A Dynamic-Capabilities View of Local Electronic Government: Lessons from Two Successful Cases

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Abstract
This paper proposes the use of the dynamic-capabilities view of the organization and system dynamics as a modeling technique to understand the core capabilities that local governments need in order to benefit from their use of information and communication technologies, what has been recently called electronic government. Based on two case studies of local governments in Mexico, we propose a preliminary conceptualization of the core capabilities and resources necessary for a successful digital government strategy. Our preliminary experiments suggest that a strategic focus on IT standards, processes, and people has a higher pay-off than a focus on IT infrastructure and systems.

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. The inclusion of electronic government (or e-government) strategies responds to the promise of ICT to create value for government, citizens, businesses, and other stakeholders. 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. In this way, benefits from ICT are to a large extent still a promise for many government organizations.

Local governments are not an exception in this regard and they face additional challenges. In fact, 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 [1]. Furthermore, 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. The general lack of resources available to local governments and their CIOs is a common problem for many countries around the world [2]. As a result, local governments often fail to achieve the objectives and promises of digital government.

Two main perspectives have been taken to explain the limited success of government IT initiatives. Frequently based on variance models and statistical analysis, the first of these two perspectives has focused on identifying key success factors [3]. In contrast, a second approach consists of detailed studies of particular initiatives using process models and qualitative analysis [4]. Following this later tradition and enriching it with the dynamic-capabilities view of the organization, we propose 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 electronic government strategy?

The paper is organized in six sections, including the foregoing introduction. Section two presents a review of previous studies on local e-government and the dynamic-capabilities view of the organization. Section three describes the research design and methods used for this study. Section four analyzes two cases of Mexican local governments that are considered successful. Section five presents a system dynamics model and some experiments associated with the two cases. Finally, section six provides some concluding remarks.

2. Literature review
This section reviews recent research in two areas relevant to our work. The first part of the section includes a review of studies on electronic
government, with particular attention to research on local governments. The second subsection includes a review of the resource-based view of the organization, emphasizing the dynamic capabilities perspective.

2.1. Electronic government at the local level

Some of the most important areas of opportunity for e-government at the local level are providing information and services, 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. 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 also an essential component [5].

The adoption of e-government at the local level is the result of organizational factors (resources and capabilities of the government’s IT department) and contextual factors (external influences such as citizen demands or the political environment) [6].

Among the main determinants of the success of e-government strategies are an appropriate e-government infrastructure [7]; the existence of digital citizens [8]; the provision of interactive services [9]; and the inclusion of citizens in order to more precisely understand the problems and opportunities in the community [10].

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. 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 [11].

Although e-government brings great benefits for the entire population, it is a reality that there are difficulties associated with it. Many localities are facing constraints in two key areas: financial and human capabilities. A survey of local 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 financial burden caused by the payment of fees for online transactions [2].

Other factors that impede the advancement of e-government, especially in developing countries, are limitations in the technical infrastructure, cultural and educational paradigms, appropriate software acquisition, the large investment necessary to begin, security and privacy issues, 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 [12].

2.2. Dynamic-capabilities view of the Organization

In 1991, J. Barney [13] 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.

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. Not only resources, but also 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 [14]. This approach is known as dynamic capabilities [15].

The importance of dynamic capabilities lies in their ability to create, integrate, recombine, and release resources, thus modifying the original resource base of the organization. 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. Finally, the most relevant criticisms of this view can be summarized as follows: it is tautological, its applicability is too limited, and it has limited prescriptive implications. Therefore, according to some authors it cannot be considered a theory [16].

We think that the dynamic capabilities view 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. Some empirical studies have shown that managerial ICT skills are only one of four attributes that can provide
studies were selected, both considered success stories. Two individual case local governments within different states in Mexico. Thirty-four CIOs from the implementation of e-government strategies in the views and experiences of CIO’s on the components of the project.

This paper reports on the third and the fourth three case studies of local governments in Mexico. (3) three workshops with municipal CIOs; and (4) citizens in Mexico about local government services; models at the local level; (2) a national survey of current practices of e-Government and e-Government implementation. On the other hand, the dynamic-capabilities view of the firm is useful to understand the relationships between ICT use (digital government) and local government performance. Therefore, the current study proposes a theoretically and practically sound perspective that has not been fully applied in previous 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 on the third and the fourth components of the project.

The main purpose of the workshops was to gather the views and experiences of CIO’s on the implementation of e-government strategies in Mexican local governments. Thirty-four CIOs from local governments within different states in Mexico participated in the workshops. Two individual case studies were selected, both considered success stories in the field of local e-government in Mexico. One important component of both the workshops and the case studies was the assessment of core resources and capabilities such as financial resources, personnel, infrastructure, systems, and applications, as well as the potential relationships among them.

System dynamics relies on a variety of qualitative and quantitative data sources in the construction and formulation of dynamic mathematical 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. 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.

The model-building process includes many iterative assessment and validation elements [19]: seeking face validity, verifying model parameters, checking for dimensional consistency, running sensitivity tests, and qualitatively assessing the model behaviors. 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 main constructs of the dynamic-capabilities view.

4. Two cases of success in Mexican municipal government

This section briefly describes two cases of successful local electronic government in Mexico. The purpose of describing them is to derive lessons about their strategies, primary resources, and capabilities, which then we apply and represent in a system dynamics model at the end of this paper. Although both are success stories, they are different in terms of strategies and focus on capabilities. The first municipality has a shorter history. In fact the IT leadership has changed every three years with the change of local administration. The second case, on the other hand, has about 11 years of continuity, much less human resources, but an important focus on the development of IT processes and standards. In this way, we have called the first local government, the municipality of Effort, and the second one, the municipality of Continuity. Although both Municipalities have an important effort to link to
external partners, our current modeling efforts focus only in the technical and strategic components of each municipality.

4.1. Effort municipality

Effort began its digital government strategy with a diagnosis of the IT department’s problems. In fact, 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 government-wide ICT guidelines, manuals, or procedures.

4.1.1. Strategy. IT policies and planning. Based on this diagnosis the authorities designed a comprehensive IT policy with the objective of generating a technology-government fusion in order to improve government efficiency and citizen satisfaction.

IT governance. To perform the functions of IT governance groups of top level officials and an IT leading group were put together. The involvement of both the President (Mayor) and the Secretary of Municipal Administration has been consistent and instrumental for a greater use of IT in the City government.

Investment priorities. There have been major investments for the improvement of equipment and IT infrastructure, systems and applications, creating a website, and the extension of the public network to Wi-Max coverage.

Resource management. When the municipality is launching a new program, the IT department makes a proposal explaining precisely what they want to implement, how long it will take to be executed, what amount of investment is required, what potential benefits exist, and the number of citizens who would benefit.

Key Processes. Key areas include public attention, the opening of business, service delivery and online payment, taxes, local development, and information provision.

IT Standards. The municipality has established technical standards on interconnection, communications, and programming languages. Also the obligations and rights of all employees are described in the internal regulations and in procedural manuals that indicate how to perform a technical task within the municipality.

IT Training. In order to build the necessary skills, training programs were introduced for all IT 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 ICT staff to gain knowledge on new technological applications.

Monitoring and evaluation. In Effort, the performance of digital government project 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.

4.1.2. Technology. Infrastructure. The municipality of Effort 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 and having a building intended exclusively for the IT department.

Technical standards. To maximize the resources and capabilities of ICT, 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 also enhanced its privacy and security policies.

Systems and applications. With the capabilities and resources established, the efforts of the city of Effort have been focused on e-services and e-administration. Effort has made progress in building a unified Internet portal for e-services, where individuals can complete online transactions like paying for a service or arranging for the opening of a new business. It is also important to note the use of the SAP platform in areas such as finance, human resources, ABAP (application development); the development of geographic information systems (GIS); and a platform for the management of relations with citizens (CRM).

Distribution channels. City website only.

Finally, it is important to note that the main challenges faced by Effort in implementing its e-government strategy have been (1) the short period of each local government administration (three years), which hinders the consolidation of projects, (2) the limited financial resources available, and (3) the resistance to change from many city government staff members. Moreover, the recent change of administration came with a change on IT leadership, making continuity to projects a very difficult task.

4.2. Continuity municipality

In contrast to Effort, the e-government strategy implemented in Continuity dates back more than ten years. The CIO and several IT staff members have
been working for the city for 3 to 4 local government administrations.

4.2.1. Strategy. *IT policies and planning.* The first step for the current administration was developing guidelines to successfully continue the e-government strategy. The IT department's objectives are (1) to develop software that helps to save money and better manage the city, (2) obtain resources through partnerships with suppliers, (3) carry out new projects for more efficient government processes, (4) create a citizen-government approach, and (5) improve the bandwidth of the network that interconnects various government offices within the city.

*IT governance.* The operation of the Department of Computer rests on five people, including the IT Director and the Deputy Productivity Manager.

*Investment priorities.* Major investments have been for (1) the improvement of equipment and IT infrastructure, (2) systems and applications, (3) creating a website, (4) the extension of the public network to Wimax coverage, (5) surveillance equipment for public safety, and (6) monitoring equipment for the utilities.

*Resource management.* New ICT 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 analysis.

*Key processes.* Key areas include public attention, public safety, efficiency of public services, service provision and online payments, taxes, local development, and the provision of information.

*IT Standards.* There is an internal working method for the ICT department, which was developed by the Department of Quality and Processes of the city government.

*IT Training.* With respect to personnel, 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 government function that is properly supported by IT. The IT Director of Continuity organizes meetings and events with staff outside working hours in order to learn more about their personal projects, interests, and concerns.

*Monitoring and evaluation.* Monitoring and evaluation are also consider key elements of the city’s e-government strategy. 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 they establish new actions to achieve continuous improvement in the short and medium term.

4.2.2. Technology. *Infrastructure.* 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 ICT 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 and maintenance of GPS devices and cameras throughout the city.

*Technical standards.* All of the software and technological tools are governed by the common programming standards and follow strict quality standards, with interoperability and usability being key elements in achieving administrative efficiency and citizen satisfaction.

*Systems and applications.* Some of the systems used in the municipality are a government resource planning (GRP) system, a geographic information systems (GIS), and a management systems for public relations with citizens (CRM). The main transactions the city has implemented are administrative functions, mapping, special rate 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.

*Distribution channels.* Public services are offered through banks, ATMs, public offices and the city website.

The main challenge the city faces in implementing its e-government strategy is the limited amount of financial resources available. 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.

5. Model conceptualization

We use System Dynamics to contribute to the understanding of electronic government management at the local level. The method is consistent with the
Dynamic Capabilities approach to management. System Dynamics models assume that the actors within the system perform activities that result in the development of capabilities that accumulate over time. For example, a programmer writes code lines (activity) that result in programs and applications (accumulation). Moreover, the effectiveness of some of these activities is often increased or limited by one or more accumulations, or the ratio between a pair of them.

Figure 1 illustrates the various components of a system dynamics model. The rectangles in the figure represent accumulations or capabilities (systems and government infrastructure), and the valves represent activities to develop these capabilities. Each of the activities in the figure depends in turn on the effort in man-hours devote to each activity and actors’ productivity. Finally, the figure shows the relationship between the two accumulations (Adequacy of infrastructure) as a factor that limits or increases the flow of activity. Thus, if the infrastructure is not adequate, the productivity of system developers will be affected negatively.

Figure 1. Example of flows, stocks and feedback loops.

5.1. Model structure

This section of the paper presents a conceptual dynamic model (LocalGovernment1) that can be used to learn about different strategies for e-government at the local level. The model constitutes a first approach to model the two cases presented in this paper.

Figure 2 shows a high-level representation of LocalGovernment1. The model consists of four sectors: (1) human resources, (2) infrastructure development, (3) processes and standards, and (4) systems development.

Figure 2. Conceptual model of the core IT capabilities at the municipal level

Each of these sectors includes a number of accumulations, activities, and other variables relevant to each of them. The human resources sector include staff of the IT area, the rest of the City staff and three accumulations of knowledge (represented as experience measured in weeks): IT staff and non-IT staff, and knowledge of business processes in all agencies and ministries at the local level. Moreover, the model includes assumptions about continuity of staff every change of administration and also includes training processes. A final important element in this sector is the allocation of staff to carry out various tasks, such as systems development, training, planning, etc.

On the other hand, the infrastructure development sector includes the government infrastructure itself, as well as activities related to planning, budgeting, and building it. Infrastructure development is constrained by the amount of effort devoted to the creation and implementation of plans, as well as the amount of financial resources approved to build infrastructure. Similarly to the human resources sector, the change in government impacts project development and implementation every 3 years. That is to say, every change of government administration, projects have a high probability of being discarded by the new administration, which brings its own projects and priorities.

The standards and processes sector includes mainly the local government’s business processes, as well as the standards and processes of the IT
organization. All business processes are candidates in this conceptual model to be digitized, that is, to have information systems to support their development. These processes can be updated or not, which facilitates or hinders its digitization. IT processes and standards in the model follow an institutionalization process, which contributes to its continuity across administrations. Of course, the development of these processes and standards also requires effort, and depends on the productivity of the actors assigned to these tasks.

Finally, the model considers a sector related to systems development. Similar to the infrastructure sector, projects are planned and executed by staff in the IT area. As mentioned in both cases, its adoption depends on the knowledge that users have about the technologies and their use. Similar to other sectors, there is the need of effort of actors to develop system components. In addition, the model includes the assumption that projects are not completed because each project has a high probability of being disposed when the administration changes. There are a significant number of feedback cycles within each of the model sectors. Figure 2 only shows the main feedback across sectors.

In the present model, all activities are carried out with the effort available in the IT department, with the only exception of infrastructure acquisition. Staff effort is allocated to training, supporting the development of business processes, development and systematization of IT processes and standards, developing IT infrastructure projects, and systems development and maintenance. Financial resources for infrastructure projects are obtained through the approval of these projects. In the two cases, this approval process is carried out directly with the Secretary of Administration and the Mayor, so that the percentage of approved projects and resources can be considered as an indicator of support from the Mayor.

5.2. Model behavior

As part of the analysis of simulation models as the one presented in this section of the report, it is common to have a baseline scenario that is used as a reference to study the impacts of modifications to the model assumptions. So, we start this section presenting a base scenario created on the basis of conversations with local CIOs in Mexico. The base scenario assumes a consistent lack of continuity and limited support from the mayor. Thus, consistent with the cases studied, only unionized staff (50%) is maintained between various administrations, and only 20% of the projects survive the change of municipal administration. Support for infrastructure projects is limited, since in this baseline scenario is approved only half of the projects submitted, and only released 50% of resources for these projects. On the other hand, the IT department payroll amounts to 5 million pesos per year, which according to the market conditions in this simulated world, constitutes enough money to have a little more than 26 full-time employees or equivalent. This town has a total of 10,000 employees in other ministries, divisions and departments, and starts with a situation of very limited infrastructure and systems. Similarly, there is no documentation of the systems or processes and standards used. In fact, in both cases, managers in the IT area of the town described a situation quite limited in terms of infrastructure development, networks and systems to begin its work in the town, which makes these assumptions more or less realistic. Finally, the base case represents a municipality with a strategy mainly focused on infrastructure and systems development, a little less interest in maintenance and business processes, and no interest in people’s training and IT processes and standards.

It is important to note that the model runs for 15 years, and even when it is assumed that the CIO changes every 3 years, the new CIO keeps the same priorities and receives the same support consistently along the years. That is to say, every CIO and Mayor have the same values to the previous ones during the simulation.

Figure 3 shows the state of infrastructure at this local government during the 15 years of the simulation. Both graphs represent ratios of infrastructure available compared with infrastructure needed to support employees and digitized processes. In this way, a value below 1 represent lack of infrastructure, and values above 1 represents an excess of infrastructure. As it is shown in the figure, this local government starts with very little infrastructure. At the end of the 15 years, only 35% of personnel have enough computing and network resources. Considering the adequacy of infrastructure to support existing systems, the situation is a little better. Unfortunately, the graph trajectory reflects the poor development of systems in this local government. Oscillations in the graph respond to the adjustments and changes every three years both in personnel and IT projects.

Figure 4 represents systems development in the local government. As it is shown in the figure, the proportion of digitized process starts close to zero and grows to a little more than 25% by the end of 15 years. The figure also shows systems adoption, which starts close to 1, decreasing rapidly as a reaction to the creation of new systems. Adoption is slow mainly
because personnel have little knowledge about IT (see Figure 5). At the end of the simulation, 75% of systems are used by personnel. System adoption follows the creation of systems, and also suffers perturbations every 3 years as a consequence of the changes in administration. Finally, this local government starts with 50% of updated processes, finishing with about 48% of updated processes.

Average knowledge of IT personnel responds mainly to market conditions. Budget and salaries are enough to hire people with 2 years and a half experience (137 weeks). People learn on the job, but an important proportion of that new knowledge is lost every 3 years, keeping average experience around 147 weeks (see Figure 5). Both levels of knowledge show small oscillations every three years. Such oscillations are not well appreciated in Figure 5 mainly because of the y-scale.

In this base scenario, and given that there is no interest in IT processes and standards, such standards start and end the simulation with values close to zero (see Figure 6).

In order to test the impact of changes in model assumptions, we created two scenarios corresponding to each of the two cases included in the paper: Effort and Continuity. The case of Effort has 20% more resources to hire employees. Given that the rest of the variables remain the same, this local government has 20% more effort than the local government in the base case. The strategy selected also reflects the values of the Effort CIO, who favored people training and IT infrastructure and systems. However, this CIO had only a three year period, and he and all his people was changed with the change in local government administration. In contrast, Continuity is a local government in which, in spite of changes in the local government administration, the same CIO (and some of his staff) has given continuity to projects and programs. Moreover, this CIO identified the development of IT processes and standards as his main priority, followed by people’s training. This CIO left infrastructure as the third priority (see Table 1).

Figures 7 to 11 presents comparative results of some key variables across the three scenarios. Figure 7, for example, shows the adequacy of infrastructure to support systems development. Interestingly, the
The continuity scenario is the one with the best performance even though it is the scenario with fewer personnel. The main reason is the additional productivity of the IT personnel promoted by better processes and standards (see Figure 11).

Table 1. Conceptual model of the basic technological capabilities at the municipal level

<table>
<thead>
<tr>
<th>Variable</th>
<th>Base</th>
<th>Effort</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion of unionized IT workers</td>
<td>0.5</td>
<td>0.5</td>
<td>1</td>
</tr>
<tr>
<td>Probability of a project to continue between administrations</td>
<td>0.2</td>
<td>0.2</td>
<td>0.8</td>
</tr>
<tr>
<td>Probability of a process or standard to continue between administrations</td>
<td>0.2</td>
<td>0.2</td>
<td>0.8</td>
</tr>
<tr>
<td>Probability of an institutionalized process or standard to continue between administrations</td>
<td>0.5</td>
<td>0.5</td>
<td>0.8</td>
</tr>
<tr>
<td>Financial resources for IT personnel</td>
<td>5M</td>
<td>6M</td>
<td>4M</td>
</tr>
<tr>
<td>Emphasis on infrastructure</td>
<td>10</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Emphasis on training</td>
<td>0</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>Emphasis on systems design</td>
<td>10</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Emphasis on IT processes and standards</td>
<td>0</td>
<td>3</td>
<td>20</td>
</tr>
<tr>
<td>Emphasis on business processes</td>
<td>3</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Emphasis on maintenance</td>
<td>5</td>
<td>10</td>
<td>5</td>
</tr>
</tbody>
</table>

Figure 8 shows the average experience in the IT department. The effort scenario shows important variations in personnel experience. Each new CIO responds to the loss of experience by promoting training programs. Unfortunately, an important component of this experience is lost in the change of administration.

Digitizing processes and systems adoption are comparable in both scenarios. The continuity scenario shows a slightly better performance when compared to the effort scenario. These results suggest, consistently to the observed cases, that both strategies can have similar pay-offs. However, the continuity scenario results more efficient, given that it uses fewer human resources, and the same amount of financial resources to obtain similar results.

6. Concluding remarks

In this paper, we present a preliminary model of core IT capabilities for local e-government strategies.
Current results suggest that there could be different approaches that could potentially lead to similar results in terms of process digitalization and use, and to successfully deploy a robust infrastructure to support systems development and personnel. However, our results also suggest that continuity and an emphasis on IT processes and standards is a strategy that facilitates the efficient use of human and financial resources.

![Figure 11. Proportion of IT processes and standards in the three scenarios](image)

We will continue exploring and enriching the conceptual model presented in this paper. An important challenge remains in gathering appropriate data to test model validity beyond sensitivity tests and conceptual experiments like the ones described in this paper. However, we believe that the current results provide interesting lessons about local e-government strategies and future studies should attempt to understand the differences and similarities in terms of outcomes for additional scenarios (different combinations of core capabilities).

### 7. References


