

A Resource-Based View of Local Digital Government: Core Capabilities for Success from the Case of Mexico

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Abstract

Digital Government has been an important component in administrative reform efforts and strategies. However, benefits from such strategies often remain as only a promise. In order to better understand the reasons for digital government success and failure, many researchers have explored the problem following one of two approaches: (1) identifying a list of success factors or (2) developing a better understanding of the problem through process models. In this paper, following the process tradition from a strategic point of view, we propose the use of a resource-based view of the organization and system dynamics as a modeling tool to explore core capabilities of local governments to exploit the benefits of digital government, promoting more competitive localities that create value for their inhabitants. On the basis of three case studies of digital government strategies in municipalities in Mexico, we introduce a preliminary conceptualization of the core capabilities and resources for a successful digital government strategy.

Keywords

System Dynamics, Resource-based view, Digital government, Core capabilities, Local government strategy

1. Introduction

In the last two decades, governments around the world have increased the use of information and communication technologies (ICT) as key components of their administrative reform efforts. This particular strategy has been named digital government, and consists of the use of ICT in government operations, services, and some applications related to democracy. The inclusion of digital government strategies responds to the promise of ICT to create value for government, but also for citizens, businesses, and other stakeholders. Some of these promises include increases in tax collection, efficiencies and savings in government operations, greater transparency, and improved accountability. However, benefits from ICT investments do not automatically result from the introduction of new technology, but from a coordinated series of efforts aligned to the main strategy of the organization, such as process improvements, staff training, or better organizational standards. Moreover, and particularly important in the public sector,

organizational activities are also constrained by institutional arrangements. In this way, benefits from digital government are to a large extent still a promise for many government organizations.

Local governments are not an exception and they face particular challenges. For example, a recent report from a series of workshops with Chief Information Officers (CIO) from municipal governments in Mexico reveals that many local governments in Mexico lack even the basic infrastructure to develop a digital government strategy (Luna-Reyes, Gil-Garcia and Celorio 2010). Further, local government IT departments have limited influence on the main government strategies and they do not have the appropriate organizational structure, trained staff, or budget to manage a digital government strategy. Local CIOs also perceive local laws and regulations as important challenges to digital government. In particular, the 3-year term of a Mayor is perceived as a major challenge for two reasons: any strategy needs to be implemented in a short period of time and frequently the next Mayor does not carry on with the main strategies and objectives. The general lack of resources available to local governments and their municipal CIOs is a problem not only in Mexico, but also around the world (Weiss 2008; Holden et al. 2003). As a result of these particular challenges, local governments' often fail to achieve the lofty objectives of digital government.

Two main perspectives have been taken to explain the limited success of digital government initiatives. The first of these two perspectives has focused on the search for key success factors (see Larsen, 2003 or Gil-Garcia and Pardo, 2005 for a review on this approach). These kinds of studies usually involve statistical testing of the impact of factors, such as the size of projects or the support of high-level managers in the success of digital government initiatives. In contrast, a second approach consists of the detailed study of a particular project development as a process (see, for example, Luna-Reyes et al. 2005). This approach usually relies on case data and process models to explain project success. Following this later tradition and enriching it with the resource-based view of the organization, we proposed in this paper that there is a set of intertwined core capabilities required to successfully implement a digital government strategy. The main question guiding our research is, which core capabilities and resources are necessary to develop a successful local digital government program that creates public value?

The paper is organized in five sections, including the foregoing introduction. Section two presents a review of previous studies focusing on local e-government and the resource-based view of the organization. This view suggests that there are some core capabilities that allow organizations to performing certain actions in a better way. These capabilities are intertwined and, therefore, they cannot be studied in isolation. Section three describes the research design and methods used for this study. This paper is mainly based on three case studies of successful local government strategies and two workshops with 34 Mexican local government CIOs. Section four analyzes three cases of Mexican local governments that can be considered successful. The descriptions and comparisons attempt to highlight certain capabilities and resources that existed in each of the cases. Finally, section five proposes an initial system dynamics model and describes the next steps for this research.

2. Literature Review

This section introduces two areas of research that are relevant to our work. The first part of the section includes a review of recent studies on digital government, with particular attention to research about local governments. The second subsection constitutes a review of the resource-based view of the organization. We think that this view could potentially contribute to a better understanding of the e-government phenomenon at the local level.

Digital Government at the Local Level

Some of the most important areas of opportunity for e-government at the local level are providing information on services and staff, offering downloads of government forms and online transaction processing, strengthening tax collection capabilities, improving strategic planning processes, and facilitating the creation and implementation of partnerships with other authorities (Beynon-Davies and Williams 2003; Jensen, Danziger, and Venkatesh 2004). Several local governments have seized the opportunities offered by e-government and have not only become leaders in digital transactions, but have reached an advanced stage of e-government in which citizen participation is an essential component (Fagan 2006; Wholers 2009).

The adoption of e-government at the local level is the result of organizational factors (features and capabilities of the government's IT department) and contextual factors (external influences such as population size and citizen demands) (Reddick 2004). Four major planning processes have been suggested as required for the success of an e-government strategy (Vriens and Achterbergh 2004): choose the applications that are conducive to the development of e-government, define the requirements for the implementation of the previously selected applications, define projects and rank them in order to allocate resources to each one, and plan the implementation of the projects.

One of the key factors for successful e-government projects is their assessment; however, examples of evaluation in the literature are relatively rare. One possible way to classify the different timeframes for evaluation is as follows: start of project (Andersen, Belardo and Dawes 1994; Cresswell 2004; Dawes et al. 2004), end of project (Heeks, 2005), monitoring progress (Stowers 2004), and comparability (Gant et al. 2002; Sandoval and Gil-García 2005; UNPAN 2008; West 2008). In the specific case of municipal portals, there are three types of indicators to gauge the level of usability: the use of the information in the description and virtual tour of the city, the transactional use that enables online payments and the collection of fines and taxes, and finally the operational use that includes permit applications, surveys, and discussion forums (Koh, Prybutok and Zhang 2008).

Among the main determinants of the success of e-government strategies are an appropriate e-government infrastructure (Holden, Norris and Fletcher 2003); the existence of digital citizens (Asgarkhani 2007); the provision of interactive services (Torres, Pina, and Acerete 2005); and the inclusion of citizens in order to more precisely understand the problems and opportunities in the community (Yang 2005). Increased citizen participation allows local governments to obtain more information, thereby giving them the opportunity to offer a wider range of services that better meet the population's needs (Walsh 2005).

Some assessments of the relationship between e-government and the effectiveness of authorities'

decisions have found that e-government is a powerful tool for mayors to listen to citizens' needs, enabling them to act quickly and efficiently (Reddick and Frank 2007). One of the first international studies about e-government at the local level was developed in the United States; it identified that local governments with greater presence in the network are able to offer various applications such as electronic commerce, transactions, customer service, geographic information systems, and citizen participation (Kaylor, Deshazo and Eck 2001). Another survey of local governments, designed to determine the degree of inclusion of local authorities within the field, confirmed that the improvement in government practices is linked to greater citizen participation and also that a municipality's size and type of government are determining factors in the implementation and development of e-government (Moon 2002).

Although e-government brings great benefits for the entire population, it is a reality that there are difficulties associated with it. Several cities have had rapid technological development, which has allowed them to offer government services through Web 2.0 applications. Unfortunately, other localities are facing two key constraints: the budget and human capabilities (Weiss 2008). Consistent with this last statement, a survey of municipal governments that had just entered the field of digital government found that they faced (1) a lack of technology, experience, and web developers, (2) very limited financial resources, (3) issues related to security and privacy, (4) the need to update computer equipment, (5) limited information about e-government applications, and (6) the payment of fees for online transactions (Holden et al. 2003).

Other factors that impede the advancement of e-government are limitations in the technological infrastructure, cultural and educational paradigms, appropriate software acquisition, the large investment necessary to begin, security and privacy, complications that may unexpectedly arise in the implementation and monitoring phase, and doubts about the return on investment from building a website to provide services to the population. A major disadvantage, especially in developing countries, is the advancement of public education, because if the population does not have the necessary knowledge, online access of municipalities will be very small and, consequently, the benefit to citizens will be limited (Evans-Cowley and Manta Conroy 2006; Asgharizadeh, Geshlajoughi and Mirmahalleh 2008).

Resource-Based View of the Organization

One of the first contributions to the study of Resources-Based Review (RBV) was conducted by E. Penrose (Rugman and Verbeke 2002; Mohoney 2004). However, it wasn't until 1984 that the study of resources as a key component of a firm's performance became important (Wernerfelt 1984; Priem and Butler 2001). In 1991 J. Barney (1991) notes that firms are heterogeneous in relation to the strategic resources they control and that such resources are not perfectly mobile. In other words, competitive advantages are the result of capacities and resources that companies control, which are valuable, rare, imperfectly imitable, and not substitutable. Such resources and capabilities can be seen as bundles of the tangible and intangible; for example, management skills, organizational routines and processes, and information and knowledge (Barney 1991).

Although there was general agreement on the model, some clarifications were needed. The firms should meet four conditions to enjoy competitive advantages that enable them to achieve sustained benefits over a normal level: heterogeneity and imperfect mobility of resources, as well as *ex ante* and *ex post* limits to competition (Peteraf 1993). Not only resources, but also

It is possible to identify three main topics in the previous research on digital government as presented briefly in this section. The first area is related to its strategic use and key applications such as tax collection or service improvement. The second area is mostly related to the key success factors to implement digital government. Finally, the literature also explores the main barriers to successful implementation. On the other hand, RBV of the firm has been applied in order to understand the relationships between ICT use (digital government) and local government performance. We believe that the current project explores a potentially interesting area that has not been previously examined in the literature.

3. Research Design and Methods

About a year ago, we started a research project with the purpose of developing a model for local digital government in Mexico. From the beginning, we have seen this model as a set of guidelines to help local governments make investments in ICT infrastructure and develop information systems and applications that create public value and have a clear impact on citizens' quality of life. The project involved four main components: (1) an exploration of current practices of e-Government and e-Government models at the local level; (2) a national survey of citizens in Mexico about local government services; (3) three workshops with municipal CIOs; and (4) three case studies of local governments in Mexico. This paper reports mainly on the third and the fourth components of the project.

The main purpose of the workshops was to gather views and experiences on the perception and implementation of e-government strategies in Mexican local governments. Thirty-four CIOs from local governments within different states in Mexico participated in the workshops. The individual case studies were Puebla, Colima, and San Nicolas de los Garza, which are all considered success stories in the field of local e-government in Mexico. The interview protocol included 14 questions on topics such as the role and experience of staff, status of digital government at the beginning of the administration, major projects and actions undertaken as part of the local government's IT strategy, the main problems and challenges they faced and their solutions, and their main strengths and weaknesses overall. One important component of both the workshops and the case studies was the assessment of core resources and capabilities such as money, personnel, infrastructure, systems, and applications, as well as the possible relationships among them.

System dynamics relies on a variety of qualitative and quantitative data sources in the construction and formulation of dynamic models. The premise is that dynamic behaviors (performance over time) are closely linked to an underlying structure of feedback loops. Dynamic simulation helps to obtain a better understanding of verbal theories and any unexpected outcome obtained from them, with the potential to inform or improve the activities of both theorists and empirical analysts (Patrick 1995). In some ways, using system dynamics models to build and test the consistency of a theory both internally and with the data is comparable to other qualitative theory-building approaches (Kopainsky and Luna-Reyes 2008). As Black (2002) notes, "When generating theory from a case study using system dynamics, a formal model is constructed by inferring from data and theoretical statements some hypotheses about causal relationships that generate a particular pattern of behavior over time observed in the case. Model-

building proceeds iteratively by representing the hypotheses in a mathematical form, simulating, comparing the model output with observed behaviors, and returning to the observations and theories to refine the hypotheses represented in the model by changing its structure. In this sense, a formal model is a non-textual, mathematical expression of a theory of the cause-and-effect relationships that systematically produces the patterns of behavior observed in the field” (120).

The model-building process includes many iterative assessment and validation elements (a good compilation of these kinds of tests can be found in Chapter 21 of J.D. Sterman’s book (2000)): seeking face validity, verifying model parameters, checking for dimensional consistency, running sensitivity tests, and qualitatively assessing the model behaviors. Although our modeling effort is still in its very preliminary stages, we are already considering some validity issues. For this particular modeling effort, the validity of the model structure comes from two main sources. First, the main variables included in the model are grounded in the descriptions of capabilities mentioned in the workshops and the cases. In addition, these variables and processes are consistent with the main constructs in RBV.

4. Three Cases of Success in Mexican Municipal Government

This section briefly describes three cases of successful local digital government in Mexico. The purpose of describing them is to derive lessons about their strategies, primary resources, and capabilities in terms of the resource-based view of the organization. These three cases, as well as comments from CIOs in the workshops, are the basis of our initial model conceptualization.

Puebla

Puebla began its digital government initiative with a diagnosis of the IT department’s problems. When a new administration began, there were some very important issues to address. For example, the city was using different technological platforms, 80 percent of computers were obsolete, the networks were not functioning properly, and many offices were not connected to the Internet. Also, there were no ICT guidelines, manuals or procedures. Based on this diagnosis and consistent with the Municipal Development Plan, the authorities designed a comprehensive IT policy with a primary objective of generating a technology-government fusion in order to improve the government’s efficiency and citizens’ satisfaction. To achieve this goal, they developed a model composed of three key components: (1) improvement in infrastructure, (2) efficiency in the communications infrastructure, and (3) redesign of business processes to increase the efficiency of the municipality.

The obligations and rights of all employees are described in the internal regulations and in procedural manuals that indicate how to perform a task within the municipality. In fact, each area has a specific job description, which facilitates the implementation of projects among teams. Several administrative procedures were designed so that IT department staff could properly execute their duties; these were included in the internal regulations. The municipality also developed more general legal regulations and guidelines—such as guidelines for the proper use of email and the web portal. These processes are documented to generate standardized reports.

To maximize the resources and capabilities of IT, the municipality has established technical standards and protocols for interoperability across different applications and platforms,

emphasizing the concepts of usability and scalability. The municipality has enhanced its privacy and security policies, establishing minimum quality standards. The municipality has placed special emphasis on the Web page design, trying to create a uniform environment with an easy to understand language and standardized colors, fonts, and templates.

The process for making decisions about the implementation of new projects or for acquisition of infrastructure and technology is highly related to Puebla's investment priorities. When the municipality is launching a new program, the IT department makes a proposal, which is addressed to the President or the Secretary of Municipal Administration, explaining precisely what they want to implement, how long it will be executed, what amount of investment is required, what potential benefits exist, and the number of citizens who would benefit. Subsequently, the President or the Secretary of Municipal Administration evaluates the proposal and determines whether it is viable; if approved, the IT department begins the necessary procedures to manage resources.

As part of its e-government strategy, the municipality of Puebla has made significant investments to generate resources and capabilities in order to meet its objectives. These investments have yielded expanded coverage of the Wi-Max network to provide free wireless Internet access in several areas of the city; use of the SAP platform in areas like finance, human resources, and ABAP (application development); development of geographic information systems (GIS); and a platform for the management of relations with citizens (CRM). Notably, over 90 percent of the projects and applications Puebla has launched were developed internally, with only the phone and Internet connections provided by two private companies.

It is important to note that at the beginning of the new administration, a significant portion of the IT staff had no relevant qualifications in IT. In order to build the necessary skills, training programs were introduced for all staff to have a similar background and a common language to develop new projects. The good performance of teams would not be possible without ongoing training programs to enable IT staff to gain new knowledge on technological applications. In recent months many of the staff members have participated in educational programs to obtain certifications in various SAP modules. Today the IT team is composed of about 100 people.

With the capabilities and resources established, the efforts of the city of Puebla have been focused on e-services and e-administration. For example, in terms of e-administration, implementation of SAP has allowed the city to integrate a large number of processes and systems, providing efficient operation at government offices. Puebla has made progress in building a unified Internet portal for e-services, where individuals can complete transactions like paying for an online service or arranging for the immediate opening of a new business. A major project is "Connection on Time," which aims to improve the digital literacy of people living in marginalized areas, especially the elderly. This project is complemented by the delivery of free wireless Internet in various areas of the city, such as the downtown area and public parks. Thanks to the training program for the elderly, the digital divide has been reduced and the number of citizens who may be in contact with government through IT has increased.

Regarding local development, the Internet portal provides tourist information about the city, which encourages people from other locations to visit and allows residents to be informed about

their municipality (including its history and events). Similarly, citizens may be in continuous communication with the government through social networks like Facebook or Twitter, through which they receive government news, information about the city, or announcements of new policies and programs within the city.

Fundamental to the proper performance of an e-government strategy are the actions of monitoring and evaluation. In Puebla, the performance of project teams is continually reviewed to verify that they are achieving their objectives. If performance is not satisfactory, the city develops new actions to guide programs and projects towards their originally proposed goals. Finally, it is important to note that the main challenges faced by the municipality in implementing its e-government strategy have been the short period of government (three years) that hinders the consolidation of projects, limited financial resources, and resistance to change from the staff.

Colima

When a new administration took power, Colima's technology infrastructure was outdated, cables interconnecting the functional areas were improperly installed or broken, and the number of e-services applications were limited and had major problems. Therefore, the first step in creating an e-government strategy for Colima was to combat the technological gap in order to be able to meet the overall objectives of this strategy. These objectives included maintaining the current cutting-edge applications and developing new projects that could impact the citizenship and not just the municipality. The IT department's mission was to provide information technology support to the city and its decentralized units in an efficient and transparent way.

The IT policy of the municipality of Colima, according to those interviewed, was based on planning and continuous improvement. The city council developed a strategic document focusing on specific administrative procedures, such as maintenance processes and systems development; however, they did not establish any formal methodologies. The proper performance of teams has been possible thanks to the continuity of training programs that have allowed staff to be motivated, gain new knowledge, and certify their skills in different applications or administrative programs. The efficiency of the IT department's operations has resulted in eight of its processes achieving the ISO 9001:2008 certification.

The decision process for executing and implementing new technology projects is built on the municipality's investment priorities, as well as the needs of the IT department and other functional areas. The first step is submitting a proposal, subject to an analysis of the project's requirements, to the Secretary of Finance, who delivers it to the Mayor. The Mayor assesses the relevance of new programs, their implementation time, benefits, and costs. Investment priorities are based on the number of citizens who would benefit from the proposed project.

The municipality has heavily invested in infrastructure, as well as systems, applications, and the interconnection of their buildings. The projects implemented in the short run consisted in the strengthening of infrastructure, the modernization of software and applications, the redesign of the telecommunications network, digitalization of archives from different municipal areas, the purchase of computers, and new infrastructure connections based on the technical standards more representative of the telecommunications industry. The operation of the IT department is

capabilities must be seen as a firm's strategic assets which are hard to imitate, scarce, appropriable, and specialized—features that give the company a competitive advantage (Amit and Schoemaker 1993).

It was also necessary to develop an approach that allowed for identifying the firm's capabilities dimension as an advantage and explained how combinations of expertise and resources could be developed, deployed, and protected. This approach is known as dynamic capabilities (Teece et al. 1997). The importance of dynamic capabilities lies in their ability to create, integrate, recombine, and release resources, thus modifying the original resource base. In the long term a competitive advantage lies in using dynamic capabilities sooner, more astutely, or more fortuitously than the competitors to create an advantageous resource configuration (Eisenhardt and Martin 2000). Finally, the most relevant criticisms of RBV can be summarized as follows: it is tautological, its applicability is too limited, and it has limited prescriptive implications. Therefore, it cannot be considered a theory (Priem and Butler 2001). RBV has reemphasized the importance of organizations in strategy research, but offers little guidance on key questions (Hoopes et al. 2003).

RBV has been incorporated into the analysis of the role that information systems and information technologies play in organizations' performance. RBV provides an analytical framework for assessing the strategic value of information systems, as well as a guide for differentiating between various types of information systems and evaluating their impact on performance of the organization (Wade and Hull 2004). Some empirical studies has showed that managerial IT skills are only one of four attributes that can provide sustainability; the other attributes analyzed were capital requirements, proprietary technology, and technical IT skills (Mata 1995).

Other empirical research has found a positive and significant relationship between superior IT capability and superior firm performance, as well as superior current and sustained firm performance when compared to average industry performance (Bharadwaj 2000; Santhanam and Hartono 2003). A model of the relationships between capabilities and competitive advantage shows that the quality of IT business expertise and the relationship infrastructure (competitive capabilities) significantly affect competitive advantage and that the intensity of organizational learning (dynamic capability) was significantly related to all of the capabilities (Bhatt and Grover 2005).

A study of how a public sector organization developed a new strategic approach based on the identification and use of internal dynamic capabilities showed that in the first stage managers identified dynamic capabilities, while in the second stage they established levels of trust to enable the uses of these capabilities. These managers found ways to manage the tensions between the enthusiasm to innovate and the necessity of constrain and guide innovations from an organizational perspective. Finally, an analysis of the implementation of an E-File System in a Singaporean government agency concluded, "During the planning phase, where the environmental climate was imperative, the focal capability was the capability to be innovative. During the developing phase, where the environmental climate was commutative, the focal capability was the capability to be adaptive. Finally, during the operating phase, where the environmental climate was propulsive, the focal capability was the capability to be responsive" (Chang and Pan 2006, 492).

supported by government resource planning systems (GRP) and geographic information systems (GIS). Both systems and applications are subject to strict privacy and security policies and continuously perform tasks related to scalability and interoperability.

To select the IT staff at the beginning of the administration, the city's leadership identified and retained staff members with the necessary technological profile; after this first round of selection, the employees were tested for a few months. When the city's decision makers found talent and willingness to work, they formalized those staff contracts. In recent months, according to the IT director, the need for more and better training to focus on maintenance and safety has emerged, as well as the certification of personnel within the IT department. The IT department has a staff of 14 individuals.

Colima has focused its efforts on giving people more government access channels—such as banks, ATMs, government offices, and the Internet—to provide quality public services to citizens. Some major projects are the SARE system (Rapid Business Opening), created for citizens to open a business as quickly as possible; the MIRA Project (Interactive Monitoring and Actions of Government), designed to collect public reports about community issues by telephone, cell phone, email, and the Internet, with a commitment to respond no later than 24 hours after the report; and finally, a network which aims to provide wireless Internet access throughout the city center. Colima's Web portal has helped many people learn more about the city and to be more knowledgeable about their elected representatives and the actions being carried out by the municipality. The website also displays information about tourism and the main attractions of the city, which can stimulate and promote local development.

In order to evaluate the results of new IT initiatives and to suggest new plans of action for the e-government strategy, the Mayor, the Secretary of Finance, and the Director of IT continuously meet to assess the progress of the strategy. During these sessions, they verify that the actions taken are consistent with the Municipal Development Plan and are therefore based on two pillars: citizen satisfaction and government efficiency. The progress of the e-government strategy in the city of Colima was very important because of their rapid IT development. However, there have been significant challenges, such as limited financial resources, resistance to change by staff, and bureaucratic holdups in the municipal bidding process. In order to reduce bureaucracy in the procurement process, the municipality is promoting the internal development of applications that fit better with the city's requirements, avoiding intermediaries and unnecessary authorizations.

San Nicolas de los Garza

The e-government strategy implemented in San Nicolas de los Garza dates back more than ten years. The first step for the current administration was developing guidelines to successfully continue the e-government strategy. The IT department's mission is to provide public services to citizens based on the tenets of quality, process, satisfaction, transparency, and good governance. The department also established a work plan that considers three closely related pillars: (1) processes, (2) computers, and (3) quality. The plan's objectives are to develop software that helps to save money and better manage the municipality, obtain resources through partnerships with suppliers, carry out new projects for more efficient government processes, create a citizen-government approach, and improve the bandwidth of the network that interconnects various government offices.

Administrative procedures were put in place to help support the strategy and to allow staff to maximize their capabilities. These procedures were documented in manuals for development, technical support, and call center operations, all of which can be accessed on the municipality intranet page. There is also an internal working method for the IT department, which was derived from the Department of Quality and Process at City Hall. In order to ensure efficiency in operations, various processes are certified under ISO 9001, while the Police department has gained the CALEA certification, thanks to its collaborative efforts with the IT department. New IT projects in the city begin with a request to the IT department, which then makes a proposal to meet this request and sends it to the Secretary of Administration or the Mayor. The decision to implement the project is based on a cost-benefit comparison.

With respect to personnel, the IT department has a staff of 30, with very detailed job descriptions. There is a philosophy of teamwork, where the staff has to focus their efforts toward the same goal; for example, achieving the welfare of society through a governmental function that is properly supported by IT. The IT Director of San Nicolas de los Garza organizes meetings and events with staff on days outside working hours in order to learn more about their personal projects, interests, and concerns. According to his testimony, these meetings have helped to improve the performance of the IT department because this informal setting allows issues that would be difficult to deal with during daily working hours to be openly discussed.

The municipality has invested in the generation of resources and capabilities to successfully achieve its e-government strategy. For example, within the town hall offices is the Centro Integral de Atención Ciudadana (CIAC), which is the space where the IT infrastructure is installed and protected. Servers, routers, firewalls, and computer equipment are in a specific room called "Site." Another place with excellent technological infrastructure is the police department building (which is approximately 10 minutes from town hall). The police maintain close links with the IT department because they have to be continually working on the installation of GPS and cameras in the city.

With regard to applications, most are developed internally, using very little outsourcing. All of the software and technological tools are governed by the common programming standards of the market and follow strict quality standards, with interoperability and usability being key elements in achieving administrative efficiency and citizen satisfaction. Some of the systems used in the municipality are a government resource planning (GRP) system, geographic information systems (GIS), and management systems for public relations with citizens (CRM). The main transactions the city has implemented are administrative functions, mapping, real property system, mobile device support for road transport, road permits through the internet, remote management of energy, management of traffic lights, a single window for procedures, management of cameras in public places, and alarms in schools. The city has promoted the construction of a wireless network in public areas. Currently, four public parks have Wi-Fi and in the coming months that coverage will increase to include other parks and public areas.

This municipality has been promoting the use of IT among its citizens and has achieved reductions in the digital divide. Similarly, it has increased transparency of government actions because citizens can use the Web portal to learn how the municipal government is using its

resources and what results they have obtained. The website also helps people learn more about their government (including general information, history, and relevant news and upcoming events, to name a few) and to promote tourism, leading to local development of San Nicolas de los Garza. The use of social networking has been vital in generating government-citizen interaction. The municipality and several of its agencies are using Facebook or Twitter in order to understand the demands of society, as well as to have a more informal and close communication with citizens.

Others key elements for the proper performance of the city’s e-government strategy are its monitoring and evaluation. The Head of Technical Support is in continuous collaboration with the IT department staff, as well as other functional areas of municipality. The Director of IT and the Technical Support Manager meet regularly with the Secretary of Administration to determine whether the actions taken so far have been satisfactory. If not, a diagnosis is made to see what went wrong and establish new ways action to achieve continuous improvement in the short and medium term.

The main challenge the municipality faces in implementing the e-government strategy is its limited financial resources, which can hinder the implementation of all the projects that are planned. Unlike what happens in other municipalities, there have been no problems associated with resistance to change, primarily because the staff appears to be familiar with the use and benefits of IT. However, it was found that the staff requires detailed performance indicators and procedure manuals; without them, the maintenance and improvement of systems was not as efficient. Table 1 shows a comparison of core capabilities and resources found in the three cases.

Table 1. Comparing Core Capabilities and Resources across the Three Cases

Puebla	Colima	San Nicolas de los Garza
<ul style="list-style-type: none"> • Internal Infrastructure • Infrastructure to provide free internet • Trained workforce • Standardization and institutionalization of procedures • Self-knowledge for application development • Officials who have understood the potential of e-government and IT in general • Development of applications for e-services and e-administration • Create formal and informal channels of communications between authorities 	<ul style="list-style-type: none"> • Internal Infrastructure • Infrastructure to provide free internet • Trained workforce • Self-knowledge for application development • Officials who have understood the potential of e-government and IT in general • Development of applications for e-services and e-administration • Create formal channels of communications between authorities 	<ul style="list-style-type: none"> • Internal Infrastructure • Infrastructure to provide free internet • Trained workforce • Staff with IT use experience • Standardization and institutionalization of procedures • Self-knowledge for application development • Officials who have understood the potential of e-government and IT in general • Development of applications for e-services and e-administration • Create formal and informal channels of communications between authorities

5. Initial Model Conceptualization and Next Steps

Figure 1 shows the initial model conceptualization, which is based in the comments from 34 local CIOs and the three cases described in the previous section. We are in the process of formulating this model in order to explore the impacts of several investment strategies in the development of resources and core capabilities, as well as social impacts, efficiencies, savings, and the revenue generated by the local government. For the next version of the model, we envision having a series of stocks describing core resources and capabilities, all of them depending on investment priorities and a limited budget. In this way, we will compare investment strategies for infrastructure, as opposed to strategies with a focus on processes or systems development. We believe that such experiments have the potential of providing insight about the interrelations and relative importance of the core capabilities and resources described in Figure 1.

The conceptualization of the model in its current state includes key activities, accumulations, and feedback loops; it is intended to serve as a guide for developing an effective digital government strategy at the local level in Mexico. The model in Figure 1 includes 12 key accumulations or core resources and competencies for local governments. As it is shown in the three cases, these core competencies and resources are associated with a strategy and key components of a digital government model. In the current conceptualization, not all flows (activities) are shown explicitly, with the purpose of making the diagram simpler.

The main technical resources are all represented in the stocks inside the rectangle on the right side of the figure. These four stocks are all built through effort in work, and the quality or efficiency of this work. Effort in work is conceptualized as a result of financial or human resources in the IT department in the municipal government, and quality and productivity of this work results from IT staff expertise and the clear articulation of plans and objectives inside the IT department. Public policies and other legislation also have an effect on these activities, either constraining or enabling them. In fact, all of these technical resources constrain or enable the development of other technical resources. For instance, infrastructure is necessary for the development of applications and systems, and the state of this infrastructure has an impact on the performance of systems and their potential to result in benefits to government operations or the society. We envision formulating these accumulations as a quantity and a quality associated with each of the flows. For example, infrastructure will be a co-flow involving the actual size of the infrastructure and its age as a measure of the current state of the infrastructure. To be able to develop effective applications and systems, local governments will need to have an appropriate amount of infrastructure, which is sufficiently updated to support the applications (see Figure 2).

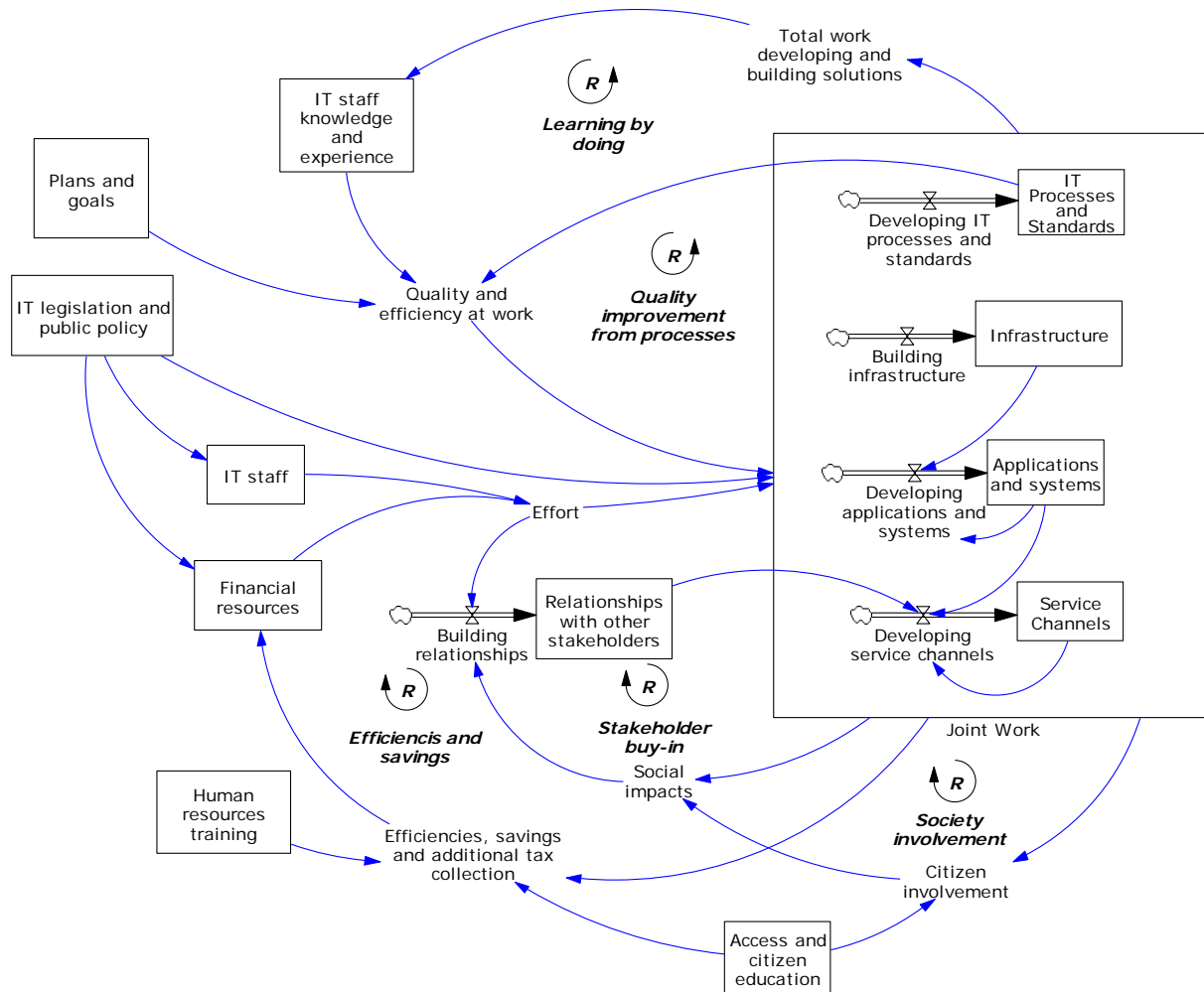


Figure 1. Initial Model Conceptualization

The development of infrastructure, IT processes and methods, systems, applications, and delivery channels all promote the development of benefits such as efficiencies, increases in tax collection, citizen participation, and other important social impacts. Of course, these benefits are not only the result of technology use, but other organizational and contextual factors, such as IT training of government employees or citizens' access to technology.

Our conceptualization includes five main reinforcing loops. All of these loops have the potential to promote the development of a digital government strategy, but all of them can also work as traps when capabilities and resources are not well developed. The first of these loops represents learning and expertise accumulation from the IT staff in developing infrastructure and applications. Again, although this loop can be seen as a virtuous cycle, when IT staff has limited expertise, they are not productive enough to progress in the development of technical resources, and in turn have a low learning rate. This loop then implies a challenge for many local governments that lack sufficient IT expertise.

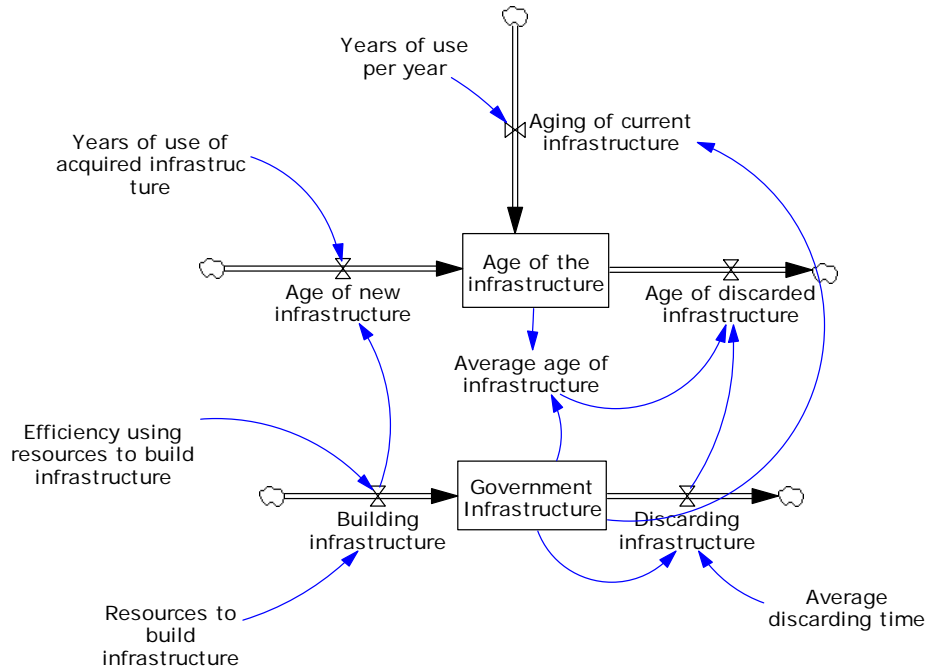


Figure 2. Government infrastructure as a co-flow

The second feedback loop shows the impact of IT methods and standards on productivity, suggesting that this technical capability may have an investment priority when compared to other resources. The loop named efficiencies and savings suggests that one way of acquiring additional resources to increase effort is through savings and efficiencies that result from digital government projects and applications. Finally, two more important feedback loops included in the initial conceptualization represent public involvement and buy-in of key stakeholders. These processes are, from our point of view, closely related to the social impact of digital government strategies. All these loops are, as we established in previous paragraphs, reinforcing in nature. In this way, they all represent traps in the initial stages of a strategy implementation. We will continue the formulation and testing of the model, and we expect to have a first full version to be presented at the conference.

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7. References

Andersen, D. F., Belardo, S., and Dawes, S. S. “Strategic Information Management: Conceptual Frameworks for the Public Sector.” *Public Productivity and Management Review* 17 (1994): 335-353.

Asgarkhani, M. “The Reality of Social Inclusion Through Digital Government.” *Journal of*

Technology in Human Services 25 (2007): 127-146.

Asgharizadeh, E., Geshlajoughi, M. A., and Mirmahalleh, S. R. S. "Identification of the Electronic City Application Obstacles in Iran." *Proceedings of World Academy of Science: Engineering & Technology* 31 (2008):295-300.

Baker, P. M. A., Hanson, J., and Myhill, W. N. "The promise of municipal WiFi and failed policies of inclusion: The disability divide." *Information Polity - The International Journal of Government & Democracy in the Information Age* 14 (2009): 47-59.

Barney, J.B. "Is the Resource-Based Theory a Useful Perspective for Strategic Management Research? Yes." *Academy of Management Review* 26 (2001): 41-56.

Barney, J.B., Wright, M., and Ketchen Jr., D.J. "The resource-based view of the firm: Ten years after 1991." *Journal of Management* 27 (2001): 625-641.

Bharadwaj, A. "A Resource-Based Perspective on Information Technology Capability and Firm Performance: An Empirical Investigation" *MIS Quarterly* 24 (2000): 169-196.

Bhatt, G., and Varun Grover. "Types of Information Technology Capabilities and Their Role in Competitive Advantage: An Empirical Study." *Journal of Management Information Systems* 22 (2005): 253-277.

Beynon-Davies, P., and Williams, M. D. "Evaluating electronic local government in the UK." *Journal of Information Technology*. 13(2003): 137 -149.

Black, L. J. "Collaborating Across Boundaries: Theoretical, Empirical, and Simulated Explorations." Ph.D. diss., MIT, 2002.

Conner, K.R. "A Historical Comparison of Resource-Based View and Five Schools of Thought within Industrial Organization Economics: Do We Have a New Theory of the Firm?" *Journal of Management* 17 (1991): 121-154.

Cresswell, A. M. *Return on Investment In Information Technology: A Guide for Managers*. Albany, NY: Center for Technology in Government, University at Albany, SUNY, 2004.

Dawes, S. S., Pardo, T. A., Simon, S., Cresswell, A. M., LaVigne, M., Andersen, D., and Peter A. Bloniarz. *Making Smart IT Choices: Understanding Value and Risk in Government IT Investments*. Albany, NY: Center for Technology in Government, University at Albany, SUNY, 2004.

Evans-Cowley, J., and Manta Conroy, M. "The growth of e-government in municipal planning." *Journal of Urban Technology*, 13 (2006): 81-107.

Fagan, M. H. "Exploring city, county and state e-government initiatives: an East Texas perspective." *Business Process Management Journal* 12 (2006): 101-112.

Gil-García, J. R., and Pardo, T. A. "E-Government Success Factors: Mapping Practical Tools to Theoretical Foundations." *Government Information Quarterly* 22(2008): 187–216.

Grant, R.M. "The Resource-Based Theory of Competitive Advantage: Implications for Strategy Formulation." *California Management Review* 33 (1991): 114–135.

Heeks, R. *Implementing and Managing eGovernment: An International Text*. London: SAGE, 2005.

Holden, S. H., Norris, D. F., and Fletcher, P. D. "Electronic Government at the local level." *Public Performance & Management Review* 26(2003): 325-344.

Hoopes, D.G, Madsen, T.L., and Walker, G. "Guest Editors' Introduction to the Special Issue: Why is There a Resource-Based View? Toward a Theory of Competitive Heterogeneity." *Strategic Management Journal* 24(2003): 889–902.

Jensen, M. J., Danziger, J. N., and Venkatesh, A. "Electronic Government, Electronic Democracy, and Modalities of Membership in the Local Political Community." Paper presented at the Conference Papers -- Western Political Science Association, Portland, OR, March 11, 2004.

Kaylor, C., Deshazo, R., and Eck, D. V. "Gauging e-government: A report on implementing services among American cities." *Government Information Quarterly* 18 (2001): 293 – 307.

Koh, C. E., Prybutok, V. R., and Zhang, X. "Measuring e-government readiness." *Information & Management* 45 (2005): 540-546.

Kopainsky, B., and Luna-Reyes, L. F. "Closing the Loop: Promoting Synergies with other Theory Building Approaches to Improve System Dynamics Practice." *Systems Research and Behavioral Science* 25(2008): 471-486.

Larsen, K. "A Taxonomy of Antecedents of Information Systems Success: Variable Analysis Studies." *Journal of Management Information Systems* 20(2003): 169 – 246.

Luna-Reyes, L. F., Gil-García, J.R., and Celorio Mansi, J.A. *Hacia un Modelo de Gobierno Electrónico a Nivel Municipal para México: Reporte de Resultados de Talleres con Directores de Informática Municipales*. Puebla, México: Universidad de las Américas Puebla-INFOTEC, 2010.

Luna-Reyes, L. F., Zhang, J., Gil-García, J.R., and Cresswell, M.A. "Information Systems Development as Emergent Socio-Technical Change: A Practice Approach." *European Journal of Information Systems* 14(2005): 93-105.

Mahoney, J.T., and Pandian, J.R. "The Resource-Based View Within the Conversation of Strategic Management." *Strategic Management Journal* 15 (1992): 363–380.

- Makadok, R. "Toward a Synthesis of the Resource-Based View and Dynamic-Capability Views of Rent Creation." *Strategic Management Journal* 22 (2001): 387–401.
- Moon, M. J. "The Evolution of E-Government among Municipalities: Rhetoric or Reality?" *Public Administration Review* (2002): 424-433.
- Patrick, S. "The Dynamic Simulation of Control and Compliance Processes in Material Organizations." *Sociological Perspectives*, 38(1995), 497-518.
- Peteraf, M.A. "The Cornerstones of Competitive Advantage: A Resource-Based View." *Strategic Management Journal* 14 (1993): 179–191.
- Priem, R.L., and Butler, J.E. "Is the Resource-Based Theory a Useful Perspective for Strategic Management Research?" *Academy of Management Review* 26 (2001a): 22–40.
- Priem, R.L., and Butler, J.E. "Tautology in the Resource-Based View and Implications of Externally Determined Resource Value: Further Comments." *Academy of Management Review* 26 (2001b): 57–66.
- Reddick, C. G. "Empirical Models of E-Government Growth in Local Governments." *e-Service Journal*, 3(2004): 59-74.
- Reddick, C. G., and Frank, H. A. "e-government and its influence on managerial effectiveness: a survey of Florida and Texas city managers." *Financial Accountability & Management* 23 (2007): 1-26.
- Rugman A.M., and Verbeke, A. "Edith Penrose's Contribution to the Resource-Based Views of Strategic Management." *Strategic Management Journal* 23 (2002): 769–780.
- Sandoval, R., and Gil-García, J. R. "Assessing E-Government Evolution in Mexico: A Preliminary Analysis of the State Portals." Paper presented at the 2005 Information Resources Management Association International Conference, San Diego, Cal., May 15 -18, 2005.
- Santhanam, R., and Edward Hartono "Issues in Linking Information Technology Capability to Firm Performance." *MIS Quarterly* 27 (2003):125-153.
- Sterman, J. D. *Business Dynamics: Systems Thinking and Modeling for a Complex World*. Boston: Irwin/McGraw-Hill, 2000.
- Stowers, G. N. L. *Measuring the Performance of E-Government*. Washington, DC: The Center for the Business of Government: 2004.
- Streib, G. D., and Willoughby, K. G. "Local governments as e-governments: meeting the implementation challenge." *Public Administration Quarterly* 29 (2005): 78-110.
- Torres, L., Pina, V., and Acerete, B. "E-government developments on delivering public services

among EU cities.” *Government Information Quarterly* 22 (2005): 217-238.

UNPAN, *UN E-Government Survey 2008: From E-Government to Connected Governance*. New York: United Nations Publications, 2008.

Vriens, D., and Achterbergh, J. “Planning local e-government.” *Information Systems Management* 21 (2004): 45-57.

Walsh, C. “E-government should make contact with councils easier.” *New Media Age*, 17 (2005).

Weiss, T. R. “State, Local Governments Slow to Tackle Web 2.0.” *Computerworld*, June 23, 2008.

Wernerfelt, B. “The Resource-Based View of the Firm: Ten Years After.” *Strategic Management Journal* 16 (1995): 171–174.

Wernerfelt, B. “The Resource-Based View of the Firm.” *Strategic Management Journal*; 5 (1984): 171 – 180.

West, D. M. “Improving Technology Utilization in Electronic Government around the World, 2008.” The Brooking Institution. Accessed November 20, 2009. http://www.brookings.edu/reports/2008/0817_egovernment_west.aspx

Wohlers, T. “A Case Study of the Diffusion of E-Government in Local Government.” Paper presented at the annual meeting of the Midwest Political Science Association 67th Annual National Conference, The Palmer House Hilton, Chicago, IL, April 02, 2009.

Yang, K. “E-government: A Blessing to Citizen Involvement in Local Government?” Paper presented at the annual meeting of the The Midwest Political Science Association, Palmer House Hilton, Chicago, Illinois, April 07, 2005.