business process, such as design development project, can be executed with greater parallelization in a more efficient manner.

We found in our case study that Organizations I, B and C have been using mainly two different versions of Wiki for collaboration:
Blog. A typical blog comprises multiple posts, which may contain text, images as well as links to other blogs, Web pages or other media related to a central topic that the blog is focused on. The blog is usually arranged in chronological order from the most recent post at the top of the main page to the older entries toward the bottom. Blogs often center on a single topic or theme and are usually written by one person or group and updated in a fairly regular manner (Anderson, 2007). Blogs harness valuable network effects by allowing readers to leave comments at will. Archiving posts and the ability to provide comments on posts are common features in a blog.

Blogs facilitate bidirectional and transparent communication between users. In other words, a visitor on a blog site can simultaneously assume the roles of reader and writer, which is not possible in a traditional Web application. Companies use blogs for both internal and external communication wherever transparent bidirectional communication is needed. The transparent bidirectional communication facilitated by blogs can help businesses reach and communicate with their customer base directly and identify customer needs through direct posts made by customers. For example, Netflix uses their blog site (blog.netflix.com) extensively to keep in direct contact with their customer base. The Netflix official blog site facilitates direct interaction between the management and customer base. Customers use the Netflix official blog site to inform the management of their concerns. In turn, the management gets to know customers’ needs, complaints and concerns directly from the customers. Through blogs, management also provides updates to the customer base on steps underway to resolve issues raised by customers on the blog. Using blogs, Netflix also solves technical problems for customers, particularly related to movie streaming service. In addition, customers often also help each other to resolve any technical problem. This sort of transparent and bidirectional interaction is not possible in traditional Web.

RSS feeds. RSS is a family of formats that allow users to find out about updates to the content of RSS-enabled websites, blogs or podcasts without actually having to go and visit the site. Instead, information from the website (typically, a new story’s title and synopsis, along with the originating website’s name) is collected within a feed (which uses the RSS format) and “piped” to the user in a process known as syndication. To be able to use a feed a prospective user must install a software tool known as an aggregator or feed reader, onto their computer desktop. Once this has been done, the user must decide which RSS feeds they want to receive and then subscribe to them. The client software will then periodically check for updates to the RSS feed and keep the user informed of any changes.

Use of the identified Web 2.0 technologies in organizations
As is evident from our case study on Organizations I, B and C, that they have been using Wiki, Blog and RSS feed-like technology in different combination to resolve the sort of issues and problems that are very similar to the problems we have identified in DPAP. Hence, it is our assertion that a similar sort of Web 2.0-technology-based solution will be applicable in the domain of DPAP as well.

Addressing coordination issue. Organization I is using project management tool such as Microsoft SharePoint with Wiki capability to manage compartmentalized teams in project and to share documents. As described by an interviewee from Organization I:

We used Wiki where 12 of our team members had access. So what we did right from literature survey to creating the products and the patent scanning – whatever we had downloaded are kept
here (Wiki); all the ACM, IEEE publication we downloaded are stored there, all the mp3 files or
video files regarding accessibility are stored there. Even all the minutes of the meetings were
captured and stored there.

Organization B is also using Wiki extensively to share documents in a project. Adopting
similar solution in DPAP can facilitate transparent communication between different groups
and reduce redundancy in process, data and documents. For instance, one project manager
noted the following:

Sending the documents as email attachment was creating space issues. Sharing with public was
also a problem in the previous systems”. With the use of WikiB, it has become easy for the project
managers to provide a platform for their team members to collaborate and generate knowledge
required for a project.

Another manager stated:

I used to spend a lot of time giving access to the people to documents. Moreover, it used to take a
lot of time, even up to 15 minutes to open a big attachment. Now all these problems are gone.

To increase tacit knowledge transfer. Organizations I, B and C use private Wiki within the
organization to create a repository of tacit knowledge that would be useful in future.

While interviewees thought that the use of Web 2.0 at the individual level increased
knowledge sharing, they found it difficult to identify specific observations of tacit
knowledge sharing. Nevertheless, the interviewees did mention instances of knowledge
sharing, which essentially highlighted tacit knowledge sharing. We found that tacit
knowledge sharing through Web 2.0-based tools is particularly prevalent in troubleshooting. Individuals gather knowledge from experiences of solving clients’
complaints, and such knowledge can be categorized as tacit knowledge. We found that this
type of tacit knowledge is shared through Web 2.0-based KM tools, and this knowledge
helps other individuals to address and troubleshoot problems faced by their clients. For
example, an interviewee from Organization C describes how:

[...] our group needed a fast solution for that client. But, our group was struggling. We posted our
problem description in the central WikiC to see if anyone in our organization had solved a similar
problem before. In no time, someone actually suggested a solution based on his experience of
working on a similar project and we solved our client’s problem.

An interviewee from Organization B shared a similar incident of tacit knowledge sharing
from contributor’s perspective:

A new tool called “Driver” came in. I had my own knowledge about that tool. So I contributed to
the Wiki to how to use “Driver” to make others life easier. These Wikis are open-ended. So when
you contribute to these Wikis, anybody can see it.

We also found that employees shared tacit knowledge to solve internal technical problems.
For example, one such example was found in Organization C’s support for Mac computers
and the Mac platform. Officially, Organization C does not endorse Mac computers and the
platform for individual use, so if an employee decides to use Mac officially he/she does not
get service from Mac sellers. Still, many employees in Organization C use Mac for different
official uses. Hence, they developed a Wiki-based community to share solutions to different
problems associated with the Mac. A few expert Mac users initiated this community, and
eventually other employees started to participate. As described by an interviewee from
Organization C.
Our organization is going to pay for a Mac if you decide to have one. But they tell you that there is not going to be any further service. At first I was a little hesitant but at the same time I wanted to use a Mac. So, I went for it couple of years back and came to know about this community. Since then I have been religiously following this WikiC-based community for Mac users. It was initiated by a few expert Mac users. Now all the Mac users not only get help from it, they share their own experience of troubleshooting in Mac to help others. I have also shared my experience there. Over time it has become so effective that it has become an unofficial “official” support center for Macs in our organization.

Such examples underline the success of Web 2.0-based KM in facilitating tacit knowledge sharing among individuals in an organization.

Similar steps can make sure that all the “It depends” parts in DPAP have been captured in a private Wiki where different people involved in DPAP will contribute. In this manner, all the people in the organizations can have a clear idea and knowledge about the DPAP, and it will be more transparent to all the involved parties.

*Communication with customer.* Organization I has been using public Wiki and Blogs to communicate with customers and to understand the requirements of the current and potential customers. At the same time, they have been using it as a channel to convey information about their product and service. Similarly, city government can use public Wiki and blog to let the applicants know about the DPAP while understanding the concerns of the citizens.

RSS feed is another neat Web 2.0 technology that is used by Organization I to provide updates on a project(s) to all the involved parties. A similar approach can accommodate current status updates to all the involved parties (including citizens i.e. applicants) of a DPAP process and provide more transparency in the process. In this manner, government offices can make sure that they are keeping the applicants updated at every stage and include in the DPAP.

Table III presented summarizes the potential solution and the organizations using it successfully.

<table>
<thead>
<tr>
<th>Tasks to address the identified problems</th>
<th>Proposed solution</th>
<th>Example of organizations using it successfully</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordination of different tasks associated with DPAP and related Documents sharing</td>
<td>Project management tool such as Microsoft SharePoint that has Web 2.0 features such as Wiki</td>
<td>I</td>
</tr>
<tr>
<td>Creating a repository of tacit knowledge regarding DPAP for internal use</td>
<td>Private Wiki</td>
<td>I, B, C</td>
</tr>
<tr>
<td>Creating a repository of Tacit Knowledge regarding DPAP for external use</td>
<td>Public Wiki</td>
<td>I, B, C</td>
</tr>
<tr>
<td>Getting rid of redundant information and providing up to date documents of an approval application</td>
<td>Private Wiki</td>
<td>B</td>
</tr>
<tr>
<td>Getting to know the concerns of the citizens</td>
<td>Blog</td>
<td>I</td>
</tr>
<tr>
<td>Providing up to date status to the different departments involved in the DPAP and to the applicants</td>
<td><em>RSS feed</em></td>
<td>I</td>
</tr>
</tbody>
</table>

Table III. Potential solution
Phase 3: identified obstacles in implementing new technology for collaboration

Web 2.0 technologies, in particular Wiki, blogs and RSS feeds, are used by leading IT organizations to address the challenges of collaborative work (Nath, 2012). We believe use of same and/or similar tools can address the existing challenges and bottlenecks of the current e-Government.

Once we identified the possible tool and technology to address the existing problems in government organizations’ E-Services, we conducted another phase of case study in the same government organization to identify the obstacles in implementing the collaborative technologies. The identified obstacles are as follows:

Realization by the upper management
One of the major problems that have been identified as a possible obstacle to adopt the proposed solution is the realization by the upper management who actually makes the final decision to adopt a new technology. As pointed out by a representative from the planning department:

I think the first is the lack of understanding of the decision makers. In other words, those who decide what we do and how things are automated, don’t have an understanding of what is happening

On the other hand, in organizations where Web 2.0 technology has been adopted successfully, the technology was introduced and promoted by the upper management (Nath, 2012). Therefore, the lack of understanding of ongoing problems in the current DPAP by the top management in combination with their lack of understanding of the potentiality of Web 2.0 technology, are jointly a major obstacle in improving the current DPAP with Web 2.0 technology.

Adoption of the new work paradigm by the existing people
Adoption of a new technology is always a challenge. From an organizational perspective, the paradigm shift and change of culture that e-Government would introduce to government institutions would certainly face resistance as seen in other forms of organizational change such as business process reengineering (Avgerou, 1993). It is a bigger obstacle in a setup such as DPAP, where different individuals from different departments are involved and quite naturally not all of them are technologically savvy. Moreover, in the Web 2.0 environment, sharing is the core principle of Web 2.0 technology; however, the people participating in the current DPAP have been working in silos for many years. Therefore, it would be a long learning curve for them to adopt Web 2.0 technology in the DPAP.

Time to create an effective repository
Adoption of Wiki-like technology in document sharing for projects will positively affect the DPAP immediately. However, by nature, a Wiki-like technology takes time to create an effective repository as the network effect has to become prevalent (Anderson, 2007). Hence, it will be a lengthy process to witness a visible improvement in the overall knowledge management of DPAP through Web 2.0 technology. Our data from the leading IT organizations in the USA suggest that it might take up to two years to see significant results (Nath, 2012). Therefore, unlike many technologies, its impact might not be visible immediately and that might restrain an organization from adopting a Web 2.0-based solution.
Technology adoption cost

Adoption of Web 2.0-based collaboration technology, like any other technology, has an adoption and implementation cost associated with it. While Web 2.0 collaborative technology is cheaper than most of the other collaborative technology, it has its cost and an organization has to bear it. For a government organization adoption of such technology can increase service efficiency. But as pointed out by representative from Inspection, having the budget to adopt a new technology is a challenge as this is not going to “directly” generate a large amount of revenue. Therefore, getting an allocation in the budget for adopting Web 2.0 technology is a major obstacle.

Table IV lists the identified obstacles in adopting technology.

The identified challenges might not be unique to the government organizations. However, because of bureaucracies associated within government agencies, we believe the obstacles are more prevalent in the current state of e-Government.

Discussion

The goal of e-Government is to provide better service for their citizens. However, there are many internal factors in existing e-Government that negatively affect the quality of services that require collaboration among different departments within government organization. Through case study in the selected government organization and service, we identified those factors. While in our study we do not rank the factors in terms of their negative effect on the collaboration effort and consequent service quality, we do establish their effect in the existing state of e-Government.

While effective collaboration is a challenge for many business organizations as well, IT industry leaders have successfully implemented different collaborative technology, especially Web 2.0-based ones, to address this challenge. We studied three leading IT organizations and found empirical evidence that the use of Web 2.0-based collaborative technology can positively affect collaborative effort in an organization. We believe government organizations can also address the collaboration challenges in a similar manner.

<table>
<thead>
<tr>
<th>Identified obstacles</th>
<th>Example (s) of quote that indicates the obstacle</th>
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<tbody>
<tr>
<td>Realization by the upper management</td>
<td>Regarding the obstacle associated with having new system to address the existing problems in DPAP</td>
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<tr>
<td></td>
<td>“I think the first is the lack of understanding of the decision-makers. In other words, the people who decide what we do and how things get automated don’t have an understanding that this is happening” (Representative from Planning)</td>
</tr>
<tr>
<td>Adoption of the new work paradigm by the existing people</td>
<td>Regarding learning new technology</td>
</tr>
<tr>
<td></td>
<td>“But unless otherwise someone has told me I would not have tried it out as all of us are busy, right. You work for 8-10 hours, come home and you do not get time to find those out unless otherwise someone tells you” (Representative from the city office)</td>
</tr>
<tr>
<td>Time to create an effective repository</td>
<td>Regarding using Wiki to create an internal repository</td>
</tr>
<tr>
<td></td>
<td>“For last few years people have contributed and made it a quite useful one” (Representative from the city office)</td>
</tr>
<tr>
<td>Associated cost</td>
<td>Regarding the obstacle associated with having new system to address the existing problems in DPAP</td>
</tr>
<tr>
<td></td>
<td>“........ we have only so much money and so many resources and this is very far out on the priority list and just stays out there” (Representative from Planning)</td>
</tr>
</tbody>
</table>

Table IV.
Identified obstacles
and get positive results. However, government organizations are different from business organizations in many aspects, and they have their own obstacles in adopting similar approach for collaboration. In the third and final phase of our research, we identify those obstacles in government organizations. We believe the identified factors could diminish the overall effect of Web 2.0-based collaborative tools in providing better e-Government services. Figure 4 essentially pictorially represents a summary of our case study findings.

To the best of our knowledge, we think our research is the first to simultaneously conduct such rigorous and sophisticated case studies on three different leading IT organizations to address a challenge in current state of e-Government. Our research has important findings for practitioners: first, we pin points the existing challenges in e-Government where collaborative effort is necessary to provide quality service to the citizens. We believe it will help the practitioners understand the challenges in their own organization. Second, we have recommended a set of tools and technology that could be used to address the challenges. On the basis of our recommendation, we believe, practitioners will be able to address the challenges in their organization. Essentially, through our research we showed that they can implement the Web 2.0-based technologies to address challenges in government organizations while providing efficient service deliveries. Finally, as we have also pointed out the potential obstacles of implementing our recommended tools, the government organizations should be able to prepare themselves beforehand and make the implementation of recommended tools effectively.

**Conclusion**

Many countries worldwide have been frequently implementing the concept of e-Government to use information and communication technologies efficiently, and to optimize service delivery to citizens and other government stakeholders. This, however, requires integration and coordination among several entities within an organization. Unfortunately, as the stakeholders work as separate entities, coupled with disconnection and asymmetry of knowledge and information, efficient delivery of services become difficult. Thus, a
transparent networked environment is required where governments can partner with other governments, citizens, businesses and other stakeholders. However, there exist challenges to create such a collaborative environment in a government organization owing to many reasons. In this paper, we have tried to address these challenges by proposing and answering three research questions.

First, we identified the existing challenges in the current government organizations faced while providing services that require collaborative effort. We used a case study approach to identify the existing problems in the DPAP.

Second, we wanted to understand how the leading IT organizations are using Web 2.0 tools for addressing the collaboration challenges similar to government organizations. For this purpose, we conducted an exploratory case study on three leading organizations. We found that Web 2.0-based KM tools can be very effective in addressing the existing challenges in the current state of e-Government. However, adopting such new technologies in government organizations could be challenging.

Finally, we identified the obstacles while trying to adopt new technology tools for collaboration in government organizations. Again, we conducted another case study on the same government organization as before. We found that realization by the upper management, technology adoption cost, adoption of new work paradigm and time to create an effective repository are some of the major obstacles faced by the government organization while trying to adopt new technology.

Our research is guided by the practitioners' point of view as it takes into account the current and ongoing problems of the government organizations. Nevertheless, we have also made a contribution to the existing academic literature. We believe that our findings will help the government organizations to address the challenges and implement new technology, and address the obstacles encountered while adopting new technology. E-Government services could, thus, become more efficient.

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