

IMPACT OF E-GOVERNMENT ON FEDERAL FACILITY DELIVERY

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ABSTRACT

This paper provides a justification for the use of e-Government applications for public facility delivery projects. The costs and benefits from one such system used in public practice in the United States are described. The emerging impacts of e-Government systems on the facility acquisition community are also identified.

KEYWORDS

e-Government, government-to-business, facility acquisition, facility delivery, business process

1. INTRODUCTION

Electronic Government (e-Government) refers to the use of Internet-based technologies such as websites, email, and file servers to improve the efficiency and transparency of government activities. e-Government applications often serve a variety of different purposes, including democratic participation and oversight, access to resources and services, and access to grants and contracts. Well designed e-Government tools allow its citizens to repackage related government services, provide standard services across multiple agencies, and combine these activities into a single virtual service organization (Clark 2003). An additional justification for e-Government activities is often based upon the assumption that such efforts enhance a nation's private sector to better compete in the information technology marketplace (Budge 2004).

Until the rise of coordinated e-Government applications within the United States, listings of opportunities, systems for documenting contractor qualification, and bidding systems were operated and maintained by each federal agency. The Federal Business Opportunity system is now the centralized government service for the capture of contractor qualifications and solicitations (General 2008). This "FedBizOps" system is widely seen as having reduced the cost of bidding on government work. It has, however, increased the costs of and provided high barriers to entry for many small businesses (Innovation 2004). Of critical concern to many working in e-Government is that the target constituencies for many of these services are precisely those sectors of the public, such as the poor, elderly, or disabled, who are least likely to have internet access (Duke 2003).

While the focus of e-Government is typically on new websites, portals, and highly complex government-to-business applications, the most basic requirement is for effective electronic information transfer services such as email and electronic funds transfer. For many citizens email and electronic funds transfer services are fundamental (Innovation 2004). The real value of email, especially the "contact us" email hyperlink on web pages, is that it makes the structure of the government agency transparent to the citizen. Decreases in cost and time associated with receipt of electronic funds transfers are self-evident. While websites with the latest technology flavor will continue to be of momentary interest, is unlikely that anyone could conceive of working at the current pace of business without email and electronic funds transfers.

2. FEDERAL FACILITY DELIVERY

Within the United States, negotiated contracts for Architect/Engineer services and best-value open bidding for federal facility projects are standard practice. These contracting methods are designed with a minimum barrier to entry in order to allow the widest possible set of prospective bidders on federal project. Under such a contracting regime, there are different sets of designers, consultants, prime contractors, subcontractors, suppliers, and manufacturers employed on each project. While individual designers and contractors specialize

in government projects and could have multiple awards over time, the full project team will typically be different on every project.

The only constant on federal projects is the set of specifications under which government contracts are awarded. Government contracts include general provisions derived from the requirements of the Federal Acquisition Regulations (Office 2008). The technical provisions of the contracts are expressed in criteria, guide specifications, and/or code supplements. Many agencies use the Unified Facilities Guide Specifications and Unified Facilities Criteria found on the Construction Criteria Base (Whole 2008).

While the general and technical provisions may be the same, differences between government project managers are anecdotally cited as the major factor in determining the successful completion of a project. Because managers or quality assurance staff have different levels of expertise, less-experienced government project personnel may have different interpretations of procedures. It is widely understood that in addition to technical knowledge, understanding how to successfully resolve problems is the key to success for a design project manager or construction quality assurance representative.

3. E-GOVERNMENT FOR FACILITY DELIVERY

In the contracts of many federal facility projects are specifications that include the use of the ProjNetSM system. ProjNetSM is a suite of government-to-business applications provided through *a la carte* subscription from the National Institute of Building Sciences, which is a congressionally created not-for-profit organization (National 2008). The ultimate objective of ProjNetSM is to help experienced project managers to implement successful business processes in the review of designs, resolution of bidder inquiries, requests for information during construction, and review of construction submittals. ProjNetSM business processes and definitions are defined through a NIBS inter-agency committee comprised of agency administrators and system users the author is the chair of this committee and responsible to translate these requirements into the ProjNetSM suite of tools.

One of the key insights of effective project managers is that all parties to a decision must concurrently participate in the resolution of the issue. Face-to-face meetings are often the most effective way to ensure that all team members are present for the resolution of issues that pertain to them. Prior to ProjNetSM, electronic means of communication were considered to be ineffective because the programs used for these purposes required a higher level of effort than a face-to-face meeting. Client-server systems imposed on contractors by contract specifications changed from one agency and department to another. Contract partners who performed work only occasionally for the federal government often strongly resisted such electronic systems due to their *de facto* bureaucratic bias against the infrequent user.

ProjNetSM is focused on the *process* of information exchange used by effective project managers. The actual *production* of the information to be exchanged, such as design deliverables or shop drawings, remains the purview of private software manufacturers and does not directly affect the process of information exchange. While federal contracts mandate specific exchange requirements for government and lead designers or prime contractors, much of the information created on projects is created by subcontractors, suppliers, and manufacturers. As a result, ProjNetSM success is highly dependent upon the provision and adoption of tools that support efficient information exchange among private industry team members, not simply the exchanges between government and lead designer or prime contractor.

While the government partners interact using a process with which they are familiar, government personnel do not see (or need to see) the processes that allow their business partners to effectively use these information exchange tools. Design executives can, for example, route design review comments based on the specific consultancy arrangements in place for the specific contract. Prime contractors may collect submittals and interact with suppliers and subcontractors in the system before submitting a package to the government. There is a growing understanding within the federal design and engineering communities that efficiency requires them to support the entire "food chain" of the process, not just the aspect of the process that results in handover of data from the prime contractor.

Allowing project managers to implement their own best practices implies that they are able to reach appropriate team members through the website, and that these stakeholders may fully participate in the identification, resolution, and verification of issues as simply as possible. From the client-software point of view, this means that a “typical” web browser using a standard broadband connection is the maximum requirement that should be imposed by e-Government systems that are intended to be usable by the entire team. Because users may not have administrative control of their computers or networks, the e-Government system cannot impose additional software downloads. Java Applets and ActiveX controls should not be used since there will be a not-insignificant percentage of users who are not able to install these “active code” applications. While a team may require the use of specific software and place demands on the team for markup and other tools, these requirements are not shared across multiple agencies, offices, or project managers and, therefore, should not be built into e-Government systems that are intended for wide distribution.

4. COST

A significant barrier to entry for most software is cost. Unless small consultants, subcontractors, and others are able to participate, their input will be lost and the business process will be broken. Because some team members may only sporadically work on government projects, even a low barrier to use, such as the per-user costs, can be enough to prevent these stakeholders from participating. To be successful, e-Government systems must be free of charge to all project-specific stakeholders. The requirement for a web browser is a very low barrier to entry for business partners. Given that web browsers are available free of charge, there need be no end-user fees for e-Government systems.

In the United States, the cost for end-users to connect to centrally served e-Government solutions should be the cost of a broadband internet connection available through Wi-Fi, cable television provider, Digital Subscriber Lines, or fiber optic lines. Given that email services are understood to be a baseline requirement at all levels of business, access to the internet through broadband networks can be generally assumed as the norm for the smallest businesses to which United States government awards facility delivery contracts. Given that internet connections are already in place, there should not be an end-user cost for connecting to e-Government applications.

Medium-sized businesses, of 10 – 30 employees, appear to have the most risk in their ability to connect to e-Government systems. Small businesses are able to manage their own networks based on home-networking solutions. Larger businesses have the overhead needed to hire full-time network staff. Medium-sized businesses purchasing turnkey services from telecommunications providers appear to have, at least in the United States, the most difficult time. It is recommended that medium-sized businesses working with e-Government applications for facility acquisition should purchase extended support services to help administer the inevitable technology tweaks needed to keep a medium-sized network operational. The e-Government helpdesk must be funded to support communication between stakeholder end users and their network service providers. While the e-Government provider may only be held contractually responsible for the application server stack they are, from the user’s perspective, responsible for the entire internet route.

While there must be no cost to end-users for e-Government services, there is a significant cost for the creation and operation of the applications. e-Government data centers require a variety of hardware such as firewalls, application servers, database servers, file servers, and additional support servers. That said, the costs associated with creating e-Government applications can be surprisingly reasonable. The average annual cost of each ProjNetSM hosted design review comment (including an entire thread of issue identification, resolution, and verification) is approximately one dollar (U.S.).

Backup procedures and contingency planning also are critical issues when fully considering the implications of providing business-process-based e-Government applications. Two types of contingency operations must be addressed: those that disable some aspect of the application or communications line, and those that destroy the entire server infrastructure. Depending on the risk-aversion of specific clients, it is possible to cost-effectively deliver different levels of service to limit downtime to less than a few hours. Real-time load balancing across multiple data centers is, in the author’s experience, not needed for e-Government applications supporting facility delivery processes.

5. BENEFITS

e-Government systems offer numerous benefits, the most obvious being the elimination of delays due to postal mailing time. This alone is the first-tier of savings available to all teams, regardless of how effectively they use the software. The second most obvious benefit, which applies to issue-resolution topics, is that issues are captured and presented in a common format. Often this format includes categories, such as design discipline, that allow the issues to be automatically collated and organized based on completion status, author, office, etc. The automation of collation has been reported to save approximately 40 man-hours per project (East 2006). Collation cost may be virtually eliminated through the use of a well designed e-Government content and process ontology.

Effective e-Government systems clearly explain the process through which work is accomplished and communicates those processes through multiple channels. These channels include screen-based confirmation messages that are consistently provided by the user interface, summary pages that show where specific items are in the overall process, and various types of email notifications. e-Government systems should not attempt to duplicate email and other messaging services, but they may be able to leverage data contained in project records to allow key team members to contact other team members using email sent through the e-Government system.

After processes are clearly identified and described within the system, the next order of benefits to project teams results from knowing the specific team members assigned to complete tasks within each process. Reports and automatic email notifications can streamline the process of seeking out those who have not completed their required actions. The important use of this information is not to “point fingers” at an individual’s failure to perform, but to identify stakeholder offices whose participation is necessary but, for whatever reason, has not been accomplished yet.

The benefits identified above are those related to the process of completing the work, not the benefits associated with “improved design quality” or “project collaboration.” Generalized claims of improved design quality and decreased construction costs through the use of web-based collaboration systems are notoriously difficult to verify. The benefits related to business process improvements, however, can be directly quantified. The quantification of benefits provided by ProjNetSM has begun through study of the Bidder Inquiry process (East 2008, in preparation). The results of a pre- and post- implementation study and a related discrete-event simulation, to be published in an upcoming paper, demonstrates a 90% decrease in the number of contracts awarded with open bidder inquiry issues. The average time to evaluate inquiries has been reduced to 14 days from 30 days on a typical paper/email process. Also, one study has identified a minimum savings of \$30K (US 2004 dollars) simply through reduction in the frequency and duration of face-to-face meetings (East 2006).

6. IMPACTS

The unforeseen impacts of new technology may take some time to become evident. A classic historic example occurred with the construction of railroad networks throughout the United States. Before the publication of train schedules, each town maintained its own local time, based on the sun’s midday zenith. Operating railroads on a reliable schedule made it necessary to synchronize clocks across longitude, by region. The establishing of time zones was a necessary but unexpected side effect of implementing railroad technology. Similarly, the impacts of e-Government sites for supporting facility delivery processes are only just becoming evident. The short-term impacts of these systems might have been predicted, but the longer-term impacts are just beginning to be felt, and they may not be fully known for several decades.

Current design and construction practice uses a hodge-podge of technology for information exchange, including email attachments, multiple anonymous File Transfer Protocol (FTP) sites, and ad-hoc use of various commercially provided web collaboration portals. The inability to limit inappropriate use of these technologies virtually guarantees that an owner’s building data will be completely accessible for any who are interested enough to look for it. Facility owners have a duty to safeguard property and building occupants by

restricting general public access to detailed design data and construction details pertaining to emergency backup systems, fire alarms, and other critical building systems. e-Government applications are able to set effective policies for the release of data that should be public. Team members can provide oversight to ensure procedures are in place that restricts the public distribution of sensitive project data. One of the short-term impacts of e-Government systems will be to decrease access to sensitive aspects of public building design and construction by those who are not project stakeholders. These same technologies, if correctly designed, ease the burden on each project team to develop their own, project-specific information technology infrastructure. Communications among project stakeholders must include those exchanges that take place outside traditional contracting requirements. e-Government systems are beginning to impact the way that government personnel think about deploying information technology to the entire project team.

It is interesting to note that all users of e-Government systems quickly become acclimated to the accessibility and ease of use of these systems. As users become habituated, the e-Government service will appear as ubiquitous as water, power, and telephone service. As a result, any outage will be seen as a critical problem by those waiting for the service to return to operation. Most often, outages will result from changes to local system or network configurations at their offices. e-Government operators must be prepared to provide technical support services to help users to interact with their internal information technology departments. To help users and managers set appropriate expectations, a "level of service" paragraph should be included in contracts. This clause should cover regular scheduled maintenance outages, durations of possible non-catastrophic outages, and recovery procedures if the system becomes unavailable due to catastrophic failure.

The provision of e-Government services has a longer-term impact on the maintenance of public project records. There have been anecdotal accounts of contractor-provided data being lost during or after the conclusion of a project when contractors purchase commercial services with project funds. These losses have been reported to occur during the discovery phase of claims processing. A less suspicious type of data loss can occur following the conclusion of projects if the contractor stops paying for the project-based commercial service. While some commercial service providers have indicated their willingness to provide data disks containing the files exchanged, this data set is only part of the data that should be actively preserved for those who will build, maintain, operate, and all-too-often litigate the project. The impact of rapid access to historical building data has been anecdotally discussed, but not directly experienced by the author. The impact of having the data available during the "litigation phase," on the other hand, has been directly experienced by the author.

Because e-Government systems for facility delivery have been operational for over a decade, several post-construction litigations have included ProjNetSM data. In one case, a party indicated that they were not informed about the resolution of an inquiry submitted during the bidding process. The ProjNetSM team, however, was able to show that the user named in the claim had obtained a report that displayed the disputed data two days after the technical resolution of the issue in question. Another dispute included a claim that a designer did not have the opportunity to communicate cost impacts because a check box was not available on the specific version of the Design Review and Checking System (DrChecksSM) screen used by the designer. The most interesting part of this claim was that the technical issues surrounding the issue, its resolution, and verification of compliance were never in question. It has been said that the court case goes to that party with the best documentation. Where e-Government systems are used, the issue of what documentation is available and who holds it is no longer in question. The data should be available to all parties in the litigation, and accessible well after the conclusion of the project. It is reasonable to expect a reduction in protracted litigation where documentation of the technical dialog and agreed-upon problem resolutions is available to all members of the project team.

Many public works and civil infrastructure projects affect, and sometimes displace, large numbers of citizens. A key insight on the use of e-Government facility delivery systems for these large projects is that all stakeholders, including political and non-governmental organizations, must participate in the projects. e-Government systems were used to assist in coastal and environmental restoration programs in Louisiana, Mississippi, and the Florida Everglades. In the review of these projects, technical advisory boards, including local political bodies and non-governmental organizations, have been able to fully document the resolution of their issues. In a conversation with the author of this paper, the project team members stated access to issue resolution documentation was a primary reason for the success of the e-Government application.

Transparency in communications directly discouraged later suggested changes and requests for design deviations suggested by influential developers or political constituents.

A final impact of e-Government systems is that the nature of dialog about technology is beginning to change. While software engineers use tools such as the Unified Modeling Language to communicate about communication between software entities, these tools are only just beginning to be widely understood and used by project stakeholders to optimize their modes of communication (i.e., business processes). Many software vendors fixate on ever-larger markets that require an ever-increasing number of features and options, but there is a point of diminishing returns on such “improvements.” Either they become too expensive for users who are not interested in many of the new features, or they become unstable due to their own rapidly increasing complexity. One key impact of e-Government systems is the growing awareness that business process modeling is the essential element for software designed to support facility delivery (East 2008).

7. CONCLUSION

The nature of successful e-Government applications is significantly different than traditional government information systems. e-Government applications must support multiple tiers of contractors, provide basic technical support for all project stakeholders, and be economical to create and operate. e-Government technologies can be justified by citing quantifiable benefits felt directly by the users of these systems. While the short-term costs and benefits of e-Government applications can be established, the longer-term impacts of these systems on the process of facility delivery are just now beginning to emerge.

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