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E-GOVERNMENT IN EXECUTION: BUILDING ORGANIZATIONAL INFRASTRUCTURE

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ABSTRACT

This paper presents a sub-framework detailing critical aspects of organizational infrastructure for e-government. According to an Accenture study performed in early 2001, Canada ranked first as a worldwide leader in e-government practices. However, the results of a survey of municipal e-government web sites in Canada illustrate how the absence of organizational infrastructure for e-government has resulted in very little diffusion across the country. We speculate that excellence in e-government can only become widespread if formal organizational infrastructure with its accompanying diffusion networks and mechanisms are put in place.

1. INTRODUCTION

Governments in many countries are providing a model for their citizens by becoming adopters of the network processes and technologies that enable convenient, cost-effective, online business-to-government, government-to-citizen, and government-to-government services. In other words, governments will be leading users of e-business opportunities. Most first-world governments have imposed deadlines, for example by 2004 in the case of the UK, as to when they expect to have at least half or most of their services online.

Personnel educated and experienced in information technology (IT) now have the unprecedented opportunity to make recommendations addressing the formation of IT policy, e-government strategy, and its execution. Although IT infrastructure has been present in government for the past several decades, new infrastructure is also required in terms of architecture that provides for interoperability across stakeholders, partnership among stakeholders, 24 x 7 availability, increased security, compliance to legislation (e.g. privacy, e-signature, e-procurement acts) and scalability.

This paper focuses on providing a sub-framework for organizational infrastructure in e-government. Briefly discussed in section 2 is an overall framework for e-government infrastructure. Section 3

details our suggested organizational infrastructure for e-government. The results of a survey of Canadian municipal web sites are provided in section 4, illustrating the need for formal organizational infrastructure for e-government. Section 6 provides a summary and concluding remarks.

2. A FRAMEWORK FOR E-GOVERNMENT INFRASTRUCTURE

Researchers of IT infrastructure commonly characterize two distinct but related components (1) technical IT infrastructure, and (2) human IT infrastructure (Broadbent and Weill 1997, Henderson and Venkatraman 1994). In this paper, we suggest that e-government infrastructure (see Figure 1) consists of three distinct but related components (1) organizational infrastructure, (2) business process infrastructure, and (3) and technical infrastructure. The framework provides a simplifying organization and identification of infrastructure issues for managing e-government deployment.

We focus on the strategic organizational infrastructure in this paper, and refer the reader to Craig and Jutla (2001), and Jutla (2002) for details on e-government business process and technical infrastructure groups. Technical infrastructure includes the common architectural framework advocating XML-based integration that allows different federal agencies, provinces, and municipalities to share data. In many places, privacy issues are yet to be resolved concerning this sharing of data.

3. ORGANIZATIONAL INFRASTRUCTURE

In this section, we focus on the organizational infrastructure sub-framework. We suggest that the organizational infrastructure for e-government consists of a partnership-based stakeholder network of networks, committee governance, a culture supporting citizen and government values focii, and performance measurement.

3.1. Partnership-based Stakeholder Network

e-Government occurs in a partnership-based setting (Jutla 2002, Craig 2001, Weatherbee 2000). Essentially, a partnership network enables us to aggregate and align capabilities, capacities, and resources for maximum value creation. The network should be built on consensus through leadership and sharing of a common vision. In practice, states or provinces, provincial and federal government agencies, community colleges, SME associations, industry associations, local boards of trade, government and university-managed business development centres, and private sector companies would be members. Since many of the candidate partners are already parts of networks or associations, (e.g. union of Nova Scotia municipalities) ideally a network to diffuse e-government would consist of a network of networks.

Opening communications and working channels among partners requires a knowledge-sharing mechanism among stakeholders at various levels in the public and private sectors. The entity responsible for setting up and maintaining the knowledge management/sharing mechanism plays a coordinating role in creating a value web that increases knowledge and innovation output, raises business and IT-based skill sets, promotes e-government practices, and prevents institutional amnesia at all levels of government.

The coordinating entity for the network of networks may be at a federal or national level, so that the infrastructure, and enabling mechanisms, such as for knowledge management, can be widely shared across states or provinces. Where this entity should be ideally housed is a question of government departments' allocation of responsibilities. Champions for countries' federal e-government efforts come from many different departments. In Canada, the Treasury Board Secretariat is in charge of e-government efforts. In the province of Nova Scotia, e-government is mainly being deployed through Services Nova Scotia and Municipal Relations and the Ministry of Public Works.

The entity that creates and maintains the partner-based network of networks for e-government diffusion is responsible for:

- (1) Coordination and hence alignment of strategies and tactics in e-government to transfer innovation to municipalities
- (2) Aggregation of resources, capabilities, and capacities of public and private sector infrastructure, human capital from local and state-level employees, public sector association employees, and private sector employees
- (3) Creation of new channels for communication among stakeholders for value creation
- (4) Building off and on social capital, a construct essential to the success of innovation networks (Cooke 1999)
- (5) Self- and external measurement of service success
- (6) Knowledge sharing and knowledge protection mechanisms such as sophisticated intellectual property proposals
- (7) Facilitating the creation of standards (e.g. for trust and regulatory infrastructure)
- (8) Aligning of local standards to national standards
- (9) Connecting municipalities with funding mechanisms
- (10) Strengthening the ability of municipalities to absorb new technologies
- (11) Keeping authoritative records on e-government activities

3.2. Committee Governance

Ideally, committee governance should be built on top of a diffusion network of stakeholders in e-government, such as the network described in section 3.1. Sensitivity to organizational culture and politics play a role in the effectiveness of IT infrastructure (Lee et al, 1995), and by extension, e-government infrastructure. Apart from a widespread diffusion mechanism for e-government best practices, committees can use a partner-based network to build consensus for cross-functional collaboration, aligned executive team function, and increased social capital. Social capital involves tangible assets of goodwill, fellowship, sympathy, and social intercourse (Hanifan 1920), and social relationships to promote or aid in the development of valued skills and characteristics (Cooke 1999).

We present a recommended committee governance infrastructure in Figure 2. In reality, there are many variations in committee governance. For example, some projects have a two tier executive committee, and no independent committee for validation and verification. Instead quality control is done through internal reviews.

In our more rigorous governance structure (Figure 2), each node plays a key role in laying the organizational infrastructure for e-government execution. At the top level, building on major stakeholder input, are the committees and councils for finance, risk management, policy, legislation, and information technology (see Figure 2). The finance committee determines how much money will be budgeted for e-government support. The risk management committee identifies e-government program risks, proposes strategies and methods to mitigate risk, and implements monitoring systems for risk. The e-government policy and legislative councils advise on target priority areas, complementary initiatives, and new laws that have implications on the deployment of e-government. The technology council advises on technology management issues towards modernization, sharing, collaboration, and performance of information resources in e-government.

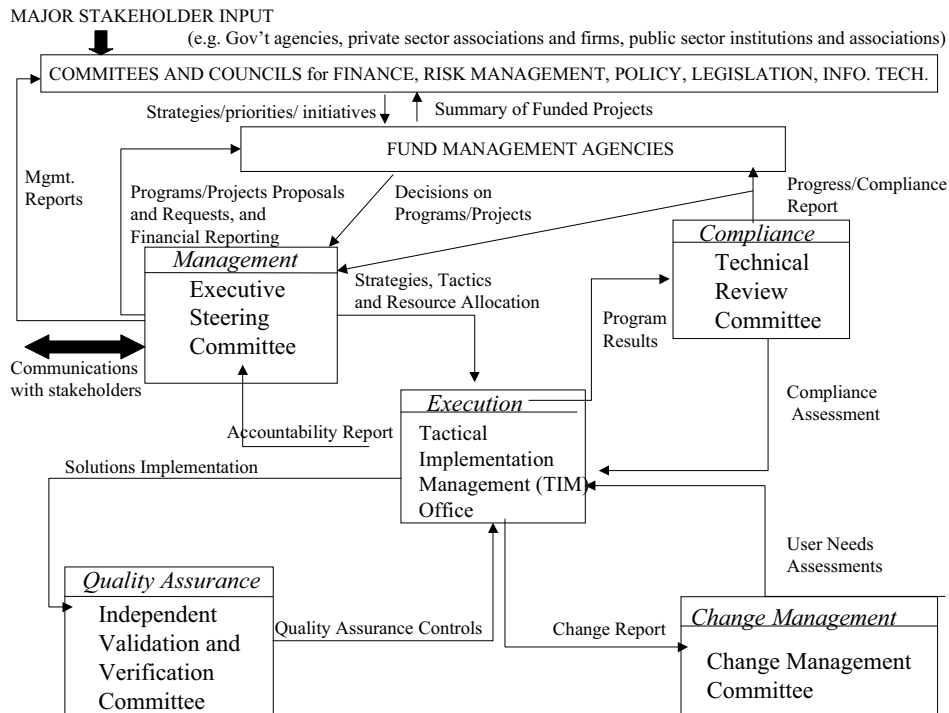


Figure 2. Organizational Committee Infrastructure for e-Government Deployment

Creating managerial strategic and tactical plans, approving e-government solutions, and deciding resource allocation for e-government projects are tasks of an executive steering committee (see Figure 2). This committee has input from risk management, policy, legislative, and capital budgeting offices for e-government projects. Managerial representatives from all government departments/agencies and senior private sector business partners provide experience in large IT infrastructure projects. Strategies for e-government on a federal level must be aligned with state or provincial and municipal strategies.

An oversight committee is required to conduct a standard compliance review of the e-government projects for the agency or agencies – this is normally referred to as a technical review committee. The members assess solution proposals and their implementation, ROI, and business and technical goal alignment. This committee ensures that business technologies and best practices are up-to-date and being followed. The committee normally consists of department and/or agency business and technical representatives, subject matter experts, consultants, and the chief architect for the government enterprise architecture.

Change management is the responsibility of another committee that assesses change requirements and monitoring changes to the government enterprise architectures due to newly identified citizen needs, new business requirements, technologies, laws, and opportunities.

A committee for tactical e-government execution oversees the e-government Tactical Implementation Management (TIM) office (see Figure 2). The committee works closely with the information technology council and is responsible for employing human resources with (1) technology management knowledge and skills, (2) business functional knowledge and skills, (3) interpersonal and management skills, and (4) technical knowledge and skills (Lee et al 1995). TIM houses the personnel (chief architect, business, systems, data, infrastructure, security architects and analysts) that executes and implements strategies and plans. The chief enterprise architect delivers the how-to plan that executes the overall e-government strategies for e-services. He/she is responsible for the architecture policies including technical, business, and legal compliance architectural policies. He/she also communicates usage of the overall enterprise architecture to stakeholders.

The independent validation and verification committee is a third party responsible for reviewing and reporting on whether the e-government projects and services meet standards of quality and accountability. Software, hardware, and role audits are performed.

In combination, these committees provide the infrastructure for the governance needed in successful e-government deployment. Structured governance along with a formal partnership-based network of stakeholders are expected to promote and accelerate widespread diffusion and uptake of best practices in e-government.

3.3. Creating a Culture for both Citizen Focus and Government Values in e-Government

A key piece of organizational infrastructure for e-government lies in changing internal government employee culture or the “way that things are done around here.” Over the last decade “reinventing government” has been in the forefront of governments in the US, Canada, tens of European nations, and many developing countries. In the US, Al Gore used Osborne (see Osborne and Gaebler (1992)) as consultant on his 1993 “Creating a government that works better and costs less: report of the National Performance Review “ publication. Osborne and Gaebler’s (1992) main themes for reinventing government lay in citizen-focus, privatization of bloated public services, and the reinstatement of the politics/administration dichotomy.

However history in government has shown that politics have never been successfully separated from bureaucratic administration. Problems arise in policy inconsistency for e-government across political parties, and employee accountability to political leadership. Yet, the benefits of the efficiencies in e-government are undisputed by all. Where government business processes are least influenced by politics, e-enabling is perhaps simplest.

When citizen demands drive service provision, civil servants need to balance the diverse needs of citizen demands through fair allocation decisions, political leadership, and public law. Such balance can alleviate a few of the concerns of critics of reinvention such as Kellough (1998), and Kearney and Hays (1998), who show that when government is driven by themes such as privatization, the goals and values of government (e.g. equity, neutral competence, professionalism) are weakened. The oversight that government implements to manage privatization of public services, or partnership with the public sector to deploy e-services, require further human infrastructure in terms of skill sets and also additional legislative and executive infrastructure. At a more detailed level, contract, project, and program management skills are being increasingly required of government employees.

Committee governance and strategies may advocate balanced government and citizen focii, but real adoption and implementation of any new or changed focus requires pro-active organizational measures. Reward measures must be created to effect the cultural changes required to host e-government. Table 1 catalogs some of the required changes.

Pay-for-performance mechanisms are not working because many governments, including the US, Canada, and some within the European Union, have failed to secure funding to carry through with pay-for-performance promises (Kearney 1998). In 1998 in Canada, the Department of National Defence promised their geographically based land force areas that if they managed a 2% savings within a fiscal year through prudent management practices that the savings could then be carried forward to the next fiscal year. Two of the four affected agencies overspent by 2 %, one saved 1 % and the fourth 2 %. The central system proceeded to claw-back the regional 3% in savings to service the overall central debt. The central system failed to reward prudent managerial practices leading to cynicism for those who placed their faith in the reward structure. Anecdotally, in the following years, regional savings were never again repeated. We suggest that educating and aligning the committee governance infrastructure, particularly influential stakeholders such as government funding agencies and capital investment committees, to share tactical vision as well as strategic vision is necessary for e-government success.

Table 1. Cultural Change Management for e-Government

e-Government driven change	Description
Move to multi-tier partnerships	<p>Most governments have multi-tier structures at central, state or provincial, and local or municipal levels. Communication channels have mainly been one-way. The needs of municipal and local governments can be more easily heard and acted on with 2-way channels</p>
Move to cross-agency partnerships	<ul style="list-style-type: none"> • Cross agency corporation facilitates one-stop complete services for citizens. Citizens want one look and feel across agencies, while each agency traditionally wants to differentiate its look.
Move focus from the functional to relationship building	<ul style="list-style-type: none"> • Raise level of importance of citizen information storage/capture to enable citizen knowledge management (KM) activities. • Incent KM activities. • Add support staff to facilitate information and knowledge capture.
Move to consistent interfaces for services provided by individual states or provinces or counties	<ul style="list-style-type: none"> • As citizens move from Nova Scotia to British Columbia, or from New York to California, they should recognize any e-government service delivered in any province/state by the same consistent naming and the same look and feel.
Move from mass-customization to personalization	<ul style="list-style-type: none"> • Governments normally try to find one solution to fit the masses as opposed to treating citizens as individuals. CRM technology will be key in helping governments move towards segmentation and personalization. Government wants one mass approach, citizens want to be treated as individuals
Introduce new incentives to reward government employee roles and their work in workflow redefinition	<ul style="list-style-type: none"> • In government, revenue is usually returned to a general fund as opposed to the organization that generates the savings. Find new ways to reward agencies/employees implementing revenue-creating or cost saving programs.
Reward risk-taking more	<ul style="list-style-type: none"> • Most governments punish risk takers in government. However successful projects may be built on the foundation of failed projects. Lessons are learned from failed projects and should be kept in government memory.

3.4. e-Government Performance Measures

Finally, metrics (see Table 2) should be interwoven in the e-government organizational infrastructure so that assessments can be made and improvements identified. Infrastructure should be adaptable, responsive, and flexible. Towards sustainable infrastructure, metrics aid in developing an environment of continuous self-assessment, learning, and improvement. The metrics provided in table 2 are merely a list of rough-grain constructs, and much work is required still to define the constructs, test, and scientifically validate them at this level.

Table 2. Proposed metrics for organizational infrastructure for e-government

Presence of an organizational infrastructure for e-government	Presence of an e-government technical interoperability framework
Degree of completeness of the organizational infrastructure	Effectiveness of the organizational infrastructure
Ratio of partners to potential partners in the stakeholder network	Ratio of human capital / desired human capital
% of online services	Degree of inter-agency integration
% of high-cost processes that are non-automated	Usage of key performance measures
% of successful e-government programs	% of provincial-federal system integration
Comprehensiveness of human performance appraisal systems	Reward ratio for risk taking

Much better understood are the metrics for the downstream services that the e-government infrastructure supports. Many of these metrics come from literature (e.g. Bittner 2000, Brown 2000, Cronin 2000, Davis 1998, Jutla 2001a) on business-customer interaction.

Table 3. Metrics for Government e-Services

% of automated processes	Elevation and transfer rate E-mail response system availability
Abandonment rate	Knowledge access index
Accuracy rate	Non-chargeable call duration
Average response time	Number of incident reports per product
Call duration	Number of calls before a problem is resolved
Chargeable call duration	Personalization index
Chargeable/non-chargeable service problem ratio	Product or service knowledge levels
Community index	Partner loyalty and satisfaction indexes
Customer feedback availability	Customer loyalty and satisfaction indexes
Customer retention ratio	
Customer satisfaction level	

In summary, we have highlighted four critical components of organizational infrastructure for e-government in this section. We advocate that organizational infrastructure should be in place at the national or federal level as well as complements of lesser and lesser scale at the state, provincial, and municipal or local levels.

4. WHAT CITIZENS ARE GETTING: THE CASE OF AN E-GOVERNMENT LEADER

In January 2001, Canada was ranked as number one in a comparison study of e-government practices (Accenture 2001). The Accenture study covered 22 countries with surveyors role-playing as citizens and businesses to execute 165 government services in each country over the Internet. Only 5 of the services were categorized as transaction-based; all others were informational. The focii were on human services, justice and public safety, revenue, defense, education, administration, transport, regulation and democracy, and postal sectors.

However much of the organizational infrastructure as described in this paper is missing in most Canadian provinces, and municipalities. Canada has a public-private sector network (e.g. Canadian Roundtable) anchored in the province that hosts the capital city, has not addressed widespread cultural change in its public sector, and more than 40% of government agencies do not use metrics. There is a public sector CIO council (PSCIOC), and an information management group within the council that is preparing a common information management framework for e-government deployment. The federal CIO was appointed in 2000. Several provinces do not yet have formal CIOs.

In this context, we did a survey to determine how widespread were the visible results of e-government efforts in Canada. A random sample of Canadian municipal web sites for municipalities with populations of under 100,000 were reviewed for content. The main features and services were cataloged according to informational, transactional, and links to businesses, religious organizations, communities, other government areas, and partnering municipalities. Table 3 below summarizes the information and services provided on a percentage basis for the sample of municipal web sites.

Table 3. A Percentage Summary of Information and Services

Web Site Features	Canadian Sample Including NS	
	Quantity	% Of Web Sites
Information:		
Political	144	94.12%
Geographic	147	96.08%
Business	141	92.16%
Tax	119	77.78%
Tourism	145	94.77%
Lic./Permits	115	75.16%
411	34	22.22%
Utilities	114	74.51%
Environmental	113	73.86%
Social Issues	97	63.40%
Police	92	60.13%
Departmental	128	83.66%
Contacts	139	90.85%
Contacts E-mail	126	82.35%

Web Site Features	Canadian Sample Incl. NS	
	Quantity	% Of Web Sites
Information		
Health Care	94	61.44%
Bilingual	17	11.11%
Fee Payments		
Property Tax	2	1.31%
Pet/Other Lic.	2	1.31%
Traffic/Parking Fine	5	3.27%
Local Links		
Business	103	67.32%
Religious	18	11.76%
Governmental	90	58.82%
Media	21	13.73%
Aligned Localities	5	3.27%

Discussion of Findings

The survey results indicate that only 1.31% of Canadian municipalities provide online payments for municipal transactions, illustrating how isolated the cases of excellence in e-government are in Canada. Such excellence was found in the online payments area in the remote town of Campbellton in the Atlantic province of New Brunswick with a population of only 8400. Campbellton (www.campbellton.org) provides online payment options to its community with seamless electronic transfer of funds to the city's accounting system and bank account.

In an interview with key personnel from Campbellton, we discovered that the city treasurer in Campbellton championed e-government throughout a turnover of five mayors over 6 years, teaching each mayor about the benefits of e-government. Apart from admirable persistence, the city treasurer was able to show the value of e-government immediately through use of an electronic accounting package. Instead of costing the municipal government \$500.00 dollars to discover how much had been paid for a ten-dollar hammer after a taxpayer made such an enquiry, the system was able to produce any required information at very low costs. Accountability became cheaper.

The mayor used e-government as a retention mechanism for employees in the municipal government. Here is an exciting project whereby the employee gets more responsibilities, and some monotonous details are absorbed by the information system. New communications channels were opened to private sector partners. Employees were given business cards and the responsibilities to service questions from partners.

Campbellton started from scratch, employed best practices such as partnership with private sector that had the technological know-how, and accomplished deploying transactional e-government services. The extra human effort to explain the business processes within the municipal domain to private sector came from volunteerism on the part of three or four employees loyal to their community and to the value of electronic systems.

The city's water and sewer bills are produced electronically by Canada Post. It saves the city 3 and a half person days and 3 cents on each stamp. The next step is for Canada Post to add online bill presentation to Internet-connected customers; at that time Canada Post will charge less than the 43 cents for payment of bills electronically. The city entered into an agreement with Services New Brunswick (SNB) to provide the engine for web payments and to use part of SNB over-the-counter infrastructure in Campbellton as a point of sale. Since October 2000, almost a third (2786) of the total city transactions (15000) are done in partnership with Services New Brunswick in either over-the-counter and web payments. As a result, the city cashier's business hours were reduced by 3 hours per day, and the converted savings were used to assist senior managers to improve efficiencies. The city's accounting application (ACCPAC), fully integrated with e-commerce applications, is to be marketed, in partnership with private sector, to other municipalities. The package being sold includes consulting, training, and implementation services.

Campbellton pushed ahead with e-government deployment and experienced high costs in terms of personnel time to create new partnerships, evaluate private sector partners, and describe business processes whilst doing so. If Canada had the proper organizational infrastructure in place, small municipalities, and a greater number of them, could simultaneously benefit from e-government without experiencing such costs. Note that our survey found that the national average for municipalities that visibly work together or partner in Canada on their Web channels is 3.27%. Now occurring are separate and diverse attempts by municipalities to engage various private sector organizations to help deploy local e-government. The result will be non-standard solutions, with business and technical interoperability challenges for working with other municipal systems, the province/state, and federal government information systems.

In this ad-hoc approach to e-government, the private sector is engaged to supply business/technical solutions for individual clients. The private sector also gains in having a pilot site with an e-government domain solution to show for further business development purposes. Particularly evident is the telecom industry interest in hosting e-government domain solutions. Competition in private sector companies does not allow for setting of interoperability standards, or creating costs amortization benefits on a wide-scale basis. Governance for e-government deployment is clearly needed to align the private sector on infrastructure issues such as legal, business and technical interoperability of proposed information systems.

6. RELATED WORK

The research that most closely resembles organizational infrastructure for e-government is that on human IT infrastructure. According to Henderson and Venkatraman (1993) and Broadbent et al (1996, 1999), human IT infrastructure includes organizational structures, human and organizational skills, knowledge, commitments, values, and norms. Byrd and Turner (2000) measure the flexibility construct for human IT infrastructure, but focuses on IT personnel flexibility. Very little attention has been placed on measuring flexibility or impact of the organizational structure component of human IT infrastructure. Lee et al (1995) provides a complementary human IT infrastructure framework that identifies what knowledge and skills are required for IT infrastructure to be effective. Lee grouped the skills into (1) technology management knowledge and skills, (2) business functional knowledge and skills, (3) interpersonal and management skills, (4) technical knowledge and skills. The four groups can be translated easily to the skills required in the e-government infrastructure domain.

The MAPIT (2001) report identifies 6 key areas for action for e-government deployment in the United Kingdom that human IT infrastructure address: (1) help local government to develop a strategic focus on the agenda, (2) extend awareness of what is possible, (3) disseminate government best practice, (4) support research and development, (5) extend e-government knowledge and learning, and (6) sustain the development of an e-infrastructure for local government. The partnership-based stakeholder network component of this paper's proposed organizational infrastructure addresses all points in the MAPIT report. The committee governance aspect particularly addresses point (1).

Elsewhere, in Virginia in the US, a programme called the Digital Dominion has a description of a stakeholder approach using a "triangle of local stakeholders – citizen, local and state governments and industry.... using a partnership approach to overcome, by sharing knowledge, expertise, and infrastructure, the capacity problems and lack of mechanisms for the smaller townships to participate in the debate, the learning, and the delivery of e-government." The approach is valid – adding in universities and research institutions in the partnership network would also address points (4) and (5) in the MAPIT report, and would represent a more rounded network for organizational infrastructure. Jutla (2001b) describes a stakeholder approach to creating e-business strategy, many elements of which are applicable to creating e-government strategy.

With an economic development focus, Weatherbee (2000) builds a case for a partner-based network among government agencies, education and research sectors, SME associations, industry associations, and SMEs themselves to effect e-business adoption in SMEs. E-government infrastructure networks may also absorb the Weatherbee network as economic development is part of local governments' mandate.

A comprehensive list of metrics for governance can be found in Craig and Jutla (2001), and Jutla et al (2002). Listed are market dislocation, workforce education, localization, clusters, access, e-business education, jurisdiction, liability, intellectual property, dispute settlement, taxation, privacy, trust, e-business architecture, and accessibility constructs.

7. SUMMARY AND CONCLUSIONS

A 2001 Accenture study ranked Canada as a leader in e-government along with a cautionary note that this country can easily lose the number one position as many processes were still not e-enabled or integrated. While, in early 2001, the ranking may be deserved at the federal level, Canada has failed to diffuse their federal advances in e-government to the provincial and municipal levels. As shown in our results, municipal efforts at e-government occur in silos.

This paper suggests that formal organizational infrastructure should be put in place for widespread deployment of e-government. A stakeholder-based partnership network of networks, committee governance, culture change management, and performance measures are needed. We advocate that the organizational infrastructure should be in place at the federal level, as well as localized infrastructure replicas of lesser scale at the state/provincial, and local or municipal levels to successfully deploy e-government. Governments should not depend solely on the private sector to drive diffusion of e-government. Interoperability among agencies, provinces, and municipalities is at stake with such an approach. So are inefficient use of scarce time and resources that private sector competition often encourages.

Challenges around creating organizational infrastructure include (1) the lessening roles of the public civil servant in areas requiring due process and governance from experts trained in legislature, (2) the inability of governments to fund or pay-up on pay-for-performance mechanisms, (3) interjurisdictional issues across partnerships, and (4) the last mile – widespread citizen adoption.

Future work on organizational infrastructure include building a formal predictive model for estimating the impact of organizational infrastructure in e-government in terms of constructs such as flexibility, penetration ability and maturity of service delivery.

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